

Crimes in Space: A legal and criminological approach to criminal acts in outer space

Julian Hermida*

Introduction

Long term-human living endeavours in outer space play a significant role in the new space scenario that emerged with the end of the Cold War. The International Space Station is the most visible and one of the most ambitious and transcendental projects of human settlements in outer space. Due to isolation conditions and a hostile outer space environment, it is expected that there will be a high rate of criminal and deviant conflicts in any long-term human endeavour in outer space, as has been corroborated in recent multi-culturally diverse space experiences. All these conflicts will have enormous legal, criminal justice and criminological implications.

First, this article briefly examines the approach adopted by the International Space Station to deal with criminal behavior as an example of criminal justice and criminal law solutions in outer space. The issues and criminal implications raised with respect to the International Space Station may be extended to other outer space habitability experiences. Second, it recounts a habitability experience

criminal acts. Then, it analyzes the most significant criminological theories to see which one -if any- may be applicable to criminal and deviant behaviour in outer space. The guiding hypothesis of the article is that the unique characteristics of the space environment, together with the exceptional social factors of all involved actors, demand new and specific theories to explain criminal behavior in outer space. Its ultimate goal is to provide an arena for further discussion on alternative explanations and solutions to criminal problems in outer space.

The International Space Station

The International Space Station, located in low-earth orbit at an altitude of approximately 386 kilometers in outer space, constitutes the first permanent civil settlement of human beings in outer space¹. With its multi-use character, it is expected to enhance the scientific, technological, and commercial use of outer space².

The International Space Station emerged as US project to maintain leadership in space³. It began as project under Ronald Reagan's

¹ Andre Farand, *Space Station Cooperation: Legal Arrangements*, in Gabriel Lafferandier & Daphne Crowther (eds.) *Outlook on Space Law over the next 30 years* (1997) 125.

² Lara L. Manzione, "Multinational Investment in the Space Station: An Outer Space Model for International Cooperation?" (2002) 18 *Am. U. Int'l L. Rev.* 507, 509.

³ Rochus Moenter, "The International Space Station: Legal Framework and Current Status" (1999) 64 *J. Air L. & Com.* 1033.

* Assistant Professor, Dalhousie University, Ph.D. (UCC), LL.M., (McGill), DCL (McGill).

administration⁴ –called Space Station Freedom- to maintain US power and leadership in outer space⁵. Due to severe criticism and very high costs, it was temporarily abandoned. With the end of the Cold War, the United States was concerned that new Russian authorities would sell space related equipment to enemy states and terrorist organizations⁶, so the United States re-floated the space station project. This time its main objective was for the United States to have the Russian space program under tight control⁷. So it rallied its European allies and Japan and embarked them, together with Russia, in this new –and more expensive- version of the original space station⁸.

Thus, the United States government reserved for itself a central role in the management and coordination of the International Space Station⁹. Additionally, the United States, together with Russia, is in charge of the production of elements which serve as the foundation for the international Space Station¹⁰. The European states and Japan have been entrusted with the production of relatively minor –but very expensive- elements and Canada’s contribution is mainly in the robotics field, with the construction and operation of the Canadarm¹¹.

As originally designed, the International Space Station consists

⁴ Marcus Lindroos, “The Space Shuttle docks with the International Space Station” Encyclopedia Astronautica <http://www.astronautix.com/craft/intation.htm> accessed August 16, 2004.

⁵ Agreement Among the Government of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan (GOJ), and the Government of Canada on Cooperation in the Detailed Design, Development, Operation, and the Utilization of the Permanently Manned Civil Space Station, done Sept. 29, 1988.

⁶ Ashe, III, Space Station Alpha: International Shining Star or Legal Black Hole?, 9 Temp. Int’l & Comp. L.J. 333 (1995).

⁷ Marcia S. Smith, “Space Stations” <http://www.fas.org/spp/civil/crs/93-017.htm> accessed August 6, 2004.

⁸ Agreement among the government of Canada, governments of Member States of the European Space Agency, the government of Japan, the government of the Russian Federation, and the government of the United States of America concerning Cooperation on the Civil International Space Station, Jan. 29, 1998, 1998 U.S.T. Lexis 212 in reprinted in 4 United States Space Law: National & International Regulation,

§ II.A.22 (Jan. 1989). Brazil later joined the ISS <<http://www.spacelawstation.com/spacestation.html#3>> accessed August 18, 2004.

⁹ IGA, article 1.2. “The Partners will join their efforts, under the lead role of the United States for overall management and coordination, to create an integrated international Space Station.” Article 7.2. “. The United States, acting through NASA, and in accordance with the MOUs and implementing arrangements, shall be responsible for management of its own program, including its utilization activities. The United States, acting through NASA, and in accordance with the MOUs and implementing arrangements, shall also be responsible for: overall program management and coordination of the Space Station, except as otherwise provided in this Article and in the MOUs; overall system engineering and integration; establishment of overall safety requirements and plans; and overall planning for and coordination of the execution of the overall integrated operation of the Space Station.”

¹⁰ IGA, article 1.2. “The United States and Russia, drawing on their extensive experience in human space flight, will produce elements which serve as the foundation for the international Space Station”.

¹¹ IGA, article 1.2.

of several pressurized modules where a crew of seven astronauts can live and conduct scientific experiments¹². When fully completed, it will have six labs, two habitation modules and two logistics modules in a total area of 110m across and 95m long¹³. It will have a frame, labs and living areas, water and power systems and places to park space vehicles in various docking stations¹⁴. Recent budget cuts motivated by a change in US space policy reduced the capability to 4 astronauts¹⁵.

It has been characterized as a kind of condominium, where partner states share the expenses of common services but retain control of their own individual modules¹⁶. Utilization rights of these working and living modules are derived from the contribution of each partner¹⁷. In general, any partner state that provides Space Station user elements retains use of those elements, except that partners which provide infrastructure elements needed to operate and use the Space Station, such as Canada's Canadarm, receive

in exchange a fixed share of the use of some user elements¹⁸.

The International Space Station is the most inhabited object in outer space. Nearly twenty five percent of all astronauts sent into outer space since the beginning of the space age in 1957 have visited the ISS¹⁹. Furthermore, it has attracted the first space tourists, including multimillionaire Dennis Tito²⁰. The ISS is also open for commercial utilization by private companies. Most of the ISS partners are actively encouraging private companies to utilize their modules in the ISS²¹. Also, Partner states may invite third states to conduct experiments and carry out commercial activities in the ISS. This results in a mosaic of multiple social interactions and relations in outer space, with the possibility of numerous deviant and criminal events²².

Criminal and deviant behavior in outer space

Both the United States and Russia have conducted a series of experiments in space and on earth aimed at testing human responses to

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<http://www.estec.esa.nl/spaceflight/inissint.htm>

¹³ Rochus Moenter, "The International Space Station: Legal Framework and Current Status" (1999) 64 J. Air L. & Com. 1033.

¹⁴ Lawrence S. DeLucas, International Space Law, (1996) 38 Acta Astronautica 613.

¹⁵ NASA cuts back plans for space station, July 24, 2004.

¹⁶ Amy Otchet, "Space law lifts off for a new odyssey", UNESCO Courier, 1999.

http://www.unesco.org/courier/1999_06/uk/plane/te/txt1.htm.

¹⁷ IGA, article 9.

¹⁸ IGA, article 9.1.

¹⁹ International Space Station, Wikipedia Encyclopedia,

http://en.wikipedia.org/wiki/International_Space_Station accessed August 20, 2004.

²⁰ Alice Lagnado, Space tourist returns from \$20-million trip to paradise, The Vancouver Sun. Vancouver, B.C.: May 7, 2001 at A.5.

²¹ <http://www.estec.esa.nl/spaceflight/inissint.htm>

²² Marcia S. Smith, "Space Stations" <http://www.fas.org/spp/civil/crs/93-017.htm> accessed August 6, 2004.

isolation conditions in outer space²³. One of the most notorious examples is the experience conducted by the Russian Institute of Biomedical Problems in 1998 and 1999²⁴. In this experience, seven male astronauts of Russian and Japanese nationalities and a female Canadian astronaut – Judith Lapierre – spent 110 days aboard a replica of the Mir space station. Astronauts conducted several scientific experiments for different agencies and the Institute of Biomedical Problems analyzed the astronauts' adaptability to a space-like environment²⁵.

The experiment attracted international attention as several crimes were committed in the station. Two Russian astronauts committed battery, assault and attempted murder and one of them – the Russian commander – also sexually assaulted and harassed Judith Lapierre²⁶. Russian officials tried to minimize these incidents but the Canadian reaction against the

sexual assault virtually derived in a diplomatic conflict²⁷.

At several occasions during the 110-day experiment, Judith Lapierre reported that she feared she would be sexually attacked²⁸. However, Russian authorities did nothing to protect her, in part because they were interested in studying human reaction, including criminal and deviant behavior, to isolation in outer space²⁹. On New Year's Eve of 1999 after several weeks of living in isolation, the Russian commander – visibly drunk – dragged Judith Lapierre, who was then 32 years old, into a hallway, violently kissed her in the mouth twice, touched her body and forced into her trying to have sex with her³⁰. Previously, that same day the Russian commander – non sexually – assaulted another Russian male astronaut which resulted in two injured astronauts³¹. A Japanese astronaut intervened to separate both of them and left the experiment soon afterwards because tensions as well as verbal and non

²³For an analysis of criminological and criminal justice issues in outer space see J. Hermida, *Norms governing launch services by NASA and commercial US private companies*, (Ph.D. Thesis, Catholic University of Cordoba, 2000).

²⁴Canadian decides to stay in Russian space study despite harassment, Tuesday, March 28, 2000

http://www.canoe.com/CNEWSSpace0003/28_la_pierre.html accessed August 3, 2004.

²⁵ Experiment could have stopped, agency says: Unwanted sex advances by Russian were noted, *The Gazette*. Montreal, Que.: Mar 26, 2000, at A.5.

²⁶Catherine Ford, Culture of inequality plagues Russia, *Daily News*. Halifax, N.S.: Apr 14, 2000, at 16.

²⁷ Brad Evenson Reporting harassment will help future crews: *Canadian National Post*, Apr 11, 2000, at A.10.

²⁸Malcolm Gray, "A space dream sours" *Macleans*. Vol.113, Iss. 16; Toronto: Apr 17, 2000, at 26.

²⁹Malcolm Gray, "A space dream sours" *Macleans*. Vol.113, Iss. 16; Toronto: Apr 17, 2000, at 26.

³⁰Graeme Hamilton, Sex harassment claim hurts career: astronaut: 'I didn't play the game': Commander's kiss simply a New Year's greeting, Russians say, *National Post*. Don Mills, Ont.: Apr 4, 2001, at A.11.

³¹Experiment could have stopped, agency says: Unwanted sex advances by Russian were noted, *The Gazette*. Montreal, Que.: Mar 26, 2000, at A.5.

verbal aggression made life impossible for him³². At a later day, another Russian astronaut had to hide the knives in the station's kitchen because the same two Russian astronauts that had fought previously threatened to kill each other and were about to stab each other to death³³.

These were not isolated incidents. Although kept highly confidential, similar deviant acts occurred in other outer space missions³⁴. Because of its proportions and the attention it received in the media³⁵, the 1999 incidents influenced the negotiation and drafting of the Code of Conduct for the International Space Station and shaped the criminal justice response envisioned for dealing with criminal incidents in the International Space Station. These incidents show that human missions and settlements in outer space are very likely to have a significantly high degree of occurrence³⁶.

³² Joanne Laucius, *Women may be from Venus, but they can't go to Mars: Female space travellers increase 'probability of conflicts': Russian official* *The Ottawa Citizen*. Ottawa, Ont.: Jun 10, 2001, at A.1.FRO

³³ Joanne Laucius, *Women may be from Venus, but they can't go to Mars: Female space travellers increase 'probability of conflicts': Russian official* *The Ottawa Citizen*. Ottawa, Ont.: Jun 10, 2001, at A.1.FRO

³⁴ Patrick D. Nolan & Marilyn Dudley-Rowley, "Effects of Organizational Structure on the Behavior and Performance of Polar and Space Work Teams" (2000) *American Sociological Association (ASA)*.

³⁵ Liz Jefferson, *Why do we ignore Lapierre's harassment?* *The Ottawa Citizen* Ottawa, Ont.: Mar 30, 2000 at A.13.

³⁶ For a sociological analysis of sex and gender in space, see Lisa Jean Moore and Monica J. Casper, "Lust in Space: Sexuality and Gender on

The International Space Station approach to criminal jurisdiction

Criminal jurisdiction

In view of the unique and unprecedented nature of the ISS and in part influenced by the events and experiences examined above, the partner states established clear rules for the exercise of criminal jurisdiction³⁷, which deviates from the general jurisdiction regime consecrated in the *Corpus Juris Spatialis*³⁸. The general principle for jurisdiction, including criminal jurisdiction, in outer space is that the state of registry exercises jurisdiction over the space objects recorded in its national space registry and the persons on board these objects, regardless of their nationality³⁹. The Outer Space Treaty establishes that "a State on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body"⁴⁰. The Registration Convention elaborated upon this principle and structured a dual system of national and

the Final Frontier" (1994) *American Sociological Association (ASA)*.

³⁷ Stacy J. Ratner, "Establishing the Extraterrestrial: Criminal Jurisdiction and the International Space Station" (1999) 22 *B.C. Int'l & Comp. L. Rev.* 323.

³⁸ J. Hermida, *Norms governing launch services by NASA and commercial US private companies*, (Ph.D. Thesis, Catholic University of Cordoba, 2000).

³⁹ Outer Space Treaty, article VIII.

⁴⁰ Outer Space Treaty, article VIII.

international registration⁴¹. Thus, the registration of an object in the national registry secures jurisdiction, including criminal jurisdiction, and control over that object in outer space and its personnel⁴².

In the International Space Station agreement, states opted for the registration of each contributed element in a separate way and therefore each partner registers as space objects the flight elements which it provides.⁴³ In the case of a joint endeavor, such as the ISS, the Registration Convention authorizes the state of registry to reach an agreement with the rest of the launching states for the application of a certain area of the law of a state other than the state of registry⁴⁴. In the International Space Station Agreement all launching states, i.e., the partner states, made use of this faculty and agreed on a specific mechanism for the exercise of

jurisdiction and control in the criminal law realm.⁴⁵

Thus, instead of resorting to the general principle of space law jurisdiction⁴⁶, Canada, the European Partner States, Japan, Russia, and the United States have opted for a criminal jurisdiction system where the right to exercise criminal jurisdiction lies, in principle, in the state of nationality of the perpetrator⁴⁷. This reflects a very traditional approach to criminal jurisdiction under international law⁴⁸. Thus, a partner state may exercise criminal jurisdiction over personnel who are their own nationals irrespective of where the perpetrator is located, i.e., in its own module or in another partner's module.⁴⁹ Thus, for example, if a Canadian astronaut commits a crime in a US module, Canada and not the United States will have primary criminal jurisdiction over the Canadian astronaut.

The IGA has also adopted –albeit in a limited fashion– the doctrine of passive personality⁵⁰. Thus, in case

⁴¹ A. A. Cocca, "Registration of Space Objects", in N. Jasentuliyana & R.S.K. Lee eds., *Manual on Space Law* (New York: Oceana, 1979) at 180.

⁴² M. A. Ferrer, *Derecho Espacial* (Buenos Aires: Plus Ultra, 1979) at 282.

⁴³ IGA, article 5. European states further delegated this responsibility to the European Space Agency.

⁴⁴ Registration Convention, article II.2 "Where there are two or more launching States in respect of any such space object, they shall jointly determine which one of them shall register the object in accordance with paragraph 1 of this article, bearing in mind the provisions of article VIII of the Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies, and without prejudice to appropriate agreements concluded or to be concluded among the launching States on jurisdiction and control over the space object and over any personnel thereof."

⁴⁵ J. Hermida, "Space Registry" (1996) 24 *International Business Lawyer* at 383.

⁴⁶ Julian Hermida *Legal Basis for a National Space Legislation* (Dordrecht, Boston, and London: Kluwer Academic Publishers, 2004) at 61.

⁴⁷ Stacy J. Ratner, "Establishing the Extraterrestrial: Criminal Jurisdiction and the International Space Station" (1999) 22 *B.C. Int'l & Comp. L. Rev.* 323.

⁴⁸ Covey T. Oliver et al., *The International Legal System* 133-35 (4th ed. 1995, at 165).

⁴⁹ IGA, article 22.1.

⁵⁰ Andrew J. Young, *Law and Policy in the Space Stations' Era* 152-53 (1989).

of misconduct on orbit that: (a) affects the life or safety of a national of another Partner State or (b) occurs in or on or causes damage to the flight element of another Partner State, the Partner State whose national is the alleged perpetrator has the primordial –but not entirely exclusive– right to exercise criminal jurisdiction⁵¹. If it decides to exercise it, then it preempts the right of the affected state. However, the affected state may concur in the exercise of such jurisdiction⁵². The only possibility that the affected state has to exercise criminal jurisdiction in an exclusive way is if the state of nationality of the perpetrator fails to provide assurances that it will submit the case to its competent authorities for the purpose of prosecution⁵³. This clearly shows a profound mistrust of each state vis-à-vis its other partner states, for all partners have orchestrated a system where each state's own nationals will –in principle– be tried by its own prosecutors, before its own courts and according to its own substantive and procedural law.

Additionally, the IGA does not specify how concurrent jurisdiction will be exercised. Under international law, there are several instances of concurrent criminal jurisdiction between two or more

states. Since there is no customary international law on how to deal with conflicts that may arise between states regarding concurrent jurisdiction, in general these issues are regulated by treaty law⁵⁴. So, for example, in the area of offenses committed by US forces stationed abroad, a specific treaty regulates which state has priority in the exercise of criminal jurisdiction⁵⁵. This is not the case in the IGA, so in the event of the commission of one of the crimes that may be subject to criminal jurisdiction there are no norms which may specify how to resolve potential conflicts arising from the concurrent criminal jurisdiction.

Code of conduct

The International Space Station Agreement's provisions on criminal jurisdiction have been complemented by a Code of Conduct⁵⁶. ISS crewmembers are subject to additional requirements, such as the ISS Flight Rules, disciplinary policy, and requirements imposed by their Cooperating Agency or those

⁵¹ IGA, article 22.2.

⁵² The IGA is silent as to how to implement in practice this concurrent jurisdiction. Stacy J. Ratner, "Establishing the Extraterrestrial: Criminal Jurisdiction and the International Space Station" (1999) 22 B.C. Int'l & Comp. L. Rev. 341.

⁵³ IGA, article 22.2(2).

⁵⁴ Mark R. Ruppert, "Criminal Jurisdiction Over Environmental Offenses Committed Overseas: How to Maximize and When to Say No" (1996) 40 A.F. L. Rev. 1.

⁵⁵ Agreement between the Parties to the North Atlantic Treaty regarding the Status of Their Forces, June 19, 1951, 4 U.S.T. 1792, 199 U.N.T.S. 67, article II.

⁵⁶ Article 11 of the IGA provides that each partner in exercising its right to provide ISS crew must ensure that its crew members observe a Code of Conduct for the maintenance of order and conduct of crew activities in or on the Space Station.

relating to the space launch vehicle transporting an ISS crewmember⁵⁷.

The Code of Conduct for the International Space Station crew⁵⁸ established a clear chain of command on-orbit; a clear relationship between ground and on-orbit management and a management hierarchy⁵⁹. It sets forth the standards of conduct applicable to all ISS crewmembers during preflight, on-orbit, and post-flight activities.

The general rule of conduct is that ISS crewmembers must maintain a harmonious and cohesive relationship among themselves and an appropriate level of mutual confidence and respect through an interactive, participative, and relationship-oriented approach, which duly takes into account the international and multicultural nature of the crew and mission⁶⁰. Furthermore, no ISS crewmember may give undue preferential treatment to any person or entity in the performance of ISS activities and may not adversely affect the

confidence of the public in the integrity of any ISS partner⁶¹.

The ISS Commander is the leader of the crew and is responsible for forming the individual ISS crewmembers into a single, integrated team⁶². During on-orbit operations the ISS Commander is responsible for the accomplishment of the mission program for ensuring the safety of crewmembers and the protection of the ISS equipment⁶³. During all phases of on-orbit activity, the ISS commander has the authority to use any reasonable and necessary means to fulfill his or her responsibilities. The state partners interpreted that this includes the use of proportional physical force or restraint to ensure the immediate safety of the crew Members⁶⁴.

The criminal law approach to criminal behavior in the International Space Station does not provide any solutions to prevent the occurrence of criminal behavior in outer space. Its emphasis is on the repression of criminal behavior by referring - in most cases- the perpetrator to the state of nationality for prosecution. It further ignores the needs of victims of crimes in outer space and is oblivious to gender issues related to crimes in space.

⁵⁷ Each ISS crewmember has a right to know about such additional requirements. ISS crewmembers will also abide by the rules of the institution hosting the training, and by standards and requirements defined by the Multilateral Crew Operations Panel (MCOP), the Multilateral Space Medicine Board (MSMB) and the Multilateral Medical Operations Panel (MMOP).

⁵⁸ Code of Conduct for the International Space Station Crew - 14 CFR Part 1214 (Federal Register: December 21, 2000 Vol. 65, No. 246) [hereinafter "Code of Conduct"].

⁵⁹ Code of Conduct, I.B.

⁶⁰ Code of Conduct, II.B.

⁶¹ Code of Conduct, II.B.

⁶² Code of Conduct, III.A.1.

⁶³ Code of Conduct, III.A.2.

⁶⁴ Farand, A., The Code of Conduct for International Space Station Crews, ESA, <http://www.spaceref.com/news/viewnews.html?id=343>.

Criminological explanations of crime and criminal behavior in the ISS

The criminology literature has been prolifically probing the causes of why people commit crimes⁶⁵. Criminological theories are as diverse as their proponents and practically every criminology author's thought has been elevated to independent theory status, partly because of criminology's lack of a common and unifying theoretical

thread⁶⁶. However, all criminology theories have one distinctive common factor –they have all been conceived to examine criminality on earth and not in outer space.

For the purpose of analyzing whether one of these theories applies to the commission of crimes in the International Space Station, we have created a typology of the most representative theories of crime. Each type in the typology is tied to a different group of theories that explains the occurrence of crime under similar postulates and from a common angle, even if their proponents have hotly debated and criticized the other theories included here in the same type.

Each type of the selected criminological theories has greatly influenced criminological thought and has shaped different criminal justice systems in the world.⁶⁷ This is so because these theories have been dominant at different times without winning the ultimate debate on the true causes of criminality and have all attracted the attention of different criminal lawmakers and societies⁶⁸.

⁶⁵Edwin H. Sutherland and Donald R. Cressey, *Principles of criminology* (Philadelphia: Lippincott 1966); Richard Quinney, *Criminology* (Boston: Little, Brown, 1979); Robert K. Merton, "Social Structure and Anomie" (1938) *American Sociological Review* 3 672-82; Travis Hirschi, *Causes of Delinquency* (Berkeley: University of California Press, 1969); Edwin Lemert *Social pathology: a systematic approach to the theory of sociopathic behavior* (New York: McGraw-Hill, 1951); Willem Bongers, *Criminality and economic conditions* (Boston: Little, Brown, and Company, 1916); Richard Quinney, *Class, state, and crime: on the theory and practice of criminal justice* (New York: D. McKay Co., 1977); Clifford R. Shaw and Henry D. McKay, "Juvenile delinquency and urban areas; a study of rates of delinquency in relation to differential characteristics of local communities in American cities" (Chicago: University of Chicago Press, 1969); Émile Durkheim, "The rules of sociological method" (New York: Free Press, 1966), Cesare Beccaria, *On crimes and punishments* (Indianapolis: Hackett Pub. Co., c1986); Cesare Lombroso, *Criminal man, according to the classification of Cesare Lombroso* (Montclair, N.J.: Patterson Smith, 1972); Thorsten Sellin, *Culture conflict and crime. a report of the Subcommittee on Delinquency of the Committee on Personality and Culture* (New York: Social Science Research Council, 1938); Mark Colvin, *Crime and coercion: an integrated theory of chronic criminality* (New York: St. Martin's Press, 2000).

⁶⁶ Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 1.

⁶⁷ Kenneth W. Simons, "Rethinking Mental States" (1992) 72 *B.U.L. Rev.* 463, 503. Thus, for example, it is common to find partially utilitarian justifications emphasizing the deterrent value of legal sanctions, which are retributive in their justification of the content of the prohibition.

⁶⁸ Joshua Dressler, *Understanding Criminal Law*, 3rd. ed. (New York: Lexis Nexis, 2001) at 22.

The types are titled: (i) individual explanations; (ii) sociological explanations; and (iii) critical explanations. The typology can be usefully applied to the study of whether current criminological thought can explain the causes of criminal and deviant behavior in outer space. The typology is descriptive and does not in itself assess the value of the theories in a context other than the International Space Station or outer space. The analysis of the criminological theories is done exclusively with respect to their applicability to criminal behavior in outer space. The different theories and the encompassing typologies are not judged in terms of their general suitability to provide explanations of the occurrence of crimes in any situation or environment other than outer space. Some of these theories, such as Lombroso's Positivist School of Criminology, have been condemned by the majority of criminologists for their lack of accuracy⁶⁹. Others have been widely criticized for their discriminatory effects, such as the Concentric theory, which links criminality to marginalized neighborhoods. Without ignoring these facts, the analysis of all major theories within each typology will be carried out with the exclusive purpose of assessing whether one or more of these theories -if any- can be used to

⁶⁹ Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 16.

explain the occurrence of crimes in outer space.

Type (i): The individual explanations

Individual explanations of crime focus on the individual offender exclusively. The main theories are classical school⁷⁰, positivist school⁷¹ and psychological schools⁷². The major tenet of the classical school - based on utilitarian social philosophy - is that criminals have control over their behavior, they choose to commit crimes and they can be deterred by the threat of punishment⁷³. Relying on Hobbes' philosophical works, classical criminology holds that people act in a rational manner, and that they choose those actions that provide the greatest pleasure and the least pain⁷⁴. Thus, criminal behavior occurs when an offender decides to risk violating the law after considering the potential value of the criminal enterprise and the potentiality of

⁷⁰ Cesare Beccaria, *On crimes and punishments* (Indianapolis: Hackett Pub. Co., c1986).

⁷¹ Cesare Lombroso, *Criminal man, according to the classification of Cesare Lombroso* (Montclair, N.J.: Patterson Smith, 1972).

⁷² William Healy, *The individual delinquent; a text-book of diagnosis and prognosis for all concerned in understanding offenders* (Boston Little, Brown 1915).

⁷³ Classical school theorists view crimes as both offense-specific, i.e., offenders will react selectively to the characteristics of the particular offense, and offender-specific, i.e., each criminal makes decisions.

⁷⁴ Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 17.

being apprehended, as well as the severity and swiftness of the punishment.⁷⁵ Classical theorists' views on the causes of crime are premised on the notion that human beings have free will and that their actions are guided by hedonism, i.e., the maximization of pleasure and the minimization of pain⁷⁶.

Crewmembers –both expedition and visiting- on the International Space Station, as well as in any other space vehicle or platform in outer space, are continually monitored. Their actions are followed permanently by NASA's headquarters in Houston, Texas⁷⁷. Crewmembers from other nationalities are also monitored by their own agencies on a continuous fashion. Their actions are covered by network and cable television and NASA TV provides live ISS mission

coverage on a daily basis⁷⁸. So, the deterrence effect of all these actions is very high. In fact, it is higher than any criminal justice deterrent measure that has been implemented on earth. Incarceration in correctional facilities, which is one of the extreme measures of deterrence, does not generally imply a permanent monitor of all the inmates' actions⁷⁹. Other deterrence devices, such as the controversial closed circuit television cameras installed in public places only provide a limited control of the persons' actions, i.e., cameras are usually located in strategic places and they do not generally film the totality of the space and the totality of all persons that enter this space on a permanent and continuing basis⁸⁰. So, deterrence in outer space is considerably high and essentially permanent.

Additionally, as discussed above, the partner states established clear rules for the exercise of criminal jurisdiction. The partner states devised a criminal justice system, based on the nationality of the offender, where crimes may be tried by the state of nationality of the perpetrator and in some cases by the

⁷⁵Thus, deterrence becomes the central purpose for punishment, which is conceived as a tool and not an end in itself. To help prevent crime, punishment – and adjudication- should be swift, severe and certain. A severe punishment, however, is only that which is severe enough – but not more so- to outweigh the personal benefits derived from crime commission. Paul J. Hofer & Mark H. Allenbaugh, "The Reason Behind the Rules: Finding and Using the Philosophy of the Federal Sentencing Guidelines", (2003) 40 Am. Crim. L. Rev. 19 at 60; Michael H. Marcus, "Comments on the Model Penal Code: Sentencing Preliminary Draft No. 1" (2003) 30 Am. J. Crim. L. 135.

⁷⁶ Sandra Walklate, *Understanding Criminology: Current Theoretical Debates* (Buckingham and Philadelphia: Open University Press, 2003) at 16.

⁷⁷ Lyndon B. Johnson Center

<http://www.spaceref.com/shuttle/newsref/sts-jsc.html#sts-jsc-mcc> accessed August 20, 2004.

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http://www.nasa.gov/multimedia/nasatv/MM_N_TV_Schedule.html

⁷⁹Katherine S. Williams & Craig Johnstone, "The Politics of the Selective Gaze: Closed Circuit Television and the Policing of Public Space" (2000) *Crime, Law and Social Change*, 34, at 183.

⁸⁰Nicholas Fyfe, "The Maximum Surveillance Society: The Rise of CCTV" (2002) *International Journal of Urban and Regional Research*, 26 at 428.

affected Partner State. So, the criminal jurisdiction regime, coupled with the deterrence devices of permanent control and supervision of all crewmembers, clearly establishes a swift, certain and severe threat of punishment. So, because criminal acts do occur in outer space, resort to the postulates of classical school of criminology are not helpful to explain criminality in outer space.

The other individual explanations of crime –positive and psychological schools– are also ineffective. Positivist or biological explanations derive from Lombroso's infamous studies of cadavers of executed criminals⁸¹. Criminological positivism is a reaction against classical theorists' notion of the rational individual who chooses to commit a crime to experience pleasure. Lombroso's main thesis is that serious offenders have inherited criminal traits. Lombroso held that crime is the result of biological differences "between criminals and normal individuals⁸²". Based on Charles Darwin's evolutionary theory, Lombroso argued that criminals are not as developed as non criminals. Because of this lack of complete evolution, these abnormal individuals engage in a life of

crime⁸³. Thus, for Lombroso, criminals are born as such, they have inherited physical problems that lead them to the commission of crimes. Furthermore, Lombroso elaborated a list of a series of criminogenic traits which he believed reproduced physical and functional qualities of remote ancestors of the human being and that were present in all criminals⁸⁴. Lombroso's further research led him to believe that criminogenic traits can also be acquired through indirect heredity, such as the case of a degenerate family with a history of insanity, deafness, syphilis, epilepsy and alcoholism⁸⁵. Psychological explanations of crime consider criminal acts as psychopathologies, i.e., the individual's unconscious leads to personality deviation, which in turn leads him to commit criminal acts⁸⁶. Strongly influenced by Freudian ideas, psychological explanations of crime revolve around the notions that criminality may result from an overactive superego that seeks punishment as a means to relieve guilt or a weak or

⁸¹ Cesare Lombroso, *Criminal man, according to the classification of Cesare Lombroso* (Montclair, N.J.: Patterson Smith, 1972).

⁸² Gina Lombroso Ferrero, "The Criminal Man" in Francis T. Cullen & Robert Agnew (eds.) *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 23.

⁸³ Cesare Lombroso, *Criminal man, according to the classification of Cesare Lombroso* (Montclair, N.J.: Patterson Smith, 1972).

⁸⁴ Gina Lombroso Ferrero, "The Criminal Man" in Francis T. Cullen & Robert Agnew (eds.) *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 23.

⁸⁵ Gina Lombroso Ferrero, "The Criminal Man" in Francis T. Cullen & Robert Agnew (eds.) *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 23.

⁸⁶ William Healy, *The individual delinquent; a text-book of diagnosis and prognosis for all concerned in understanding offenders* (Boston Little, Brown 1915) 1.

defective ego that may not control the impulses of the id, which leads to an unrestrained id and thus to delinquency⁸⁷. The psychological and psychoanalytical perspectives have broadened to include other ideas that foster people to commit crimes. These ideas, which range from Piaget-inspired notions of moral development⁸⁸, information processing and low intelligence, all focus on the delinquent's defective mind as the main reason for criminality⁸⁹.

Astronauts are subject to a very rigorous recruitment process where they are evaluated from medical and psychological standpoints⁹⁰. Thus, for example, applicants to NASA must meet basic physical and psychological conditions and are thoroughly screened as part of their recruitment⁹¹. This very careful and competitive process only selects very highly qualified individuals for human space programs⁹².

⁸⁷August Aichhorn, *Wayward Youth* (New York, Viking Press 1966) 1.

⁸⁸Jean Piaget, *The moral judgement of the child* (Glencoe: Free Press 1948).

⁸⁹Leonard D. Savitz & Norman Johnston (eds.), *Contemporary criminology* (New York: Wiley, 1982).

⁹⁰For an analysis of personality testing data from final stage applicants to the NASA astronaut program, see D. M. Musson, G.M. Sandal & R. L. Helmreich, "Personality characteristics and trait clusters in final stage astronaut selection" (2004) *Aviat Space Environ Med.* 75(4) at 342.

⁹¹Henry S. F. Cooper, Jr., "The Loneliness of the Long-Duration Astronaut" (1996) *Air & Space/Smithsonian* 11(2) at 36.

⁹²E. V. Khrunov, I. F. Chekirda, & I. A. Kolosov, "Astronaut training in airplane laboratories under weightless conditions, in preparation for work activity in outer space"

Furthermore, medical and psychological conditions are evaluated annually and only those that can satisfactorily pass these evaluations may maintain flight status⁹³. Similarly, in Canada astronauts are selected on the basis of their medical and psychological aptitude. Furthermore, in Canada, the recruitment norms specifically set that candidates must have the ability to perform in a group setting and that they should possess strong personal and social competencies, as well as other characteristics and personality traits in order to effectively deal with the unique aspects of human spaceflight⁹⁴. In all cases, candidates with a previous criminal record are automatically disqualified from the recruitment process⁹⁵.

Therefore, since the recruitment and training programs are so demanding and place such an enormous emphasis on physical and mental conditions by keeping those that show criminogenic characteristics or proclivity to commit crimes out of the recruiting process, criminality in space may not be explained in terms of biological or psychological criminological theories.

(1971) *Voprosy Psichologii*, Vol. 17(5), 1971, at 30.

⁹³ *Astronaut Career Model – Briefing Book*, version 1.0. June 15, 2001.

⁹⁴ Since astronauts are expected to be role models they are selected on the basis of their moral standards.

⁹⁵http://www.space.com/teachspace/module_astronaut_0900/become_astronaut_0900.html accessed August 20, 2004.

Type (ii): The sociological explanations

Sociological explanations tend to explain criminality in terms of the social environment of the offenders. Sociological explanations of crime lie outside the individual. The emphasis is on external factors which may trigger off criminogenic social conditions. The immediate social environment is primarily responsible for criminality in society⁹⁶. Major social factors causing criminality include broken families, poor parenting, low quality educational experiences, delinquent peer relations, poverty, lack of equal economic opportunity and inadequate socialization to the values implicit in the dominant culture, among others. Some of the theories which follow this approach include social disorganization, control, strain, cultural deviance, labeling and social learning, among many others.

Social disorganization theories, such as the Concentric zone theory developed by the Chicago School, focus on the characteristics of the geographical areas where people live and link criminality to the composition of urban cities. For example, Shaw and McKay's theory puts forward that transition zones in major cities are inhabited by immigrants from other countries or

other states or provinces⁹⁷. Because of constant population changes, permanent poverty conditions and high heterogeneity, institutions of social control, such as the family, commercial establishments and schools, break down and can no longer carry out their expected functions⁹⁸, thus fostering the upsurge of crime. Furthermore, these areas with a high concentration of delinquency tend to perpetuate its criminality by means of the transmission of delinquent values through successive generations⁹⁹.

Travis Hirschi's social control theory has focused on why people do not commit crimes¹⁰⁰. For Hirschi everyone has the potential to become a criminal but most people refrain from committing criminal acts as they are controlled by their bonds to conventional society¹⁰¹. When the

⁹⁶ Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 9.

⁹⁷ Clifford R. Shaw and Henry D. McKay, "Juvenile delinquency and urban areas; a study of rates of delinquency in relation to differential characteristics of local communities in American cities" (Chicago: University of Chicago Press, 1969) at 164.

⁹⁸ Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 96.

⁹⁹ Clifford R. Shaw and Henry D. McKay, "Juvenile delinquency and urban areas; a study of rates of delinquency in relation to differential characteristics of local communities in American cities" (Chicago: University of Chicago Press, 1969) at 164.

¹⁰⁰ Travis Hirschi, *Causes of Delinquency* (Berkeley: University of California Press, 1969) at 164.

¹⁰¹ Hirschi identifies four elements of the bond to conventional society. These are: (i) attachment, i.e., sensitivity to the opinion of others which permits the internalization of conventional norms, (ii) commitment, i.e., fear of risking

social bonds that individuals have to parents, peers, and important social institutions, such as the school or the workplace are strong, they fear that their potential criminal activity may jeopardize their relative position in society and thus they refuse to run the risk of losing meaningful social relationships, careers, and opportunities. Crime occurs when the forces that bind people to society are weakened or broken¹⁰².

Merton's strain theory holds that crime is a function of the conflict between cultural goals, purposes and interests that people have and the means they can use to legally obtain them¹⁰³. While cultural goals are the same for all, the ability to achieve these goals is dependant on the socioeconomic position that each individual enjoys in society. Informed by Durkheim's functionalism¹⁰⁴, Merton's theory identifies the conditions which do not permit those in the lower classes to attain cultural and social goals, such as prestige, monetary success or middle class status. For Merton, lower classes are blocked through

important interests, (iii) involvement, i.e., lack of opportunities to engage in criminal behavior due to heavy involvement in conventional activities, (iv) belief, i.e., assent to conventional society's value system. Travis Hirschi, *Causes of Delinquency* (Berkeley: University of California Press, 1969) at 164.

¹⁰² Travis Hirschi, *Causes of Delinquency* (Berkeley: University of California Press, 1969) at 164.

¹⁰³ Robert K. Merton, "Social Structure and Anomie" (1938) *American Sociological Review* 3 672.

¹⁰⁴ Emile Durkheim, *Suicide* (New York: The Free Press, 1951), p. 209.

legitimate channels -they receive an inferior education, lower values, they lack valuable social connections, may face discrimination in the job marketplace- from the possibility of attaining these common goals¹⁰⁵. So, lower class individuals feel anger, frustration and resentment which is referred to as strain¹⁰⁶. Sometimes, these people resort to alternative means of attaining society's cultural goals, such as the commission of crimes¹⁰⁷.

The major tenet of cultural deviance theory is that conformity to the prevailing cultural norms of lower class society causes crime. Lower class subculture has a unique set of values and beliefs¹⁰⁸, which are invariably in conflict with conventional social norms¹⁰⁹. Criminality is an expression of conformity to lower class subcultural values¹¹⁰. Members of the working

¹⁰⁵ Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 172.

¹⁰⁶ Robert K. Merton, "Social Structure and Anomie" (1938) *American Sociological Review* 3 672.

¹⁰⁷ Other alternative means include addiction to alcohol and drugs. Robert K. Merton, "Social Structure and Anomie" (1938) *American Sociological Review* 3 672.

¹⁰⁸ These include trouble, toughness, smartness, excitement, fatalism and autonomy. Sandra J. Bell, *Young Offenders and Juvenile Justice: A century After the Fact*, 2d. (Scarborough: Thomson Nelson, 2003) at 158.

¹⁰⁹ Thorsten Sellin, *Culture conflict and crime*. a report of the Subcommittee on Delinquency of the Committee on Personality and Culture (New York: Social Science Research Council, 1938) at 63.

¹¹⁰ Albert Cohen, *Delinquent Boys: The Culture of the Gang* (New York: Free Press, 1955) at 25.

class commit crimes as they respond to the cultural norms of their own class in an effort to deal with problems of social -middle class-adjustment¹¹¹.

Social learning theory holds that a person resorts to criminal activity when he has received an excess of definitions, such as motives, attitudes, rationalizations, techniques, and values, favorable to the commission of crimes over those unfavorable to the violation of laws¹¹². Criminal behavior is learned through social interaction in a process of communication. For Edwin Sutherland, people learn the techniques and attitudes of crime by association with criminal patterns within intimate personal groups.¹¹³

Labeling theory emphasizes that people become criminals when significant members of society label them as such and they accept and assume those labels as part of their personal identity¹¹⁴. As exemplified by Lemert, this takes place "when a person begins to employ his deviant behavior or a role based upon it as a means of defense, attack, or

adjustment to the overt and covert problems created by the consequent societal reaction to him¹¹⁵". Labeling theory is not concerned with why people originally engage in acts that result in their being labeled -primary deviance. Its concern is with criminal career formation and with the effects of labeling -the creation of a stigma and the effect on self-image¹¹⁶.

Astronauts, including expedition and visiting crewmembers, all belong to middle or upper classes. Astronauts are recruited from middle or upper class families, who live in affluent neighborhoods. As a way of illustration, Canadian astronaut Julie Payette came from a middle class Montreal family. She finished her high school studies in Wales, worked for the Canadian affiliate of a multinational company and studied in two of the most respected universities in Canada¹¹⁷. Likewise, US astronaut Peter Jeff Wisoff also attended prestigious US universities and worked as a researcher in a top university¹¹⁸. None of the astronauts in any space program has ever come from a poor immigrant family who does not

¹¹¹Thorsten Sellin, *Culture conflict and crime*. a report of the Subcommittee on Delinquency of the Committee on Personality and Culture (New York: Social Science Research Council, 1938) at 63.

¹¹² Edwin H. Sutherland and Donald R. Cressey, *Principles of criminology* (Philadelphia: Lippincott 1966) at 5.

¹¹³ Edwin H. Sutherland and Donald R. Cressey, *Principles of criminology* (Philadelphia: Lippincott 1966) at 5.

¹¹⁴ Edwin Lemert *Social pathology: a systematic approach to the theory of sociopathic behavior* (New York: McGraw-Hill, 1951) at 75.

¹¹⁵ Edwin Lemert *Social pathology: a systematic approach to the theory of sociopathic behavior* (New York: McGraw-Hill, 1951) at 75.

¹¹⁶ Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 295.

¹¹⁷ http://www.space.gc.ca/asc/eng/csa_sectors/human_pre/cao/biopayette.asp accessed August 7, 2004.

¹¹⁸ <http://www.jsc.nasa.gov/Bios/htmlbios/wisoff.html> accessed August 7, 2004.

speak the language of the majority and who has no access to social institutions, such as the school or the middle-class job market¹¹⁹. Thus, social disorganization theories, with their emphasis on the transition zone as the main focus of criminality, and strain theories, which focus on the lower class' impossibility to attain common goals, may not account for criminality in space. Equally ineffective is cultural deviance theory -which links the commission of crimes to conformity to lower class subcultural values- as no astronaut has been raised in a lower class culture.

Astronauts receive a high degree of social reinforcement from media attention. They are considered role models¹²⁰ and during the early stages of the space age they were regarded as true national heroes¹²¹. Furthermore, they are very well remunerated¹²², they frequently appear before the media, give

interviews, make public appearances, give talks to students and act as role models for youths¹²³. Additionally, only astronauts with a strong support network of family and friends are recruited¹²⁴. Therefore, it is easy to see that all astronauts have strong bonds with society, which presumably they will not intend risking. So, control theory is ineffective to account for outer space criminality. Equally so is social learning theory -which holds that criminality is a function of individual socialization- as astronauts do not interact with criminal offenders and may not have before they were recruited.

Since part of the recruitment process also consists of analyzing whether candidates have had a prior criminal record and those with even minimal criminal antecedents are automatically disqualified, labeling theory does not help either in understanding the occurrence of crimes in outer space.

Type (iii) Critical Explanations

Critical theories tend to attribute criminality to the capitalist system. Its major tenet is that capitalism creates criminal behavior. It has a distinct political view of crime. For these theories, the ruling class uses the law and criminal justice system to advance its economic and social

¹¹⁹ Some astronauts, such as Fernando Caldeiro, who came from Buenos Aires, Argentina, or Michael E. Lopez-Alegria, who came from Madrid, Spain, were originally immigrants, but their families were of middle to upper class origin and fit the social profile of other astronauts of non immigrant origin. <http://www.jsc.nasa.gov/Bios/htmlbios/caldeiro.html> accessed August 7, 2004.

¹²⁰ Astronaut Career Model – Briefing Book section 4.1.3.6, version 1.0. June 15, 2001.

¹²¹ Hermida, Julian, *Commercial Space Law: International, National and Contractual Aspects* (Buenos Aires: Ediciones Depalma, 1997) 6.

¹²² In the United States salaries for civilian astronaut candidates are based on the Federal Government's General Schedule pay scales for grades GS-11 through GS-14, and are set in accordance with each individual's academic achievements and experience.

¹²³ Astronaut Career Model – Briefing Book, version 1.0. June 15, 2001.

¹²⁴ Astronaut Career Model – Briefing Book, version 1.0. June 15, 2001.

purposes¹²⁵. Criminal laws are viewed as the product of the upper classes and crime is a political concept to protect the power and the position of the upper classes at the expense of the poor. Capitalism is the root cause of criminal behavior because the human needs of the poor are ignored¹²⁶. Capitalism increases the need to dominate by the capitalist class and the need to accommodate and resist by the exploited class¹²⁷.

¹²⁵ Karl Marx, "Population, Crime and Pauperism" in Karl Marx & Friedrich Engels, *Ireland and the Irish Question* (Moscow, Progress Publishers 1971) at 92.

¹²⁶ Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 334.

¹²⁷ Criminology authors have exposed several variations of critical criminology, which focus on different factors but which all share the same general idea that capitalism creates criminality. For example, Willem Bonger claimed that the main cause of criminality is the mental state of egoism. For Bonger, egoism is rooted in economic relations fostered by capitalism, such as ruthless competition and the exploitation of others in the pursuit of individual profits. Bonger also recognizes that capitalism creates crime among the bourgeoisie. Crimes are a product of a bourgeois environment where economic advantage at any cost is a valued moral principle. Willem Bonger, *Criminality and economic conditions* (Boston: Little, Brown, and Company, 1916) at 196. Francis T. Cullen & Robert Agnew, *Criminological Theory: Past to Present: Essential Readings* (Los Angeles: Roxbury Pub. Co., 1999) at 335.

Richard Quinney's theory centers on the proletariat's struggle against oppression by the capitalist class. The capitalist class commits crimes in order to protect its interests and repress any challenge to its dominant position. Its crimes deal with the violation of human rights, the commission

While outer space endeavors have been and are sponsored by different types of states¹²⁸, it is quite clear that those that participate in outer space missions are from upper classes and may not be considered to be proletariat or otherwise oppressed.

Critical criminology also focuses on the crimes of the dominant class. These crimes have been attributed to egoistic sentiments and a need to maintain and advance its socioeconomic position at any cost. As examined above, upper class crimes revolve around violations of basic human rights, the adoption of anticompetitive measures and the manipulation of the legal system in

of economic crimes and the manipulation of the legal system to obtain economic advantages. For the working class, crime constitutes a response to its severely hard living conditions and often results in unconscious reactions to exploitation and conscious acts of survival. Richard Quinney, *Class, state, and crime: on the theory and practice of criminal justice* (New York: D. McKay Co., 1977) at 60.

Mark Colvin focuses on coercion as the main cause for crime. His major thesis is that the coercion methods used in the secondary job market are transferred to the family, where parents discipline their children coercively, even by resorting to the use of physical force. For Colvin, this coercion is counterproductive as it weakens bonds to parents and society, which ultimately leads to criminality. Mark Colvin, *Crime and coercion: an integrated theory of chronic criminality* (New York: St. Martin's Press, 2000) at 43.

¹²⁸ Julian Hermida *Legal Basis for a National Space Legislation* (Dordrecht, Boston, and London: Kluwer Academic Publishers, 2004) at xiv.

pursuit of socioeconomic advantages, among others.

As analyzed before, crimes of astronauts in outer space resemble those crimes generally attributed to lower, oppressed classes rather than those that critical criminology attributes to the dominant elite, which astronauts clearly belong to. Thus, for example, the examined experiences show that astronauts engage in sexual assault, battery, and attempted murder rather than white collar crime¹²⁹. So, critical criminology is also inadequate to account for criminality in outer space.

Conclusions

The current International Space Station Intergovernmental Agreement's approach to criminal behavior is based on a criminal law regime which places a strong emphasis on the state of nationality's power to try its own national offenders, coupled with severe disciplinary norms, which even include the use of physical force. This approach is inadequate to satisfactorily resolve the variety of behavioral problems which will be created¹³⁰ as it is premised on a

¹²⁹ Edwin H. Sutherland, "White Collar Criminality" (1940) *American Sociological Review* Vol. 5 No. 1, at 2.

¹³⁰ Some authors have advocated for the creation of a specific international treaty to govern all manned space missions and settlements. Carl Q. Christol, *Space Law: Past, Present, and Future* 200 (1991) at 200. Ashe, III, *Space Station Alpha: International Shining Star or Legal Black Hole?*, (1995) 9 *Temp. Int'l & Comp. L.J.* 362. Ashe argues that a space treaty governing

repressive approach which does not take into account the unique needs of victims of crimes in outer space and which does not address or propose specific solutions to prevent the occurrence of criminal behavior in outer space.

The inadequacy of the adopted criminal justice solution stems from the lack of understanding of the nature and causes of criminality in outer space. None of the existing criminology theoretical views can explain the commission of crimes in outer space. So, until criminology comes up with a thorough understanding of the causes of crime in outer space, the criminal justice system will lack the necessary theoretical tools to design a criminal justice approach to effectively deal with these conflicts.

Specific explanations of crime in outer space will have to take into account the special characteristics of

inhabited space stations or a WSO could provide a legal framework and forum upon which current and future partners of Alpha could base their course of action. A treaty may alleviate some of the international political pressures the current Partners face. The debate between developed and developing nations could be partially diffused if a treaty guaranteed specific rights (e.g., access rights to Alpha) to developing, non-space faring nations. A treaty could ensure that the space station will benefit all countries by enhancing such activities as telecommunications, weather forecasting, natural resource exploitation, environmental protection, crop and livestock disease control, air traffic control, navigation, maritime and land rescue operations, secure transmissions from satellites (e.g., copyright protection) and the limitation of damage from accidental or natural disasters involving radioactive materials."

the outer space environment, particularly its hostility to human habitability, the isolation conditions of current and projected missions and future settlements¹³¹, and emotional stress brought on by the monotony, confined space, sense of danger and anxiety invariably present in all space endeavors¹³². A criminological theory of criminality in space will also have to explore the psychological¹³³ and biological¹³⁴ effects that deprivation of their natural habitat causes on astronauts, the physiological changes in the human body induced by a microgravity environment¹³⁵, as well as the consequences of a lack of contact with other chemical elements

¹³¹ The Canadian Astronaut Office justified the criminal behavior on the fact that people exposed to extreme conditions are prone to commit crimes. Experiment could have stopped, agency says: Unwanted sex advances by Russian were noted, *The Gazette*. Montreal, Que.: Mar 26, 2000, at A.5.

¹³² Alexei Arkhipovich Leonov & Vladimir Ivanovich Lebedev, "On the Problem of Psychological Compatibility in Interplanetary Flight" (1972) *Voprosy filosofii*, 26, at 14.

¹³³ Joseph F. Kubis & Edward J. McLaughlin, (1967) "Psychological Aspects of Space Flight" *Transactions of the New York Academy of Sciences*, 30(2), at 320.

¹³⁴ D. R. Hamilton, D. Gloss D. "Cases in space medicine" (2004) *Aviat Space Environ Med.* 75(3) at 288.

¹³⁵ These changes include cardiovascular degeneration, bone decalcification, decreased plasma volume, blood flow, lymphocyte and eosinophil levels, altered hormonal and electrolyte levels, muscle atrophy, decreased blood cell mass, increased immunoglobulin A and M levels, and a decrease in the amount of microsomal P-450 and the activity of some of its dependent enzymes. A. Graebe, E. L. Schuck, P. Lensing, L. Putcha & H. Derendorf, "Physiological, Pharmacokinetic, and Pharmacodynamic Changes in Space" (2004) *J Clin Pharmacol.* 44(8) at 837.

which people naturally count on and depend upon on a permanent and natural fashion on earth¹³⁶.

Social relations are also exceptional in outer space. An individual only interacts with a handful of selected persons in an artificial social context under permanent and close scrutiny. They also suffer from lack of unmediated contacts with family and friends. Social processes and social relations in outer space have unique characteristics that result in very different social interactions from those on earth. Furthermore, these phenomena are compounded due to, among other things, the involvement of more and more national cultures in long term space missions¹³⁷.

Power relationships are also extraordinary. While all astronauts belong to a privileged class, their power relationships in space cause anxiety and stress. These relations do not have to do with ownership or lack of ownership of the means of production, with possession or lack of possession of material resources or with Colvin's coercive disciplining methods. Rather, anxiety derived from power relationships in outer space missions have to do with on ground versus in

¹³⁶ Richard J. Bord & Robert E. O'Connor, "Risk Communication, Knowledge, and Attitudes: Explaining Reactions to a Technology Perceived as Risky" (1990) *Risk Analysis*, 10 at 499.

¹³⁷ D. J. Kealey, "Research on intercultural effectiveness and its relevance to multicultural crews in space" (2004) *Aviat Space Environ Med.* 75(7 Suppl) at C58-64.

orbit conflicts¹³⁸, with a very rigid and un-modifiable chain of command and with a complete lack of freedom to deviate from a carefully tightly planned course of action¹³⁹.

All these exceptional factors of life and social relations in outer space missions and settlements have to be thoroughly explored in order to come up with a deeper understanding of the causes of criminality in outer space¹⁴⁰. As put forward by the literature, the "consequences of poor social planning for space missions can be as severe as those of poor engineering."¹⁴¹

¹³⁸Studies have found that that both crewmembers and mission control personnel displaced unpleasant emotions to monitoring personnel outside of their group. N. Kanas, "Group interactions during space missions" (2004) *Aviat Space Environ Med.* 75(7 Suppl) at C3-5.

¹³⁹ Henry S. F. Cooper, Jr., "The Loneliness of the Long-Duration Astronaut" (1996) *Air & Space/Smithsonian* 11(2) at 36.

¹⁴⁰ Additionally, the different effects of long term and short term missions on human behavior must also be taken into account. Similarly, a comprehensive theory on space criminality has to explore the effects of intense and permanent control, scrutiny and supervision of all aspects of astronauts' activities, including professional and non professional activities.

¹⁴¹ T. Stephen Cheston, *The Psychology of Orbital Human Factors* <http://www.jsc.nasa.gov/er/seh/psychology.html>, accessed August 16, 2004.