

SUPERPOWER GAMING IN ARMS CONTROL
NEGOTIATIONS: A STUDY OF NUCLEAR NON-
PROLIFERATION TREATY (NPT).

DISSERTATION SUBMITTED TO JAWAHARLAL NEHRU UNIVERSITY IN
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE
DEGREE OF
MASTER OF PHILOSOPHY.

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2001.



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New Delhi,

21st July 2001

CERTIFICATE

Certified that the dissertation entitled SUPERPOWER GAMING IN ARMS CONTROL NEGOTIATIONS: A STUDY OF NUCLEAR NON- PROLIFERATION TREATY by Mr.Rajat Bandyopadhyay in partial fulfillment of the requirements for the award of Master Of Philosophy, is a bonafide original work & has not been previously submitted for any other degree of this or any other university.

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DEDICATED TO ALL THOSE WHO

ARE UNFED AND STAY

UNDER THE BARE HEAVEN

ACKNOWLEDGEMENTS

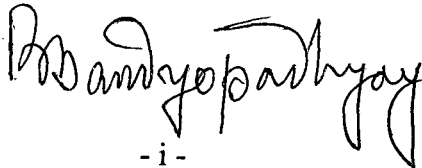
During the last one year, while I was working on my dissertation I had many anxious moments regarding conceiving the intricate aspects of my research. In all these moments I have always found my supervisor Prof. Aswini.k.Ray by my side providing me with insights and directions to my work. He gave me ample independence and space to nurture my thoughts so as to substantiate my research. Simply thanking him will fall short of showing my gratitude towards him.

I am grateful to my parents who with all their love and sincerity helped me to reach the zenith of mental sophistication. I love them to the extent that I love myself. Moreover, they have assisted me in proofreading the manuscript.

I also would like to congratulate Indranil de (M.Phil.CSRD/SSS/JNU) for assisting me at various stages of my research. Words will fall short to praise him.

Acknowledgements are also to be given to Anup Sarker Chief Librarian and Ardhendu Mishra Asst. Librarian, of the Dept Of Economics, Jadavpur University (Calcutta), for providing me with valuable references pertaining to my research work.

Lastly I wish to thank other professors and fellow students who have sincerely criticized and honestly commented on my work.


-i-

PREFACE

The power of the uranium atom continues to threaten our life and living. Each and every attempt to de-emphasize the role of nuclear arms has proved futile. The Atoms-for-Peace programme started by President Eisenhower stands at bay. We stand in a world in which the nuclear shield has replaced the conventional sword and sticking on to nuclear options has become the major security strategy of the nation states. Treaties and negotiations with regard to non-proliferation have proved ineffective and no major peace mechanism has been developed to break the vicious circle of war-peace-war. Nations are urged strongly to enhance their nuclear capability by developing technologically superior nuclear warheads and laser guided missile systems. Even the space is used for the deployment of nuclear weapons thus making the strategic defence initiative or the “star wars” programme a grand success.

In the spring of 2000 I presented one seminar on the application of the Game of Prisoner’s Dilemma in NPT. The responses and comments that I received from my fellow friends and concerned Professors urged me to search, investigate and explore further the related aspects of superpower gaming in arms control and disarmament negotiations. My exploration process was further expedited by the valuable comments of Prof. A.K.Ray and my dear father. In this dissertation I have made a benevolent attempt to decipher those enigmatic aspects of bargaining and game that underlay all negotiations and treaties with regard to controlling and restricting arms.

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CHAPTER-1

INTRODUCTION

Decisions pertaining to war and peace have always been central to the study of international relations. But regrettably no strategic decision-making has been substantial enough to vindicate people from the scourge of war. Moreover, with the incipience of the nuclear age and with a paradigm shift in warring techniques, the problem of decision-making has intensified further. Disarmament negotiations as a conflict resolution mechanism have failed miserably to provide a broader framework of action and consequently the world is now not a safer place to live. The amount of delinquency and breach of trust in bilateral and multilateral arms-control and disarmament negotiations manifest an inherent tendency of the nation-states to take up nuclear weapons as a major instrument of policy. Hence the nuclear arms race continues to flourish in an upward spiral.

It is not the question of who holds the nuclear power; it is the question of how sticking to nuclear options threaten the basic existence of human life. There is no foolproof conflict control system to provide assistance with regard to a sudden outbreak of nuclear war. The hydrogen bombs made up of uranium isotopes have sufficient potential to annihilate the entire human race. The destructive potential is so huge that it defies the imagination: a single thermonuclear bomb can unleash in a fraction of a second more energy than the sum total of explosions that have occurred “in anger” throughout the history of mankind; since gunpowder was invented, including two world Wars, Hiroshima and Nagasaki and the blanket bombings in Vietnam¹. The escalation of sophisticated nuclear weaponry is leading to a world in which the power of the uranium atom will dictate terms upon humanity. Barring classy nuclear weapons and their respective delivery systems there

¹ Joseph Rotblat (ed), “Scientists, the Arms Race and Disarmament”, p-18

have been the development of strategic and operational intelligence systems with automated and deployable command and control, done primarily by using surveillance and reconnaissance satellites. But unfortunately there are still weapon delivery systems with refined technologies, the control and management of which is still unknown to human knowledge. Disposal of nuclear waste is scientifically unfeasible and the risks of a nuclear disaster like the Chernobyl one, stands at bay. Moreover, nuclear threat becomes the provenance of other sources of conflict. The existence of nuclear weapons opens the danger of their use; indeed, some believe that the action-reaction process that drives nuclear competitors to even more sophisticated devices leads to more and more provocative postures which, in the end will trigger war². /

At the very outset the difference between arms control and disarmament needs to be clarified because the social researchers as well as the defence planners have often used these terms to their advantage. At the theoretical level, disarmament is the “ought to be” goal and arms control is the key or the means towards achieving the goal of disarmament. At the structural-functional level, both arms control and disarmament essentially assumes a conflict situation and speaks of controlling the belligerent acts of warring nations. / At the level of operationalisation, arms control specifies a direction towards the use or non-use of nuclear weapons and thereby checks the arms race whereas disarmament speaks of destroying the existing nuclear stockpiles of an “already declared” nuclear nation. Arms control is needed because armaments will always increase the probability of the outbreak and escalation of war. The purpose of arms control is not necessarily to disarm, but to

² Harald Muller, David Fisher, Wolf G Kotter (ed)., “Nuclear Non-Proliferation and Global Order”, p-2. Original document derived from U.N General Assembly document

prevent accidental, catalytic and preemptive war³. Arms control also implicitly assumes that nuclear arms other than warring can be used for profitable purposes./

Disarmament is much more comprehensive because it considers armaments build up as a menace to world peace and believes that treaties and negotiations are the only viable security strategy to arrive at peace. Most of the non-proliferation treaties that were drafted to be ratified and signed before 1970,s are termed as arms control measures, while those after that till date are aptly termed as disarmament negotiations. This is because too much of armaments were manufactured till the 70's of the 20th century and the need of that hour was more to disarm and less to control. Strategic planners and foreign policy makers of the contemporary world opine that Nuclear Non-Proliferation treaty (NPT) 1968, was the first major arms control negotiation and Strategic Arms Limitation Talks I (SALT-I) was the first major disarmament programme? Disarmament also intrinsically assumes that some nations have so much of nuclear might that they do not face a security dilemma with regard to choosing offense as the best defence or vice-versa and can deter any possible threat. Ultimately disarmament is a nonfigurative concept that lacks in direction and has often been used by superpowers to their advantage. While on the other hand, like laws to prohibit alcohol, control lobbying or impose taxes, arms control has been an ineffectual exercise in questionable implementation and ingenious evasion⁴.

The way of determining and defining a 'superpower' is ambiguous. On the basis of strategic and economic superiority Professor W.T.R. Fox in the year 1944 applied the

³ Walter B.Wentz, "Nuclear Proliferation", p-156

⁴ R W Howe, "Weapons: The International Game of Arms, Money and Diplomacy", p-226.

very term 'superpower' to Britain as well as the United States and Soviet Union.⁵ The genesis of this term was more from a chance factor and can be attributed to the power vacuum that was manifest when the Second World War put every potent belligerent nation in raze. We, the people of the 'other' world have subjectively ascribed the term 'Superpower' to U.S.A. and U.S.S.R. stimulating their 'recognition hunger'⁶. This motivation not only helped them framing condescending images regarding themselves but also facilitated the policy makers of both the countries to induce electorates on the basis of this 'ascribed image'. Their superpower image was further refurbished by their strategic locations and their economic and technical superiority. At the global level both these countries by virtue of their image sincerely felt that the future of the global international order⁷ depends upon their ways of conceiving convoluted aspects of international politics. Both of them considered that the ultimate answer to human problem lies with them and mediating or arbitrating in conflicts will help in the preservation of the rule of law and basic human rights and enhance fostering 'enduring peace'. The historical developments of social processes that led to the formation of the great 'theoretical-ideological' divide (i.e. the division between communism and capitalism), was also led by these two powers. So these two nations became the platform for all those countries that favoured either of the two divides.

The term 'Superpower' itself implies conflict. Williams (1947) has indicated that the necessary conditions for conflict include 'visibility' and competition in addition to

⁵ Carsten Holbraad (ed)., "Superpower and World Order", p- 142

⁶ In " Games People Play", Eric Berne speaks of food hunger, stimulus hunger& recognition hunger

⁷ Hedley bull differentiates between international and world order.

contact⁸. Both U.S.A. and U.S.S.R. believed that the future international stability depended on the success of its own concept of world order. Even in the 80's when other nation states were emerging with divergent views and newer options, Ronald Reagan aptly said, "we are in this country, are by destiny rather than by choice, the watchman on the walls of world freedoms". The amount of hypocrisy and deception that are revealed in different protocols, treaties and negotiations is a classical example of how these actors have played a politics of commitment in their domestic front and a politics of confusion in the international front. The intensity, the direction and the implications of superpower conflict have varied with changing points of time and space. Referring to U.S.A. and U.S.S.R., Francesco Calogero speaks of a military-industrial-bureaucratic complex designating a network that assisted the continuation of arms race. Unlike territorial rivalry superpower rivalry was a structural one!

Most of our day-to-day social interaction involves a situation of gaming in which rational⁹ self-interested actors choose the best option from a given set of options to optimize his utility preference. In a game there are rules, which the players are to abide by because the rules determine the actions or strategies of the players thus determining the outcome¹⁰. Game theory assumes that each player is strictly rational in the sense that he is aware of his alternatives, forms expectations about any unknowns, has clear preferences and chooses his action deliberately after same process of optimization¹¹.

⁸ Raimo Vayrymen (ed), "New Dimension in Conflict Theory", p- 29.

⁹ The term has been used in its economic sense.

¹⁰ Harsanyi, "Rational Behavior and Bargaining Equilibrium In Games and Social Situations", p – 88, Harsanyi in his book says about 3 rules. i) Social conventions observed by the players.ii) Laws of Nature governing the performance of human body.iii) Distribution of Resources among players.

¹¹ Martin Osborn, Rubinstein, "A Course In Game Theory" p -4

Rational behaviour implies that each actor in a strategic situation has certain well-defined sets of values and objectives and would decide upon his own policy. Game theory as a theory of preferential behaviour is aptly applied as a tool to understand the behaviour of interacting superpowers in a strategic situation. Martin Shubik defines strategies as a sequence of decision; even a whole policy of action is formulated as a single contingency laden decision or a 'game plan'. Players in a game situation may also face intrinsic as well as extrinsic problems¹². Superpower gaming refers to the optimal strategies undertaken by U.S.A. and U.S.S.R. in a conflict situation to maintain their strategic supremacy. This work speaks about the application of games of strategy in Nuclear Non-Proliferation Treaty (NPT). The game is modeled on the moves and counter moves of the two superpowers and the gains or losses are represented through payoffs. The outcome measured by the pay-off is represented physically by ordinal values.

Games can be broadly classified into two types – zero-sum and non-zero-sum games. In zero-sum games the gain of one player is equivalent to the loss of the other. For any action of one player and the counter action of his opponent the sum of their pay-offs is zero. Zero-sum games are applicable in total war situation. Non-zero-sum games are those where the pay-offs of the players are not equivalent. Most of the games of strategy that are played in treaties and negotiations are non-zero-sum.

¹² Harsanyi speaks about 4 major problems, which are the enforcement, or stability problem, joint efficiency problem, and strategy coordination problem and bargaining problem. He further divides the problem of bargaining into bargaining problem (in a narrow sense), the threat problem, and the coalition problem.

The level of information that was available at the preplay level, at the inception of the game, and when the gaming process was on, did affect the strategic maneuvers of these two national actors. Superpower gaming to a large extent has depended on their detection devices to gather information regarding strategic developments throughout the globe. Basing upon their detection device superpowers have either co-operated fully, partially or went on the lines of conditional cooperation. Till the establishment of a stable information system in the year 1963, by the establishment of hot line, the verification problem was met up with (neutral) surveillance system emphasizing spying and counter spying. The later verification processes depended upon the information received from the reconnaissance satellites about weapon systems and precision targets. When information tantamount to their strategic interests, cooperation and some time unconditional cooperation was probable. However, enhanced detection capabilities sometimes increased the vulnerability of a country's defences to a preemptive strike and thereby render a situation more unstable¹³. Thus power relations between U.S.A. and U.S.S.R. have been both mutually exclusive and antagonistic.

Various related aspects of superpower game can also be identified in a wider framework of continuity and change in their domestic and foreign policies. Yet by applying the theory of games to a single multilateral negotiation like NPT, it is cumbersome to reach at a tangible inference with regard to their actual policy orientations because the gaming has been a continuous process covering all disarmament treaties and negotiations since the end of 2nd World War.

¹³ Brams, Davis, Straffin Jr, "The Geometry of the Arms Race", pp – 567-568.

Superpower gaming did not severely affect those countries who by mistake, ethically or by will tried to uphold non-nuclear policy. At the same time it was easier to make these countries, which mostly represented the weaker nations of Africa and Asia, and the peace loving Scandinavia and Australia, convinced that arms-proliferation was not taking place. But for those nations, who were ethnically & territorially disturbed and who had their own versions of threat and security were never to be brought under the same umbrella. The gaming was an attempt to subvert the security policies of the 'other' nations thereby prescribing their own conceptions of global security. In the late 60's and early 70's when disarmament proceedings were going on, United States was urging Japan to develop more military hardware, while U.S.S.R. was trying to come to terms with China. Even with Australia and New Zealand they went for ANZUS treaty towards co-operating in conflicts and conflict resolution processes. Superpowers were anxious about the growing Chinese power and coming up of actors like India, Pakistan, Israel, Brazil and South Africa in the global political scenario. Both the nations felt that neither 'imperial totalitarian' nor 'imperial capitalist' systems are feasible options to dominate the 'other' world. The only means left was strategic-economic and strategic-political dominance, which at the end of the 20th century seems that both America and Russia have been successful in doing, one through globalization of nuclear arms and the other through unspoken technology transfers and nuclearisation of space. Kant has been true in saying that any fully rational agent who wills an end necessary wills the means to that end.

By transferring raw technologies and strategic war formulas both these countries have tried to rejuvenate their domestic economy, which was affected because of the World

Economic Depression in late 1930's and the 2nd World War. Even the technology (both conventional-military and contemporary-nuclear) that was transferred to the emerging nation states by the superpowers was of the second grade type. Sticking on to nuclear options became the only viable means of the superpowers to gain dominance over institutional arrangements and political processes of other nations. An enigmatic trade-off in their assumption of nuclear strike is also manifest. They always had a misconceived conception about security. Both of them assumed that the other power can go for a first strike and hence made itself potent enough to resist the first strike and simultaneously prepared for a second strike. This sort of a security measure not only balances threat but also provides for a huge escalation in strategic arms, which further breeds in other forms of violence. Both U.S.A. and U.S.S.R, to increase their spheres of influence, got engaged in the fantastic arms race thereby proliferating the technologically sophisticated weapons and delivery vehicles. By balancing power and more literally by balancing terror the superpowers did weave an authoritarian elitist framework that promoted a status-quoist strategic regime. The superpowers did not even refrain from limiting and restricting the competing nations like U.K. and France. Finland and Austria were refrained from developing technologically refined tactical weapons.

Though both U.S.A. and U.S.S.R. have remained publicly opposed to the principle of nuclear proliferation yet at the tacit level they made beneficial adjustments to regulate the arms race. Paul Keal in his book "Unspoken Rules and Superpower Dominance" speaks about a tacit understanding which is characterized as one, which causes or allows particular actions or inactions of states which cannot or will not communicate directly

about what is understood, but which nevertheless seem based on some kinds of understanding. A tacit understanding was apparent when U.S.S.R. did not speak on U.S.A's intervention in Cuba and U.S.A. did not speak on Russian invasion of Czechoslovakia in 1968 as well as Russia's violation of Outer Space Treaty by Soviet Fractional Orbital Bombardment System (FOBS). Hence tacit understanding connotes a subtle co-operation despite strategic and ideological conflicts. But unfortunately tacit understanding is an impediment upon common information.

In a race for spending on armaments huge sums were sacrificed and the corresponding "gain" was measured in kill effectiveness. The two superpowers have been the principal actors in the race; "gaining" incomparably more than others in military strength¹⁴. The superpowers zealously felt that by constructing destructive capacity they can match each other's strength, which further enhanced the development of the concept of 'overkill'. Newton's third law of motion stating that every action has its equal & opposite reaction was vehemently defied in the Pearl harbor bombing (action) Vs. Hiroshima bombing (reaction), where the reaction did supersede many times than the action. The action – reaction process was further reflected in the Cuban missile crisis, U.S.S.R's attack on Czechoslovakia, and U.S.A's attack on North Korea and Vietnam. Superpower pretension was further reflected when on one side they were vociferously trying to stop the proliferation of nuclear weapons in the non-nuclear states, on the other side they were providing arms and technologies for the expansion of armed conflict. The amount of divergence and delinquency is also reflected when superpowers pledging for the

¹⁴ Alva Myrdal, "Game of Disarmament: How Russia and U.S. Run the Arms Race", p – 6.

ratification of important treaties, were simultaneously installing arms in space and developing Intercontinental Ballistic Missiles (ICBM),

TABLE-1 Soviet and American Strategic Nuclear Forces, 1963-1986

	1963	1972	1981	1986 With SALT II	1986 Without SALT II
ICBMs					
United States	424	1054	1052	1052	1052
Soviet Union	90	1533	1398	1200	1604
MIRVed ICBMs					
United States	0	139	550	550	550
Soviet Union	0	0	652	820	1190
ICBM warheads					
United States	424	1332	2152	2152	2152
Soviet Union	90	1533	5354	6080	9110
SLBMs					
United States	224	656	576	640	712
Soviet Union	107	437	950	950	1016
MIRVed SLBMs					
United States	0	160	496	640	664
Soviet Union	0	0	192	380	444
SLBM warheads					
United States	224	2096	4656	6344	6584
Soviet Union	107	437	1334	2470	3740
Intercontinental bombers					
United States	630	457	348	348	348
Soviet Union	190	156	156	100	150
Strategic cruise missiles					
United States	0	0	0	2600	3400
Soviet Union	0	0	0	0	100
Total delivery vehicles					
United States	1278	2167	1975	4688	5512
Soviet Union	387	2110	2504	2250	2870
Total force loadings (Warheads and bombs)					
United States	?	5598	9000	13100	13260
Soviet Union	?	2282	7000	8750	13150

Source: Bruce Russett, *The Prisoners of Insecurity: Nuclear deterrence, The Arms Race and Arms Control*. Originally derived from U.S. Department of Defence Reports.

Arms escalation and the failure of arms controlling mechanisms have had a negative impact on some nation states. A vertical proliferation of arms by the superpowers led to a horizontal proliferation among other nation states. Nations which perceived a threat from its neighbors, or nations which had some amount of socio-economic mileage over others and those who felt that an escalation in arms might act as a barrier upon their territorial

integrity and sovereignty went towards increasing their nuclear stockpiles. Hence a security dilemma drove them towards choosing nuclear weapons as the only alternate security strategy. There have also been cases in which nation states wanted the status-Quo to be maintained and adhered to nuclear options even without a threat, to enhance its bargaining strength. But even if armaments that cause the perception of a challenge are intended to be purely defensive, they are liable to provoke an armed response¹⁵. Moreover, there have been nations like France, Germany, and Japan, who with their own versions of world order had a long history of restoring indigenous cultures by taking recourse to the principle of conventional warring/

Samuel P. Huntington speaks about culturally dominant societies shaping the future world order. In the emerging era, clashes of civilizations are the greatest threat to world peace, and an international order based on civilizations is the surest safeguard against World War¹⁶. He identifies that nation always search for commonality in cultures and nuclear war can be avoided if cultures match. He further specifies that religion determine culture. In culturally dominant societies, though individual rationality leads to group rationality yet the role of the global elites in reinstating the global nuclear order is hard to be denied/

Lewis Richardson (1960) has appropriately put forward a model to describe armament build-up between two countries basing upon three assumptions. His assumptions are

¹⁵ Harald Muller, David Fisher, Wolf G Kotter (ed)., "Nuclear Non-Proliferation and Global Order", p - 2

¹⁶ Samuel P. Huntington, "The Clash of Civilization and the Remaking of World Order", p – 321.

1. In an armaments race between two countries, each country would attempt to increase its armaments proportionally to the size of the armaments of the other.
2. Economics is a constraint on armaments that tends to diminish the rate of armaments by an amount proportional to the size of the existing forces.
3. A nation would build-up arms guided by ambition, grievances and hostilities even if another nation poses no threat to it.

Richardson's model fails to identify that multiple actors represent the global order though only a few might play dominant roles. Many nations both developed and developing have felt the need to use an impregnable defensive shield so that the adversary is deterred. There have been nations like India, Pakistan and Brazil who took up nuclear options as an instrument of their foreign policy decisions¹⁷.

Structures like Weapons Intelligence Systems Programme (WISP) conceived and developed in U.S.A., provided additional amount of threat to these newly developing nuclear states. As a consequence the domestic economic infrastructure of these developing countries was enfeebled, because huge amount of resources were allocated towards the development of strategic defence. The introduction of nuclear weapons into different areas will continue to nullify the American–Russian bipolarity and to alter the global political system. This will result from the greater independence of the proliferating nations and the creation of political subsystems¹⁸. Though to carry out an overt national

¹⁷ Ibid P - 1

¹⁸ Walter B. Wentz, "Nuclear Proliferation", p – 150.

nuclear weapon programme seemed unfeasible for lesser powers, but deterrent strategy adopted by superpowers boosted their interests in keeping nuclear options as a stand-by.

The process of assessing a nuclear power is pretty erroneous. Strategic nuclear superiority or inferiority among superpowers has been circumstantial and can only be judged at a time when either of the party is prepared to use nuclear weapons. Most of the times a nation-state was regarded a nuclear power if they succeeded in making a nuclear test. This is how India was called a nuclear state after its Pokhran blasts in 1974. From the “Nuclear Inferno” in Hiroshima, the intensity of fissionable material is identified, but to what extent a nuclear bomb can devastate remains unanswered. Again, ambiguity persists with regard to the intensity of its aftereffects. We are still not aware of the quantities of the laser guided nuclear arms including space sensors, electronic information processing and precision targeting devices that are installed in space. Moreover, due to unavailability of proper information and other technical and institutional shortcomings, both qualification and quantification of available nuclear weapons becomes a tough exercise. Surprisingly, we have only one common information and that is, a huge number of uranium plants – with nuclear reactors still exist.

The concept of security is not a self-emerging event in history. It is rather a social evolutionary creation. Hence an imperialist or a totalitarian will have their own versions of security, which might not tantamount to the interpretations of the security provided by ‘other’ nations. The concept of détente embodied in U.N. charter and adopted as a general-democratic international law after the 2nd world war, failed to come up as a

positive security policy enhancing peaceful coexistence and upholding the interest of other international actors. According to Schwarz, "The policy of détente adopted pragmatically has been the only reasonable practice, indeed, but enthusiasm and hope to bring about a fundamental change have made themselves scarce". The concept of peace is also abstract and there have been problems in defining peace and how peace can be attained. Peace and security are inextricably linked with the socio-economic conditions of existence inherent in a specific historical environment. Detente, which was intended to bring in peace by eradicating the more complicated forms of strategic conflict, was replaced by deterrence.

The policy of proliferation or non-proliferation is essentially related to deterrence. The rational theory of deterrence starting with the "enduring rivalries"¹⁹ between superpowers manifest in the era of cold war or the era of 'uneasy peace', had the task of demonstrating that certainty is an illusion: an ineradicable uncertainty is inherent in the deterministic threats promulgated by superpowers²⁰. The concept of deterrence is based on assessing the amount of threat the other nation can pose. The nations in general always perceive more amount of threat than what is really existent. By assessing threat the nations not only build conventional and nuclear hardware but also use spy satellites with high-resolution cameras for processing information. It involves calculating both the first and second-strike capacity of the contending nations. Deterrence is reassured by the concept of Mutual Assured Destruction (MAD) in which both nations are burly enough to inflict heavy injury upon each other. The concept of MAD has further led to the idea of making

¹⁹ Bruce russet uses the term enduring rivalries to designate 'nation-states' in general and 'superpowers' in particular.

²⁰ Steven J.Brams, "Superpower Games", p-6

a Doms day machine in which a super bomb will go off automatically if the country undergoes a severe nuclear attack. If the adversary has a second strike capacity and can use and control the Doms day machine than the opponent is deterred.

Here though a fair chance of nuclear war becomes unfeasible, yet there are high chances of lower forms of violence. Countering violence for violence is a case of build-up verses build-up. The adversary nations are strongly urged to equip themselves with sophisticated nuclear arms. If both sides can inflict an unacceptable level of damage against the other, then equilibrium is obtained and military stability exists²¹. But powers and threat are conceptual dispositions that never exactly balance because of changing social orders and shifting biases of the superpowers in terms of strategic policy formulation. Again if both powers can convince each other that each has the capability of MAD than deterrence can turn into détente or other forms of tacit co-operation. Thus deterrence has been more a strategy of near war and less a strategy of total war because recourse to total nuclear war creates existential deterrence²².

Balance of power was replaced by balance of terror. Deterrence as a peacekeeper looks less persuasive and more like a dangerous kind of handgun that bore the nickname "peace-maker". Mutual nuclear deterrence perhaps prevented *nuclear war*, but had there been no nuclear weapons, by definition there could not have been a nuclear war any way²³. In deterrence there is a perceived notion of incompatibility of interest among

²¹ Walter B. Wentz, "Nuclear Proliferation", P – 145.

²² McGeorge Bundy (1983) speaks about 'existential' deterrence.

²³ John Gjelstad, O Njolstad, "Nuclear Rivalry and International Order", p - 82

superpowers. Finally, deterrence, détente and peace are all abstract phenomena that have been used at different points of time by the superpowers to represent their security policy,

The superpower in the late 60's were building up Multiple Independently Targetable Reentry Vehicle (MIRV) and ICBM. Both MIRV and ICBM served as a bargaining chip in later disarmament negotiations like Salt-I. The deployment of MIRV further led to the escalation of nuclear warheads. A huge amount of modified nuclear technologies were sold and the prices of crude oil was controlled by superpowers in the field of international trade and investment thereby making it rather difficult to make out whether economic or security concerns dominated the security strategies of U.S.A. and Soviet policy makers.

The newly emerging powerful nation states in the late 60's, a rise in global consciousness regarding the dire consequences of nuclear war and ultimately the birth of platform like NAM professing ideological pluralism, U.S.A. and U.S.S.R. had no option but to move from deterrence to détente. The Superpowers were convinced with the fact that the rising heads of other nuclear nations can only be chopped off if the role and importance of nuclear weapons as an instrument of policy²⁴ is de-emphasized and multi lateral non-proliferation policy opted. Through unilateral, bilateral and multilateral negotiations both at the overt and covert level, they have tried to regulate arms escalation vis-à-vis arms race. U.S.A. President Johnson on Jan'27th 1966 stated that avoidance of war is the central common concern of all mankind. He said, "My country is dedicated to this end. The effort to control and reduce ——— and ultimately ——— eliminate modern engines of

²⁴ Ibid p-1

nuclear destruction is fundamental to our policy. We have with all mankind, a common interest in acting now to prevent nuclear spread, to halt the nuclear arms race, and to reduce nuclear stocks²⁵.

Arms controlling measures were adopted as the most candid approach to establish peace. Thomas L. Saaty (1968) Defines Arms Control as an attempt of the nations to impose arbitrary linking on the instruments and consequences of conflict²⁶. Conflict is an abstract term and its purview is so wide that no theoretical attempts have been sufficient to define it. At the sociological level, conflict is the opposite of co-operation and a consequence of stringent competition. Morton Deutsch (1991) says that misconceptions and misjudgments between contending parties can happen for impoverished communication, hostile attitudes and over sensitivity to differences, which can thus perpetuate conflict²⁷. Conflict may be of nerves, may be of ideologies, may be of structures, but superpower conflict has been predominantly strategic. A strategic conflict is not always to be resolved because once real issues are resolved through conflict management tools; the superpowers will never be at an advantage. Moreover strategic conflicts have been predominantly nuclear. And nuclear conflicts with all its potential levels and related dimensions have been fundamentally different from other types of conflict.

War is the ultimate end to a conflict, and more precisely a nuclear war is the ultimate end to a strategic conflict. The intensity of war more or less remains the same, whether it is

²⁵ Walter B. Wentz, "Nuclear Proliferation", p - 148

²⁶ He argues that the minimization of the consequences of conflict can reversibly lead to the outbreak of armed conflict.

²⁷ Problems can also happen with regard to pre-play communication for lack of information or disinformation.

fought with a nuclear weapon or with ultra-sophisticated military hardware. The word 'War' implies some recognizable use of force, but except for the distinction between redistributions that occur 'voluntarily' and those there are forced by some form of "aggression", countries can be required to transfer resources by opposite coalitions in any nuclear of ways, from peaceful negotiation to armed conflict²⁸. Wars as of definition are mainly conventional though holding nuclear options can add to the strategic maneuverability of a nation. The difference is only of time. A fission bomb can destroy within seconds while conventional weapons take longer time to devastate. This table illustrates the amount of weapons that were manufactured by U.S.A.

TABLE -2. Three Capability Indexes in the Post-World War II Era

Year	Naval Capability Index	Ha Strategic Weapons Index	Nuclear	Ward Military Stockpile Data Index
1946	1.000	1.000		n.d.
1951	1.000	1.000		0.959
1955	1.000	0.903		0.877
1960	0.724	0.717		0.860
1965	0.770	0.728		0.863
1970	0.714	0.620		0.713
1975	0.707	0.726		0.674
1976	0.639	0.611		0.531

NOTE: Ha's (1983: 35) index represents the United States' proportion of strategic nuclear warheads deliverable by bombers, land-based missiles and sea-based missiles. The U.S. share is based on an N encompassing the Soviet Union, the United Kingdom, France, China and the United States. Ward's (1984:312) military stockpile data combine two indexes. One measures the conventional forces (manpower X fire power X mobility) of the Soviet Union, /East Germany, West Germany and the United States. The second series focuses on U.S and U.S.S.R. strategic forces (total number of weapons weighted by lethality). The two indexed are added and then divided by 1.000. The series in this table is the U.S. (and the West German contribution to the conventional index) share of the total stockpile data.²⁹

After a handy bargaining in the Cuban Missile Crisis and more specifically after the installation of hot line between White House and Kremlin, both the powers ardently felt to substantiate tactical decisions on the policies of war and peace. Some wars bring about

²⁸ Emerson Niou, Peter Ordeshook, "Preventive War and the Balance of Power", p - 416.

²⁹ William R. T, Karen A. R, "War and Systemic Capability Reconciliation", p - 353.

structural change and some wars happen because of a negative structural change. On the basis of history and structural development, wars can be assigned variety of labels. Wallerstein (1984) speaks about 'world war', Modelski (1984) speaks about 'global war' and Midlarsky³⁰ speaks about a 'systemic war'. An interesting interpretation relevant to this research has been put forward by Gilpin (1981). He describes a 'hegemonic war' as a war between the already declared belligerent nations and the upcoming powerful states. This sort of a war is primarily strategic and continues to flourish as potential states tries to stop the newly emerging powers. The most important consequence of a hegemonic war is that it determines who will govern the international system and whose interests will be ultimately served by the new international order³¹. Levy (1985) speaks about 'general war' but accepts that it is rather unfeasible to define general war in terms of systemic consequences of the war. Table2 speaks about the characteristics of these wars.

TABLE – 3 The Array of Conceptual Elements In Five Definitions of System Wars

Conceptual Elements Stressed	Gilpin	Modelski	Wallerstein	Midlarsky	Levy
Participation					
Most or all major actors	X	X	X	X	X
System leader					X
System leader and challenger(s)					
Most minor actors	X				
Long duration	X	X	X	X	
Scope					
Board geographical	X	X			
Scope					
Land-based			X		
Great severity / intensity	X		X		X
Fundamental issues				X	
Substantial civilian involvement				X	
Necessary structural causes	X	X	X	X	
Consequences					
Concrete structural change	X	X	X		
Potential structural change	?				X

Source: William r. Thompson, Karen A .R Rasler, Journal of Conflict Resolution page-339

³⁰ Midlarsky emphasizes on the structural and processual similarities and argues that this type of war is long in duration and a substantial proportion of the population becomes involved in the combat.

³¹ William R. T, Karen A. R, "War and Systemic Capability Reconcentration", p – 337.

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Brodie (1973) speaking about 'preventive war' says that a country undertakes to destroy an already strong rival whose power one fears may grow faster than one's own³². To prevent is better than to cure. Hence a war is better than healing the devastations made in war. Thus adhering to the policy of war, more precisely strategic war makes the world order vulnerable because there happens a shift in security policies of all major powers. Nations then feel like considering the question of 'insecurity' in order to maintain a secured system vis-à-vis stable system. The powers are also urged to make the 'other' powers feel unsecured by adopting strategic security policies. The amount of 'mutual distrust' upheld by the nation-states in times of foreign policy formulation, ultimately affects prospects of enduring peace. Barring disinformation or imperfect information 'mutual distrust' can also develop if the contending parties fail to interact informally. If the contending parties have prior knowledge about the nature of conflict he is in, and the outcome of the conflict if they take rational decisions, then there is a larger chance of conditional co-operation and the accommodation of competitive interests. There is a normative framework, which regulates the relations between the conflicting parties and the abilities and skills of the conflicting parties to engage in different types of conflict processes³³. Initiation of formal arms control treaties and protocols also furthered the conflict process.

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U.S.A. and U.S.S.R. had a common interest in stabilizing the arms race³⁴ by regulating it. Stability in the arms race has been based on the policy of deterrence, or Mutual Assured

³² Emerson Niou and Peter Ordeshook, "Preventive War and the Balance of Power", p - 389.

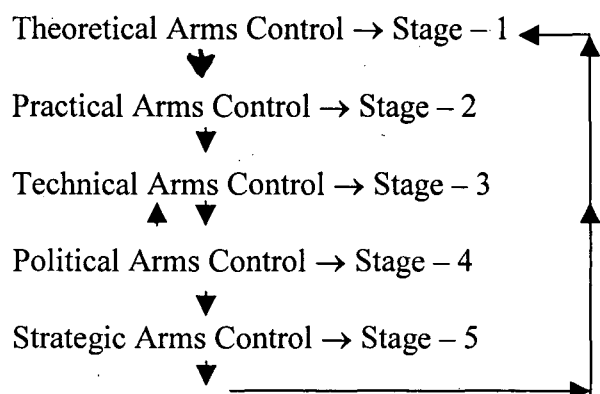
³³ Raimo Vayrymen (ed.), "New Dimension in Conflict Theory", p - 27.

³⁴ See Paul F. Diehl's Study of the methodological interpretation of arms race put forward by Wallace (1982).



Destruction (MAD) --- the ability and willingness of each side to respond to a preemptive first strike³⁵. Arms controlling measures at the policy level and disarmament at the institutional level provided the intellectual spin-off to the growing arms technology.

A five-stage model for the development of the concept of arms control can be given.



In the first stage both the superpowers with their own conceptions of world order³⁶ defines the theoretical aspects of arms control. The first stage not only deals with subjectively defining the concept of arms control but also helped in providing a purview within which arms control can work. The assumption behind arms control was arms escalation, a phenomenon rampant in the late 50's and early 60's of the 20th Century. Thus, even the power of sophisticated non-nuclear weapons was underemphasized and nuclear weapons were considered as an instrument of policy³⁷. Arms control was defined as a tool that provides national security and subsequently brings in peace. Thus with a purpose defined, the conceptual disposition of arms control was ascribed with a structural functional paradigm and a system was attributed within which it was to work. In the

³⁵ Steven J. Brams, Philip D. Straffin, "The Geometry of the Arms Race", p- 583.

³⁶ Ibid

³⁷ Ibid

second stage, the purposes of arms control was translated into embodied documents like protocols and agreements. In this practical arms control stage, the superpowers defined powers on the basis of their possessing or not-possessing nuclear weapons. In this stage both the powers tried to qualitatively and quantitatively describe the role of sophisticated nuclear systems in shaping the international political order. The picture of both the problems and prospects of a nuclear world was provided before the 'other' world. The concept of threat and its relation to stability was redefined. Arms control policies spoke about reducing the nuclear stockpiles step by step until total disarmament is achieved. In the third level, the technical aspects of nuclear arms and their related parameters are defined. In this stage the methods, tactics and patterns of military uses of nuclear weapons becomes clear. Complicated technical, military and hardware problems are supposed to be solved. The quality of strategic arms with regard to their technological sophistications is put before the global order. The process is further enervated with the exploration of the capabilities of these sophisticated nuclear weapons. This stage of arms controlling is invariably related with political arms control because the political support of the electorate as well as the policy makers are needed to give arms control its proper form. Political support is needed further to get negotiations underway and must be maintained for agreements to be ratified³⁸. Thus a certain amount of bureaucratization of the technical process is needed. For superpowers, in real life situations, coordinating military and engineering judgment with diplomatic negotiation has proved to be cumbersome at different points of time³⁹. The last stage is the stage of strategic control in which the superpowers establishes a domain of control over the rest of the world, outside

³⁸ Henry W. Schaefer, "Nuclear Arms Control: The Process of Developing Positions", p – 3.

³⁹ Thomas C. Schelling, Morton, "Strategy and Arms Control", p – 83.

the domain of arms control. The strategic perception of arms control has concentrated more on force balance and changes in force structure than on force levels, it has tended to equate arms control with shifts in force composition that faster deterrence and stability⁴⁰. Strategic control redefined theoretical arms control to move with same structure but with different functions.

Most of the negotiations exhibited active diplomacy and much support for a formal ban; but they also showed hesitations by the great powers about relatively unimportant parts of their defence planning and by important non-nuclear nations about their future if they abjure these weapons formally and permanently⁴¹. Though there are several problems in subjectively identifying the real purposes of the superpowers towards emphasizing the policy of non-proliferation yet their explicit involvement in technology transfers and nuclearization of space proves beyond any shadow of doubt that non-proliferation policy was only a pawn on the global nuclear chessboard. William Kincaid, former executive director of the Arms control Association, has argued that it is essential to create the ability to judge negotiated security proposals and agreements, so that citizens can distinguish what is equitable, negotiable, domestically acceptable, verifiable, enduring and productive of greater security from what is not⁴².

A study of a multilateral treaty like NPT might help in providing us with deeper insights with regard to the nature of involvement of the superpowers in arms-control negotiations.

⁴⁰ Henry W. Schaefer, "Nuclear Arms Control: The Process of Developing Positions", p – 25.

⁴¹ Leonard Beaton, "Must the Bomb Spread", p – 137.

⁴² Henry W. Schaefer, "Nuclear Arms Control: The Process of Developing Positions", p – 9.

CHAPTER-2

HISTROY OF THE DEVELOPMENT

OF NPT

The Idea of formulation of a comprehensive multilateral arms control treaty like Nuclear Non-Proliferation Treaty (NPT), owes its genesis to the conventional disarmament negotiations which was first conceived by the Hague Conference of 1899. A reiteration of the process was followed up by the 2nd Hague Conference of 1907 in which international assemblies tried to evolve international laws for the pacific settlement of disputes. The use of poison gas, which was very much frequent in conventional wars, was banned. A code was developed to stop the bombardment of undefended habitations. A permanent code for arbitration was also established. In the year 1906, thirteen countries including U.S.A signed the Treaty of Algeiras, to stop arms trafficking.

A major progress towards achieving disarmament was manifest in the Treaty of Locarno passed on Nov. 16, 1925, which clearly revealed the willingness of the international actors to solve disputes amicably. The international actors ardently felt the increasing amount of tension and conflict and considered conflict as a central problem that acts as an impediment upon the conditions of peace everywhere. In the year 1928, the Kellogg-Briand Pact was signed by 63 states to put an end to war. In the Geneva convention of 1929, representatives of forty-seven governments, adopted conventions on the treatment of prisoners of war. In the year 1932 a major step towards disarmament programme took place and World Disarmament Conference was conducted by various nations to bring an end to the use of conventional weapons and redefine rules pertaining to security and insecurity. Unfortunately all these treaties were awfully breached when many European nations went for arms licensing and rampant arms trading.

After the formation of the United Nations (U.N.), the Security Council was empowered by Articles 11, 26 and 47 to control the proliferation of arms. Article 39, of the U.N. charter maintained that the Security Council shall determine the existence of any threat to peace, breach of peace, or an act of aggression and shall make recommendation, or will decide upon the measures to be taken to maintain international security. The principle of collective security was adopted. The formation of the United Nations after the 2nd World War provided the first boost to bipolar politics and marked the entry of U.S.A. and U.S.S.R. in the global political scenario as supreme powers with their own conceptions of world order⁴³. Germany was shattered, Italy was severely affected, British fleet was in shambles, and it was only U.S.A. and U.S.S.R., which suffered very little from the post war effects. So the responsibility to look into the problems and prospects of war and peace was bestowed upon U.S.A. and U.S.S.R. by the war-struck European Nations. Both U.S.A. and U.S.S.R. started using United Nations as their platform to decide upon questions of war and peace vis-à-vis international security. They were subjectively ascribed with the power of initiating, formulating, negotiating and arbitrating treaties, protocols and conventions.

Actions and words are essential prerequisites of informal and formal bargaining. Weiss and Strip (1985) have developed a conceptual framework of negotiations that includes seven national negotiating styles in terms of these variables: American, Chinese, French, Japanese, Mexican, Nigerian and Saudi. Employing their variable, Weiss and strip characterize the American style of negotiation pattern as: competitive, soliciting negotiators on the basis of knowledge and experience; oriented to substantive issues;

⁴³ Ibid.

informal; explicit in communication style; employing empirically based reasoning in persuasive argumentation; individualistic; trust rests on verification and enforceability of agreements, risk-taking; negotiating under a sense of time pressure; making decisions authoritatively and preferring contractual agreements⁴⁴. This subjective categorization of culturally sensitive variables put forward by Weiss and Strip fails to identify that the dimensions of time and space and the nature of their political involvement determines the itinerary of these negotiating techniques. One implication inherent in this generalization is that U.S. negotiators seem to distrust 'other' international actors. U.S.A.'s feeling of distrust towards 'others' might be an ant offshoot of a 'perceived' distrust from 'other' nations. At the extreme, the U.S. policy makers even felt that they might be truncated if they fail to perform to their standards. Thus, the negotiators even risked themselves to enter into enigmatic international conflict situations, to garner advantage over other nations. The same 'trust-distrust' syndrome can be applied in the case of U.S.S.R. though their pattern of carrying out negotiations was different.

Since the end of World War, world history was to large extent determined by the tidal waves of relations between U.S.A. and U.S.S.R. and any disturbance at one point began upsetting all other points of the 'maintained' equilibrium. As part of their security policy they took up détente through deterrence thus maintaining the cold war intact. Talking disarmament while relentlessly building up their own armaments to dazing levels, prodding and aiding allied countries to do the same, though on a more modest scale, making the world more dangerous; compelling even non-aligned countries to keep their

⁴⁴ Raimo Vayrymen (ed)., "New Dimension in Conflict Theory", p – 36.

defenses high – this is how peoples and governments of lesser powers have experienced superpower politics after the war⁴⁵.

These powers were the original initiators to consider nuclear options as a part of their foreign policy, and an overt explanation of this phenomenon can be drawn from U.S.S.R.'s denial to accept the Baruch Plan. Superpower gaming started with their adhering to 'one-step forward two-step backward' formula with regard to their non-proliferation measures. Both the countries felt that in order to maintain a status-quo, both emphasizing and de-emphasizing the role of nuclear options is essential. As the first major disarmament programme under the conditions of bipolarity, the Geneva meetings were held in the year 1955 which specified on positive disarmament and tried to put an end to military establishments. On 1st December 1959 the Antarctica Treaty was passed. This treaty tried to provide a much more congenial framework for providing peace and security by denuclearising the Antarctic Zone. It provided for the inspection of the Antarctica stations by the signatory nations.

The early 1960's represented a paradigm shift in bipolar politics with a new version of U.S. – Soviet strategic relationship. American attention shifted in the way of making greater provision for limited war while Soviet decision makers were trying to decode the 'virtual-real' nuclear capacity of U.S.A. and desperately trying to find out the means to reduce them⁴⁶. On 5th August 1963, U.S.A., U.S.S.R. and U.K. passed the Partial Test Ban Treaty (PTBT) in order to prohibit testing of nuclear devices under water and above

⁴⁵ Alva Myrdal, "Game of Disarmament", p – 25.

⁴⁶ Jeffrey, Robert, Uri (ed.), "Superpowers in the Multinuclear World", p – 3. In this article John Ericson relates it with Khrushchev's Policy of 'minimum deterrence'.

ground. But this treaty did not ban underground tests. This year also marked the partial shutdown of Britain's Capenhurst gaseous plant. By the time, Partial Test Ban Treaty (PTBT) was passed; American nuclear stockpile was so large that the production had to be maintained in the gaseous diffusion plants so as to avoid the labour difficulties of a rapid cessation of production⁴⁷. The Outer Space Treaty passed on 27th January 1967, tried to stop arms escalation in space and provided for granting opportunities for foreign inspection of installations on moon and other celestial bodies and international observation of space flights. On 14th February 1967, the Treaty of Tlatelolco was passed to stop proliferation of arms in Latin America and to strive for nuclear free zones.

The most significant international agreement on arms control since the beginning of the nuclear epoch has been Nuclear Non Proliferation Treaty (NPT) passed on 1st July 1968. Though Howe calls it the 'most-abused'⁴⁸ among modern pacts, yet there is no denying the fact that NPT has been the first all-encompassing instrument which tried to establish nuclear free zones and de-emphasize the role of nuclear weapons as an instrument of policy⁴⁹. The comprehensiveness ascribed to this treaty is also because of the fact that NPT tried to define nation states in terms of holding or not holding nuclear weapons. Moreover, with the flow of information between White House and Kremlin, because of the establishment of hot line on June 20 1963, initiation of this treaty was enhanced. Barring U.S.A. and U.S.S.R. another prime mover in NPT has been Britain. NPT came into force on 5th March 1970 with ninety-one countries excluding U.S.A, U.S.S.R and

⁴⁷ Leonard Beaton, "Must the Bomb Spread", p – 110.

⁴⁸ Howe calls it most-abused because of its breach. He aptly says, "NPT has been honoured largely in the breach".

⁴⁹ Ibid.

Britain ratifying the treaty. The conspicuous non-signers were China, India, Cuba, Pakistan, France, West Germany and South Africa.

The provenance of NPT lies with the Irish Resolution of 20th December 1960. This resolution was convinced with the fact there was an increase in the number of states possessing nuclear weapons that can threaten to intensify the arms race. Hence there was a call for global cooperation to solve the problem of escalating arms. The resolution called upon all states and urged them to cooperate to reach at an international agreement whereby the states producing nuclear weapons should refrain from relinquishing control of such weapons to any nation not possessing them and whereby states not possessing them would refrain from manufacturing them. One thing which is crystal clear in this resolution is that since the great divide after the Second World War, the major states have been trying to stop the arms proliferation among non-nuclear nations. It was an attempt to nip in the bud of the burgeoning nation states, which were willing to get a hand over nuclear power for security and supremacy. U.S.A. spearheaded Arms Control and Disarmament Agency (ACDA) made clearer statements regarding this. In its opening statement, Public Law 87-297, September 26, 1961, known as the Arms control and Disarmaments Act, ACDA stated that, "An ultimate goal of U.S.A. is a world which is free from the scourge of war and the burdens of armaments: in which the use of force has been subordinated to the rule of law, in which international adjustments to a changing world are achieved peacefully. It is the purpose of this Act to deal with the problem of reduction and control of armaments looking toward ultimate disarmament"⁵⁰. In the year 1962, both U.S.A. and U.S.S.R. drafted treaties on complete and General Disarmament

⁵⁰ Thomas I. Saaty, "Mathematical models of Arms Control and Disarmament", p- 3.

specifying the need to reduce the force level of conventional weapons as also nuclear arms.

The Cuban Missile Crisis in the year 1962 also initiated the need of formulation of an all-inclusive non-proliferation policy. Superpowers were urged to involve themselves in practical gaming and U.S.S.R. withdrawal of military brigade from Cuba on the basis of an overt warning and covert request from U.S.A. intensified the gaming process. Both the governments redefined their nuclear capacity vis-à-vis strategic superiority, on the basis of possessing nuclear weapons. It was a conflict that was driven to the brink of war and then resolved. It was practically the first experiment of the reconnaissance satellites to provide relevant information using high-resolution cameras. Indeed, it sowed the seeds of today's much talked about "verification problem", when from October 14 to October 21, 1962, U.S.A. by using photographic evidence, went on to measure the qualitative and quantitative intensity of the then Soviet troops stationed in Cuba. It was a period of rich and handy bargaining between the two powers, a period when international political order was redefined and a period that marked the start of an "adversary-partner" relation between the two. The relation was given an instrumental shape when both Kennedy and Khrushchev regarded each other as both adversary and partner. The Cuban Missile Crisis also helped in the growth of concepts like stable threat and immediate threat. Premier Khrushchev proposed a trade of Soviet missiles in Cuba for NATO missile bases in Turkey; the U.N. Security Council was to verify fulfillment of both operations, contingent upon the approval of the Cuban and Turkish Governments⁵¹.

⁵¹ Ole Holsti Richard B, Robert N, "Measuring Affect and Action in International Reaction Models" p - 172

Thus, the crisis defined before the international order⁵², the role of formidable nuclear weapons and its power to deter threat. A strong stimulus provided by one of the interacting decision maker involves a strong response by the other actor. Hence, as mutual military build up increases, the probabilities of further escalation simultaneously de-emphasizing the role of nuclear weapons increases the probabilities of non-proliferation. Hence when the power balances or when both the countries suffer from equal intensity or “security-insecurity” syndrome, there arises a fairer chance of cooperation with regard to issues of strategic importance. Relations between superpowers then were judged on the basis of tension and tension reduction. Relevant to this, Osgood (1962) recommended a conflict management tool called GRIT (Graduated Reciprocation In Tension Reduction).

Robin Ranger considers the year 1964 an important year that marked a change of focus from surprise Attack to Non-proliferation. Arms Control policies became the major tool of the superpowers to maintain détente. After a hiatus that lasted until October, 1966 the political leadership of both superpowers shifted away from this limited view of political arms control as providing for a relaxation of tensions after a major crisis and on to a broader concept of arms control as the chief modality for a major superpower détente stressing their unique bilateral interdependence in the nuclear age⁵³. After futile attempts of the Eighteen – Nation Disarmament Committee (ENDC) to come to an agreement about the them stapes of nuclear forces, United Nations Disarmaments Commission took the matter of non-dissemination in its own hands and instructed the Eighteen Nation

⁵² Hedley Bull differentiates between World Order and International Order - *ibid*, chap – 1, p - 4.

⁵³ Robin Ranger, “Arms And Politics 1957-1978: Arms Control In a Changing Political Context”, p – 81.

Disarmament Committee to prioritize a treaty of comprehensive arms-control. On the other side of the World, the Non-aligned nations were busy drafting a general treaty to stop the escalation of strategic arms. The Cairo conference in October 1964, pleaded for a comprehensive nuclear test ban to achieve General and Complete Disarmament. Similar aspirations were manifest among the Latin American countries and except the Dominican Republic of Cuba, all other urged for nuclear free zones.

It was U.S.A. who submitted the first draft to ENDC on August 17, 1965, to prevent the escalation of nuclear weapons. It provided for the definition of a nuclear power and under that U.S.A., U.S.S.R., U.K., France and China were included. It was the first naïve attempt to denuclearize the then coming – up nuclear nation states. On September 24, 1965 an almost identical draft was submitted to the twentieth session of the United Nations General Assembly. It specified on the banning of transfer of all nuclear information to non-nuclear states. In the American draft, Article I spoke about the non-transfer of any nuclear weapons into the national control of any non-nuclear state either directly or indirectly or through military alliance⁵⁴. The amount of convergence in these two treaties, especially alter Articles I and II, proves beyond any shadow of doubt that the installation of hot line and other reconnaissance measures opted by the superpowers provided them with a common knowledge that was relevant to the development of both. The same criticism was made by the British delegate, Lord Chalfont: It is our view that the present draft of Articles I and II of the treaty does leave open one possibility, which may well have more theoretical than practical importance but which would prefer to see

⁵⁴ Michael E. Sherman, “Nuclear Proliferation: The Treaty and After”, p – 41.

closed⁵⁵. On 21st March 1966, the United States tabled amendments to its draft Treaty of 1965 in the ENDC, seeking to clarify and emphasize the Western view that collective defense arrangements would not violate the principle of non-proliferation. The role of nuclear weapons in shaping security policies was emphasized⁵⁶. It also tried to make a positive trade off between NATO sharing plans and non-proliferation. By the end of 1966 the U.S. and Soviet co-chairmen of the ENDC began private talks, and by the end of the year they had reached tentative agreement on the basic non-transfer and non-acquisition provisions of a Treaty, as well as other related aspects to arrest the proliferating nations..

On August 24, 1967, the United States and the Soviet Union were able to submit separate but identical texts of a draft Treaty to the ENDC. Other ENDC members proposed numerous amendments, largely reflecting the concerns of the non-nuclear states⁵⁷. On January 18th, 1968, both U.S.A. and U.S.S.R. decided to submit the final draft to the Eighteen Nation Disarmament Committee (ENDC) with minor changes. It laid down that the parties to the treaty possessing no nuclear weapons shall conclude agreements with International Atomic Energy Agency (IAEA) individually or jointly with other states in accordance with its charter⁵⁸. It was at the 22nd session of General Assembly that the treaty as a marked step towards armaments reduction and proliferation was recognized. With both U.S.S.R. and U.S.A. trying to provide security guarantees to those nations not possessing sophisticated nuclear arms and those who were not willing to develop it. Hence the terms of security as well as insecurity was redefined on the lines of threat and

⁵⁵ Leonard Beaton, "Must the Bomb Spread", p – 135.

⁵⁶ Ibid.

⁵⁷ See U.N web site

⁵⁸ A. Y. Yefremov, "Nuclear Disarmament", p – 128.

more specifically nuclear threat. On the 7th March 1968 U.S.A., Britain and Soviet Union submitted to the Eighteen Nations Disarmament Committee (ENDC) a draft resolution to be adopted by the Security Council. The draft resolution considered that many non-nuclear states are debarred from enjoying the bliss of peace because of an emergent security crisis. The draft also spoke about providing assistance to the non-nuclear states if they are threatened by the peril of nuclear arms. In the final draft submitted to the U.N. General Assembly on March 11, 1968, ENDC representing both U.S.A. and U.S.S.R. incorporated two more things. One is the Japanese proposal to review the treaty every five years after it comes into force and the second one was the Swedish proposal to end all experimental tests of nuclear weapons. On June 19, 1968 the Security Council adopted a resolution submitted by the U.S.S.R., U.S.A. and Britain, which provided security guarantees for the non-nuclear states. The treaty was eventually passed on 1st July 1968. T.B. Millar (1971) indicates the presence of a measure of soviet – American condominium with regard to the formulation of Nuclear Non-Proliferation Treaty.

Article I of Nuclear Non-Proliferation Treaty stated: “Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices”. This article in its perfect embodiment was primarily designed to stop the

emerging nation states with their own conception of world order⁵⁹. The hegemony maintained by the two powers was not to be disturbed. It also marked a flexible threat response to military policies of up coming major powers. They were ascribed with a second-class status and also debarred from harnessing the positive facets of nuclear energy for peaceful purposes. Article III said about not to provide source or other fissionable material to non-nuclear countries, and signatories to the treaty were urged not to provide any sort of help to the nuclear aspirants. The superpowers were astonished at the unprecedented development of the aspiring nations. At a time when U.S.A. and U.S.S.R. were passionately trying to denuclearize the world through sophisticated bargaining mechanisms, at the same time i.e. in the year 1968, Soviets had a hard nuclear bargaining in Czechoslovakia and U.S.A. suffered a loss of face in Vietnam. The amount of hypocrisy is revealed further when both these powers using article X of nuclear non-proliferation treaty tried to stabilize the arms controlling mechanism by extending the treaty for another twenty-five years from the day it comes into force i.e. from 5th March 1970. Both for U.S.A. and U.S.S.R. stabilizing the arms race by regulating was the only golden mean to restore its eroding bases. A reiteration of this process was seen when International Atomic Energy Agency (IAEA) a stooge in the hands of both the powers was provided with powers and responsibilities to decide upon the questions relation to the research, manufacture and transfer of nuclear devices. It is really hard to forget that International Atomic Energy Agency (IAEA) in the early 60's of the 20th Century set out in the selling of nuclear weapons under 'safeguards'. Leonard Beaton (1966) quotes "If, an agency like I.A.E.A. sets out to establish substantial stocks of U-235 at various

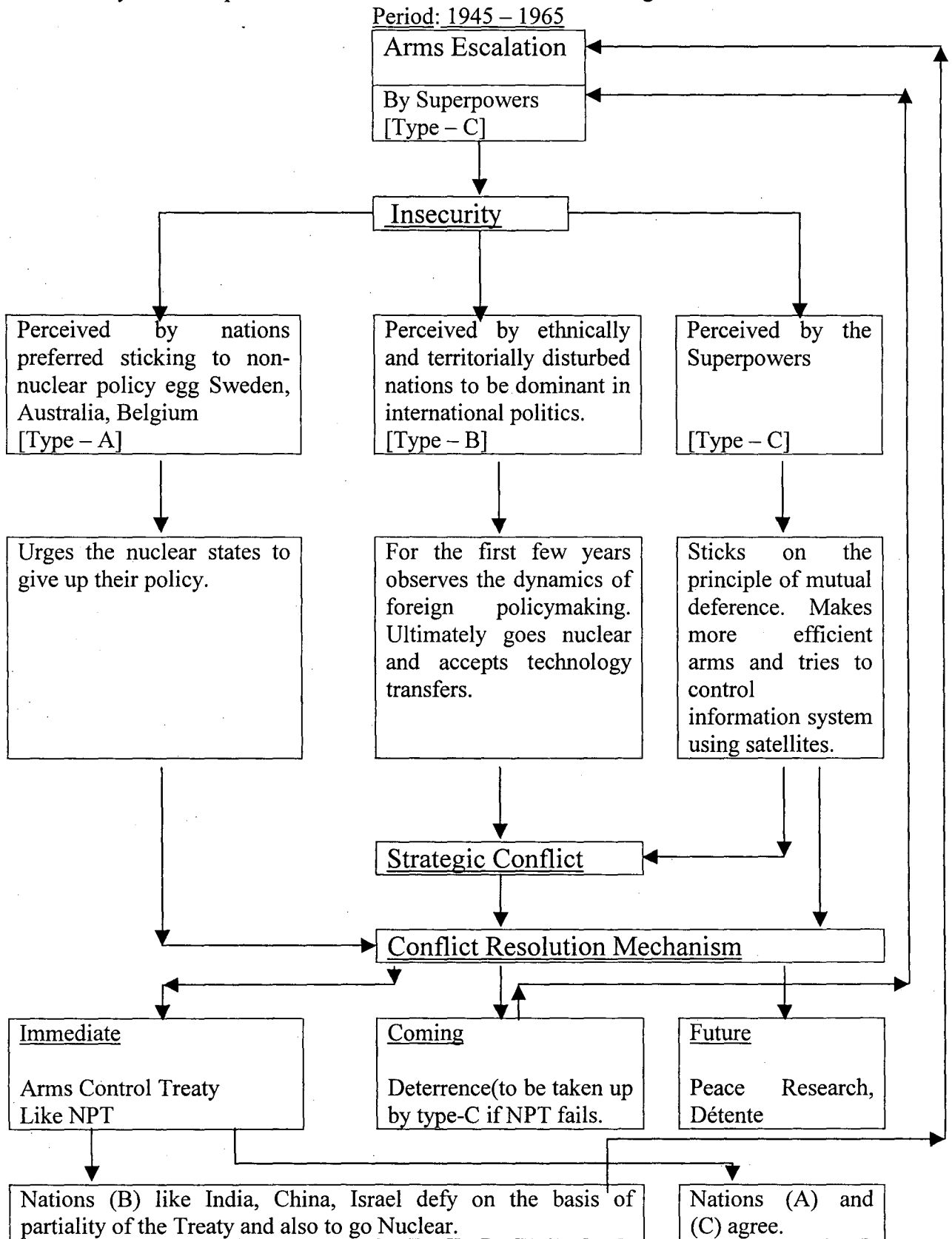
⁵⁹ Ibid.

enrichments and plutonium, and to make these available cheaply under safeguards to any who want them, this could make national facilities uneconomic”.

NPT was technically framed by the technocrats, politically developed by the policy-decision makers and globally implemented by the United Nation’s Security Council, a proxy platform that U.S.A. and U.S.S.R. have been using since its formation. Despite its comprehensiveness, this treaty has not been devoid of minor aberrations. It failed to provide a demarcation line between nuclear and non-nuclear devices. To characterize armaments strictly on the basis of conventional military and contemporary nuclear is prone to error. The world has seen the development of Semi-nuclear devices and chemical weapons made up of poisonous and bio-chemical gases, which are no less destructive than purely nuclear devices. Ambiguity persists with regard to Article VI which states that, “Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament and on a treaty on general and complete disarmament under strict and effective international control”. Article VI fails to specify the time and the means to achieve general and complete disarmament. Given all its loopholes and shortcomings NPT can still be regarded as one of the major arms control negotiations that ultimately ruled the future of many international actors.

NPT was the first of its kind in the history of arms control negotiations. In its journey from a ‘naïve atom’ to a ‘sophisticated void’ i.e. from its birth till maturity it took about ten long. The need of a wide-ranging treaty like NPT can be traced to arms escalation.

This history of development of NPT can be shown in this flow diagram:



This model tries to depict the development of arms control agreements like the Non-Proliferation Treaty. It indicates that once escalation happens, prospects for peace almost becomes obscure and the war → peace → war model rotates on. Arms escalation of any kind leads to escalation of all kinds because nations are the prisoners of insecurity and insecurity further breeds in hatred, suspicion and apprehension. War becomes the handgun of the 'privileged' and only the 'privileged' provides newer versions of war and peace according to their own conception of world order⁶⁰. The amount of simulation of privileged nations also becomes obvious in the model when both deterrence and conflict resolution policies are followed simultaneously. The omnipresence of these superpowers in all areas of international conflict and cooperation proves beyond any shadow of doubt, their willingness to hegemonise this world, 'their world'. While the peace loving nations insisted for a weapon free world, the emergent nuclear nations kept on increasing their nuclear stockpiles, sometimes at the cost of their domestic resources. Ultimately, Nuclear Non-Proliferation Treaty ensured that the superpowers become so much powerful that their nuclear predominance goes on indefinitely. It further reinforced superpower leadership in strategic technology⁶¹.

The next chapter deals with the application of game theory in Nuclear Non-Proliferation Nuclear Treaty (NPT)

⁶⁰ Ibid.

⁶¹ Carsten Holbraad, (ed)., "Superpowers and World Order", p – 73.

CHAPTER-3

APPLICATION OF A GAME MODEL

IN THE FORMULATION AND

RATIFICATION OF NPT

According to Harsanyi (1977), game theoretic models provide analytical studies of conflict situations. It furnishes sharp and specific predictions, both qualitatively and quantitatively about the outcome of any given game and in particular about the outcome of bargaining among rational players. Harsanyi demarcates between classical and non-classical games on the basis of pay-off function and strategy probabilities. In the classical mainstream game, players have full knowledge about the moves and subsequent outcomes of one another. The gaming set is stable. While in non-classical games, there is no central rule regarding strategies and pay-offs and any player is free to upset a binding or an agreement if he thinks that he can benefit by doing so. The central theme behind this demarcation is commitment or the lack of it. In some exceptional cases delayed commitment is accommodated.

Situations on gaming are situations of strategic interdependence in which every actor chooses a viable strategy from a pool of strategies. Martin Shubik (1982) defines strategies as a sequence of decision; even a whole policy of action is formulated as a single contingency-laden decision or "game plan". Every interaction between the actors involved in a conflict situation can be represented by the gaming process in which both parties have sufficient knowledge about the nature of conflict he is in and the strategies to be adopted for conflict resolution. Conflict, though theoretically abstract, is a social creation and each participant has their own ideas of conflict and develops certain perceptions and preconceived notions about the other participant. Hence every game situation considers a conflict of some kind. Each participant in a social interaction, being

cognizant of the other's capacity of awareness is influenced by his own expectations concerning the other's actions as well as their perceptions of the other's conduct⁶².

Superpower gaming has been predominantly affected by a sense of deception, to be very specific, perceived deception. Machiavelli's theorization, that he who wants to deceive others always finds himself deceived, can be applied here. This sense of deception gives rise to unwarranted non-rational situations in which both powers sense a smelling rat in each other maneuvers. Charlatanistic system of such non-rational situations is that, an attempt on the part of an individual or nations to increase its own welfare or security without regard to the security and welfare of others is self-defeating⁶³.

There is an inherent tendency of both the players to avert risks at the outcome of the game. Moreover, preference pattern of every superpower has been the pivotal factor in decision-making. Preference patterns are not based on the regularities of the action profiles, but are based on the consequences. Sometimes we wish to model a situation in which the consequence of an action profile is affected by the exogenous⁶⁴ random variable whose realization is not known to the players before they take their actions. Player's preferences are also subject to small variations with regard to the changing social context. There are also changes in interests, motives and strategies with regard to time and space. Even co-operation with regard to treaties and negotiations do not specify concordance of interests. Most of the global actors commit themselves sometimes unwittingly as also unwillingly in situation which they think will ultimately fetch

⁶² Raimo Vayrymen (ed), "New Dimension in Conflict Theory", p – 28.

⁶³ Raimo Vayrymen (ed), "New Dimension in Conflict Theory", p –47.

⁶⁴ Niou and Ordeshook (1987) talks about exogenous variables affecting military growth.

advantage. The players can come under a cooperative solution to non-co-operate in the future.

Though a move of one player in the gaming process had a reference to the other and vice versa, yet any cooperative solution for them did not mean co-operation at the broader level. It is a sort of condensed and situational co-operation that benefits both of them. If non-co-operation of quasi co-operation gives them better pay-offs they can shift preferences. Each of the superpowers knew that if they maintain the arms race there is always a chance of getting ahead and for both getting ahead is always better than either maintaining status quo or falling behind. Thus U.S. and U.S.S.R. had a common interest in stabilizing the arms race by regulating it. NPT as the brainchild of both these powers took ten long years to come into force. NPT provided the first platform for both to initiate on treaties and protocols relating to war and peace.

With regard to the framing and ratification of the treaty a four stage game model can be applied to identify the strategic maneuvers of U.S.A. and U.S.S.R. The first stage involves the application of the game of 'Prisoner's Dilemma'.

		U.S.S.R	
		C	NC
U.S.A	C	5,5	2,7
	NC	7,2	<u>1,1</u>

→ Dominant strategy for both.
 C= Cooperation
 NC= Non-cooperation

In the game of 'Prisoner's Dilemma' two suspects are arrested and charged with crime. The authorities lack substantial evidence to convict the suspects, unless at least one confesses. The authorities also explain certain consequences of confessing or not confessing. In this game both the players have two strategies, confess or not confess. If both cooperate by confessing, then both are released from prison. If one actor cooperates by not confessing and the other actor doesn't, then the non-cooperative actor is at an advantage and the cooperative actor is thrown into prison.

In this game we see that if U.S.S.R non-cooperates and U.S.A cooperates then U.S.S.R is better off i.e. its value will be 7 while that of U.S.A's will be 2. Again if U.S.A non-cooperates then U.S.A is better off than U.S.S.R. For both the best outcome would have been (C, C) in which both has a value of 5. But both chose to non-cooperate and the game ends in a sub optimal solution (NC, NC) with both the actors only having value 1. So at the initial stages of the formulation of NPT, both the players not exactly conversant with the fact and facets of the gaming process choose to non-cooperate. To them choosing non-cooperation was the most rational strategy. Thus it became the dominant strategy for both. Rational behaviour implies that each actor in a strategic situation has certain well-defined sets of values and objectives and would decide upon his own policy. The problems of making decisions under risk first appeared in the analysis of a fair gamble, and here again the desire for a utility concept arose⁶⁵.

⁶⁵ Luce, Raiffa, "Games and Decisions", p-19.

In the 50's and 60's of the 20th century both these countries in order to have an edge over the other, spent heavily for the escalation of strategic and tactical arms and even took the nuclear programmes in space. Both U.S.A. and U.S.S.R. believed that the future international stability depended on the success of its own concept of world order. The stability was maintained by manufacturing Anti Ballistic Missile System and the instability was sustained by enhancing a retaliatory response (sometimes flexible) or graduated deterrence⁶⁶ through first strike and second strike capacities. It was at this juncture that there was a call for non-proliferation and global ban of nuclear arms. Even countries like Italy, France, Japan and Germany who had a long history of conventional warring were against U.S.A and U.S.S.R's policy of sticking on to nuclear options. Thus, both the powers felt that it is necessary to go for non-proliferation of strategic arms to both emphasize and de-emphasize the role and functions of nuclear armaments. The need of a multilateral treaty like NPT was the only viable mean of these powers to maintain supremacy in the long run. Finally, nuclear weapons have played a vital role in shaping power relations between U.S.A. and U.S.S.R.

The non-cooperation can be identified in Cuban Missile Crisis of 1962, a year, which marked the first intrepid step by both the superpowers to go for general and complete disarmament. Though the Irish resolution of 20th December 1960 marked the major sign of nonproliferation measure and the identification of strategic potential on the basis of nuclear capability, yet U.S.S.R was pretty apprehensive about the role of Arms Control and Disarmament Agency (ACDA) to bring in complete disarmament. Both for U.S.A and U.S.S.R sticking to arms controlling mechanism was necessary but unfortunately

⁶⁶ Steven J. Brams in his book "Superpower Games" speaks of graduated deterrence

they were unaware of each other's bargaining techniques as well as the possession goals and milieu goals.

The 'stability- instability' syndrome pertaining to arms races affected both. Many times in the history of war and strategic conflict, ambiguous assumptions and false predictions about the capacity of the adversary have moved nation states towards seeking for relevant security strategies. Both being the prisoner's of insecurity could not trust the other actor's policy choices. This 'perceived' security dilemma led to conjectures, guesses, surmises and suspicions that ultimately ruled the strategies of superpower gaming at least in the initial stages. Uncertainty and risk affected their policy choices.

The non-cooperation in the gaming process can be traced to the problem of free human will, in which the freeness of an actors will, might determine his actions and preferences. The defector with the free will is regarded as the free rider. Free riding mainly happens with those prisoner's dilemma games that are generally simultaneously one shot. A free rider under a conflict situation is expected to defect more and co-operate less, thus making the regularities and patterns of the entire interaction process extremely difficult to apprehend. The simultaneous one shot prisoners dilemma is a non-cooperative version of the game. Non-cooperative game theory provides a rigorous tool for explaining the theories addressing critical elements of international crisis—credibility, dynamics and perception.⁶⁷ Simultaneous game can only end in a cooperative solution if there is something common in the actor's way of conceiving strategies and interests.

⁶⁷ Nehemia Geva and Alex Mintz(ed), "Decision-making on War and Peace", p-11

The internal dynamics of arms race is pretty intricate and providing any framework to understand the dynamics is a hard exercise. It was from Cuban crisis that both the powers had a common understanding of the entire situation. The crisis provided the first door of learning for both these powers and it laid down the commonality in their approach towards regulating the arms race by controlling it through employing mechanisms like NPT. Moreover, The Cuban crisis also led to direct Radio talks between Premier Khrushchev and President Kennedy. Though both U.S.A and U.S.S.R had to accept a minor loss of face before the world order for upholding nuclear policies, yet the crisis opened the floodgates of information, interests, options and strategies. The commonality in their foreign policy decisions were identified and the 'security-insecurity' syndrome seemed vanishing. The shooting down of an American u-2 reconnaissance plane over Cuba and U.S.A's overt threat to U.S.S.R for the withdrawal of Soviet troops was insignificant with relation to their strategic gain. They defined new rules for the future social processes and provided for a new dimension for future social interaction. With intentions of both quite clear there emerged a new phase of cooperation.

The second stage involves the repetition of the game of Prisoner's dilemma.

		U.S.S.R	
		C	NC
U.S.A	C	<u>5,5</u>	2,7
	NC	7,2	1,1

C= Cooperation
 NC= Non-cooperation

Dominant strategy for both

In the second stage, a new development in their strategy becomes manifest. Though in general one shot prisoner's dilemma, there are lesser chances of cooperation yet the repeated game of prisoner's dilemma calls for a trade-off between individual rationality and collective rationality which may further provide common good for both. Both U.S.A and U.S.S.R chose (C, C) and thus cooperate. A 'partial' reflection of cooperation was also reflected in the Partial Test Ban Treaty (PTBT) that called for some 'partial' proliferation. The cooperation is much lucidly identified when both U.S.A and U.S.S.R drafted almost identical NPT treaties in the year 1965. The U.S draft was submitted in the month of August and the U.S.S.R draft in September. Moreover, they developed a common understanding between them. The process was facilitated by the installation of the hot line between White house and Kremlin. The conventional process of spying and counter-spying was given up. A subtle reciprocation of strategies dominated the repeated game of prisoner's dilemma. Like goals were divided on the basis of immediate and future understandings, strategies were divided into sub-strategies though the trade-off lay between the best strategy and the next to best.

Games can further be divided into non-cooperative and almost non-cooperative categories. Talking about 'almost non-cooperative' game Harsanyi speaks of mutually expected rationality in which both players expect that the other player will try to maximize his⁶⁸ utility preference..

⁶⁸ to Harsanyi there is little difference between 'his' and 'their' utility because both actors understands mutually the situation they are in.

In a single shot prisoner's dilemma there is a single cooperative and efficient outcome but in the graduated game there is a larger set of available cooperative outcomes. In the repeated prisoner's dilemma the 'dilemma' becomes evanescent and with more learning dynamics and interaction process, both the powers chose to cooperate. The cooperation is clearly reflected when both U.S.A and U.S.S.R came out with more or less identical NPT drafts to arrest the strategic growth of burgeoning nuclear states. Thus a shift in conceptualizing rationality lead to a shift in strategies and decisions of these two powers.

The repeated prisoner's dilemma thus revealed a tendency of both the powers to reach at stable outcomes. In this connection it can be mentioned that Steven J. Brams (1985) with a slight deviation from the classical game theory speaks of 'Non-myopic Equilibria' and the 'Theory of Moves; the concept of non-myopic equilibria and the theory of moves is not based on the immediate advantages or disadvantages of switching strategies, it is rather based on a futuristic process in which both the actors acutely observes the moves and counter-moves of each other. When neither player perceives a long-term advantage from departing from an initial outcome, that outcome is the non-myopic equilibrium⁶⁹. Hence the game rolls in sequence and the moves and counter-moves are determined by the actor's way of assessing the initial as well as final outcomes. Even in the case of formal diplomatic negotiation, culminating in a treaty, communicating with the partner (potential enemy) country is a complex matter⁷⁰.

⁶⁹ Steven J. Brams, "Superpower Games", p-67.

⁷⁰ Thomas C. Schilling, Morton H Halpenin, "Strategy and Arms Control", p-80.

Friedman makes a relational link between co-operative games and non co-operative games in the repeated game aspect, that allows for a co-operative outcome to be supported by a non co-operative equilibrium. It is because in the repeated game process the learning and interaction process that goes on between the actors allows them a functional space where they converge and where the interest of both are more or less served. Moreover, Friedman also speaks of a transfer utility, which is an assumption that makes the co-operative game model look more conducive to both the players.

Rapoport argues that in prisoner's dilemma game "rational decision theory does not lead to unique, definitive solutions". In his view such a game possesses two different but equally admissible standards of rationality. One is individual rationality, corresponding to what we call the non-cooperative solution and joint rationality, corresponding to what we call the cooperative solution⁷¹.

Nigel Howard while specifying cooperation in prisoner's dilemma speaks about 'Metagames' that uses a descriptive rather than a normative concept. In 'Metagames' actors generally come to a cooperative solution because it involves perfect communication between actors. Axelrod (1981) speaking about collectively stable strategies says that collectively stable strategies are those, which work the best among a given pool of strategies and can never be invaded⁷². So there comes up a system of collective action. Even there might arise problems with collective action. Keeping this in

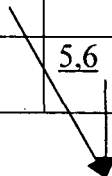
⁷¹ Harsanyi, "Rational Behavior and Bargaining Equilibrium in Games and Social Situations", p-277

⁷² According to Michael Orkin, a strategy is collectively stable if it is optimal against itself.

perspective Duncan Snidal speaks about a solution that might be achieved in any number of ways and be reflected in correspondingly different institutional development⁷³.

On the basis of gradually developing cooperation we can sketch the third game model. The third stage model involves the application of the Battle of Sexes game.

	U.S.S.R		
	B1	B2	
A1 U.S.A.	6,5	0,0	<p>A1 and A2 are the two given strategies of U.S.A. B1 and B2 are the two given strategies of U.S.S.R.</p>
A2	0,0	5,6	



 Both are dominant strategies for U.S.A & U.S.S.R

In the battle of sexes game, two players have two choices for an evening entertainment. Each can either go to a movie or a game show. One actor prefers the game show and the other actor the movie. However, to both it is more important that they go out together than that each see the preferred entertainment.

According to the Battle of Sexes game, two players generally have the same goal but have conflicting interests. Each player knows that the other player knows the outcome of the given situation with respect to two alternative strategies. Both U.S.S.R. and U.S.A. had the common goal to make Nuclear Non Proliferation Treaty passed and ratified. Hence to both U.S.A. and U.S.S.R. sticking on to a sub-optimal solution at the initial

⁷³ Duncan Snidal, "Coordination Versus Prisoner's Dilemma: Implications for International Cooperation and Regimes", p-923

stages of the initiation of the treaty will fetch higher pay-off in the long run. If U.S.A. plays A2 and U.S.S.R. B1 then none is better off. Again if U.S.S.R. plays B2 and U.S.A. plays A1, then also their purpose is not served. For both the players, the goal became important than the mean; hence they cooperated even though one of the players had to forsake some of his interests. U.S.A. was be more content with (A1, B1) and U.S.S.R. was be more content with (A2, B2).

Which player will succumb depended upon the stubbornness of any one of the actors. A player can act stubbornly if he feels that he is strategically superior to the other actor. Once the reputation of toughness is established firmly, the larger unit pushes the weaker bargaining partner very close to their concession limits⁷⁴. Stubbornness also depends upon the bargaining techniques of the actor as also the strategic superiority of the actor at the time the game is played. Yet whether U.S.A. or U.S.S.R. was strategically superior at the time the game was played is hard to find out, because at the time NPT was initiated, both U.S.A. and U.S.S.R. with their own conceptions of world order were more or less equal in power. The stability in power equation was inferred from the number of nuclear and semi-nuclear devices or specifically the ICBM's and the SLBM's with their respective warheads that were possessed by the powers as also the level of information available to both the players through satellites and espionage systems.

Moreover, the game of battle of sexes implies that both the players are equally powerful to decide upon a policy. The game further implies that conditional cooperation is better than non co-operation. Both U.S.A. and U.S.S.R. felt the urgency of a multilateral treaty

⁷⁴ Harsanyi, "Rational Behavior and Bargaining Equilibrium in Games and Social Situations", p-1 88.

because of three main reasons. 1) New states with their own conceptions of security, were willing to stick on to nuclear options and other tactical devices to enhance their bargaining strength 2) Their emphasizing on nuclear policy as the only alternate security option was seen with suspicion by the 'other' nation states including the peace loving nations. 3) there was a need to redefine the problems and prospects of nuclear proliferation so as to accommodate 'their' versions of threat and security within the then existing international political order. Thus NPT proved to be the 'golden mean' to emphasize as well as de-emphasize the role of nuclear weapons as an instrument of policy.

Reverting to the game model, we see that neither (A1, B2) nor (A2, B1) were feasible options, because that would have put an end to the entire gaming process, or rather specifically would have stopped the process of formulating the treaty. In this game, a certain amount of pre-play communication is needed to understand the wish of the actor to stick to a definite strategy. In the case of U.S.A. and U.S.S.R., information was at flow not only because of their 'mutual understanding' in Cuban Missile Crisis, but also because of the establishing of the hot line. Moreover, pre-play communication enhanced leaning and interaction process. Both U.S.A. and U.S.S.R. understood that agreements like NPT are essential to keep the system stable and both of them did not mind either to stick on to strategy (A1, B1) or (A2, B2). This game has two Nash equilibrium, (A1, B1) and (A2, B2). Nash equilibrium is an outcome from which no player wishes to move because given the other person's move any other move would not fetch any better outcome. The strategy adopted to reach at Nash equilibrium is called the dominant

strategy for both players. Thus, both the players' act for each other mutual advantage. If U.S.A. sticks on to A1 and U.S.S.R. to B1, then U.S.A. is partially better off with a gain of 1 and if U.S.S.R sticks to B2 and U.S.A. to A2, then U.S.S.R.'s gain is 1.

This game model also marks the first sign of cooperation with regard to decision-making of common interest. Here players become bounded rational agents more because they know they will again play the game, might be of a different kind. Steven J. Brams calls it the 'Theory of Moves'. This approach of U.S.A. and U.S.S.R. helped both to understand first, the pattern of bargaining of each other second, the particular interest in the game and the general interest at the outcome of the game and third the kind of strategies that each player can take, under the situation of perfect and complete information as well as misinformation. Here the relative loss of one to the other was insignificant as the larger goal was to be achieved. Moreover, when they became aware of the necessity of implementing a multilateral arms control treaty like N.P.T, they cannot but become convinced that the other is probably coming to the same conclusion and the perceived necessity is thus self-confirming⁷⁵. In this connection we can take into consideration Rapoport's work. Anatol Rapoport (1960) speaks about coordination of strategies by telepathy.

Deutsch's experiments with regard to this deserve special mention. Deutsch⁷⁶ considered four different communication conditions and he assumed that players are more or less equal in power and professes joint maximization and at the same time they are

⁷⁵ Anatol Rapoport- "Fights, Games and Decisions", P – 178.

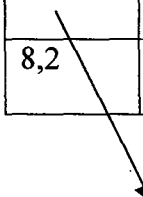
⁷⁶ See Anatol Rapoport, P – 219, for a proper description of Deutsch's work.

individualistic and competitive. The communication conditions were, 1) No communication 2) communication 3) reversible decision 4) non-simultaneous decision. The no communication game started without prior communication between players.

In the communication games players were only allowed to interact through writing. In the reversible decision each player after making choices had the opportunity to change his strategy any number of times. In the non-simultaneous decision, one subject made his choice first, which was announced to the second before he made his choice. The results were interesting. In the first case under all conditions of co-operation, individualism and competition, actors did not really cooperate. In the second case, cooperation was high barring the competitive level. In the third case, cooperation was the highest because of the actor's advantage of changing decisions after the move was taken. The fourth case, the amount of co-operation is the lowest because if one actor makes a trusting choice he is at the mercy of the other player. In this case we see that the amount of retaliation from the other player can be excessively high. Both the first and second types of communicative actions have been seen in the interaction between U.S.A. and U.S.S.R. with regard to the passing of NPT and the cooperation did lead to a 'marriage of convenience' between them.

The fourth stage game model applied in the formulation of the treaty is the Hawk and Dove game.

		U.S.S.R		
		B1	B2	
A1 U.S.A.	5,5	2,8		Dove = B1 Hawk = B2
A2	8,2	0,0		Dove = A1 Hawk = A2


 Dominant strategy for both

The Hawk and Dove game speaks of a situation in which two actors fight over the same prey. Each can behave either like a Hawk or a Dove. The best outcome for each player is that he acts like a hawk while the other acts like a dove. The worst outcome is that in which both the animals act like Hawks, because they can end up in a bitter conflict.

Every actor in this game expects the other player to act dovish while he acts hawkish. U.S.A. and U.S.S.R. had a common prey at the time the treaty was formulated. New nation states were coming up with nuclear options and thus provided threat to the tactical supremacy maintained by the two powers. The treaty was initiated and formulated to arrest the growing nuclear states or those states, which were aspiring for nuclear power. So the emerging nuclear nations were the prey and for whom the game was played. Though both U.S.A. and U.S.S.R. knew that if they act Hawkish while the other acts dovish, then their individual ego maximizes. Thus, if U.S.A. chooses A2 provided U.S.S.R. chooses B1 then U.S.A. gains $(8 - 2) = 6$ whereas if he chooses A1, i.e. acts dovish he gets a pay-off of 5, which is lesser than 6. In the case of U.S.S.R. the same thing is applicable. If U.S.S.R. chooses B2 provided U.S.A. chooses, A1, the U.S.S.R. is at a better position than choosing B1 given U.S.A.'s A1. But as because both had a

binding set of a common interest in regulating the arms race through protocols and negotiations and arresting the increase of emerging power, they preferred to be Dovish and remain silent till the treaty is passed. This sort of marriage of convenience can be identified when U.S.A. kept silent on the issue of U.S.S.R.'s violation of Outer Space Treaty as well as the invasion in Czechoslovakia.

Superpower gaming has always been dominated by a tacit understanding. Both U.S.A. and U.S.S.R. had a common understanding of the whole situation and U.S.A. understood that U.S.S.R. understands U.S.A.'s understanding and vice versa, thereby making preferential choices through beneficial adjustments which are consciously contingent. Tacit understandings are also related to time frames and one actor becomes conversant with the other actor's choices and preferences when they socially interact. Though both of these nations wanted to keep an open space for predictions, conjectures and refutations, yet the learning and interaction process open certain fundamental behavioral and technical aspects of the gaming nations. Moreover, both for U.S.A. and U.S.S.R. it was a search towards finding a 'commonality' in perspective and orientations with regard to dynamic issues arms control. The concept of searching 'commonality'⁷⁷, also makes open, those that are not common to both. A subsequent division of interests happened on the basis of things that are found in research. Not surprisingly, no search has been fundamental enough to stop U.S.A. and U.S.S.R. from misjudging and misperceiving each other or at least showing before the world that they carry a sense of distrust towards each other.

⁷⁷ Samuel P. Huntington speaks about nations search for commonality in culture.

CHAPTER-4

APPLICATION OF A GAME MODEL

IN ARTICLE TEN (CLAUSE-2) OF NPT

The original NPT draft consisted of eleven articles. Most of the articles speak about the non-transfers of nuclear knowledge to non-nuclear states. In every embodied article there are loopholes with regard to its structural representation. In every article there have been unspoken biases and strategic maneuvers. At all levels there have been gaming and applying it to a single embodied document is prone to error because it provides only a partial picture about the intensity of superpower gaming.

A two stage game model can be applied to Article ten (clause2) of the NPT draft to identify superpower strategic orientations. Article ten (clause2) states, "Twenty five years after the entry into force of the treaty, a conference shall be convened to decide whether the treaty shall continue into force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the treaty".

The first stage involves the application of the game of 'Prisoner's Dilemma'.

		U.S.S.R&		
		U.S.A		
		C	NC	
EMERGING NUCLEAR STATES	C	6,6	3,7	C=Cooperation NC=Noncooperation
	NC	<u>7,3</u>	2,2	
				→ Dominant strategy for new nuclear states.

Unlike the other forms of gaming, this game model is of a different kind because the players change places with shifting alternatives and biases. After the ratification of the treaty, both U.S.A and U.S.S.R thought that cooperation among them was the only solution to stop strategic proliferation among emerging nuclear states. Though they made provisions in the treaty so that the treaty remains opposed at the policy level yet they were giving it a last try through non-proliferation measures. This article provided a two-way strategic measure to hegemonize the 'other' world. It is like a vicious circle and once anybody enters into it there is no way out. Moreover, this treaty essentially implies that arms race will continue and arms controlling mechanism will fail to check the escalation of armaments. Looked from the other angle it seems that one assumption of these powers has been, if they stop the proliferation or destroy the existing nuclear stockpiles then accidental nuclear war, planned and controlled by the growing nuclear powers might happen.

In this version of the game the normal sub-optimal solution is not achieved. This happens because the emerging nuclear nations prefer to choose non-cooperation on the basis of the biased version of article ten (cl-2). If both would have cooperated (C, C) i.e. the superpowers trying for the ratification of the treaty and proposing non-proliferation measures, and the emerging nuclear states stopping arms proliferation then both would have been better off with a value of 6 each. But the provisions as embodied in article ten (cl-2) proves beyond any shadow of doubt that the superpowers through discrimination was trying to subvert the policy of the 'other' nations. By extending the treaty

indefinitely they have tried to restore the balance of power and more literally the balance of threat. This marked another phase of strategic cooperation between these powers. In a co-operative game it is a natural assumption that the players can make binding threats, which would have to be carried out if a conflict situation arose, for this is simply an extension of the general assumption that all agreements and promises made by the players have a binding force – the defining characteristic of co-operative games. Moreover, in a conflict situation each player would prefer to save the cost of implementing a threat if he could⁷⁸.

Thus both the superpowers in order to maintain stability in the long run accepted to cooperate to non-cooperate in the future. This aspect can be more comprehensively identified with heuristics. Heuristics or rules of operation are something, which generally develops through the process of learning and interaction between two rational actors. One actor becomes well conversant with the other actors' intensity, his optimal situation and his behavioural altitudes. Even when co-operation happens between two countries the actors assume that non-co-operation can come up at any level of the game thereby affecting the course of the game.

Thus with the rules of operation defined the emerging nation states defected and denied to sign the treaty. To be more specific they chose to non-cooperate (NC) while the superpowers chose to cooperate (C). Hence the new nuclear states had a value of 7 by not cooperating. Though the strategies of these newly emerging nation states were affected by the strategies of these superpowers yet they were no less interested in building huge

⁷⁸ Harsanyi, "Rational Behavior and Bargaining Equilibrium In Games and Social Situations", pp- 167-168.

repository of nuclear armaments. Hence their ways of defining various aspects of international politics depended on our ways of conceiving their politics. Perhaps the most obvious way to try to resolve Prisoner's Dilemma is to note that in many social contexts for which it might be a model, the game is played not just one, but repeatedly⁷⁹. This is probably one of the reasons why Emile Borel (1921) following a converging approach has tried to restrict the dimension of game models within one shot strategy moves, thereby trying to make the game process static and implicitly limiting it to time.

A reiteration of article ten (cl-2) is seen in article eight (cl-3), which speaks about the conference of the parties to the treaty, five years after it enters into force. Thus keeping in parlance all the facets of superpower gaming it can be said that every attempts were made by these powers to restore their supremacy by clicking on to the policy of armaments. The provisions that were envisaged in the treaty went against the interests of the other states not only because they were stopped to use nuclear arms but also they were categorically dictated not to use nuclear energy even for peaceful purposes. Moreover, they felt that they would not be better off by coming into terms with these powers. Thus the defectors i.e. the superpowers cooperated while the cooperators defected.

Robert Boyd (1989) says that in real life situations it seems likely that individuals will sometimes make mistakes-individuals who wish to cooperate ultimately defects and those who wants to defect ultimately cooperates. The probability of a mistake may depend on the turn, or the sequence of behaviours up to that turn, but not on the identity of the

⁷⁹ Philip D. Straffin, "Game Theory and Strategy", p – 24.

player⁸⁰. It was very much obvious from the treaty that non-cooperation was a better solution than cooperation.

But the game was never to stop and a new phase in superpower gaming began. Both U.S.A. and U.S.S.R have been quite 'rational' in formulating the treaty in a way that catered to their fervent wish to go for build-ups.

The second stage model involves the reiteration of the game of prisoner's dilemma. The players remain the same while strategies and options change.

		U.S.S.R&		
		U.S.A		
		C	NC	
EMERGING NUCLEAR STATES	C	4,5	5,4	C=Cooperation NC=Noncooperation
	NC	5,6	<u>6,5</u>	
				→ Dominant strategy for both.

This stage reveals an interesting turn in the entire gaming process of the superpowers. The non-cooperation of the emerging nations was seen with suspicion and anger. And ways to retaliate was in search. In the second version of the game, non-cooperation becomes a cooperative strategy because both the nations by non-cooperating wishes to

⁸⁰ Robert Boyd, "Mistakes Allow Evolutionary Stability in the Repeated Prisoner's Dilemma", p-49

increase their nuclear stockpiles. Thus the dominant strategy for both the players becomes (NC, NC) with superpowers getting a value of 5 while the emerging nation states getting a value of 6. If both had cooperated i.e. the superpowers by sticking on to the policy of arms ban and the emerging states by signing the treaty then their pay off would not have been better. So in the final stages of gaming in NPT other nation states also get involved. According to Luce and Raiffa (1957) each player is fully cognizant of the game in its extensive form and he is also aware of the rules and utility functions of the other player. So cooperation or non-cooperation depends solely on the actors wish to cooperate or non-cooperate.

According to Rapoport, in prisoner's dilemma games, an actor mainly chooses to non-cooperate because of two main reasons. One is greed and the other is fear. Greed suggests non-cooperation as the largest pay-off. Fear on the other hand, suggests non-cooperation as the largest pay-off with relation to cooperative actor's smallest⁸¹ pay-off. From a practical policy making view, most of the situations that happen are non-cooperative because prudent decision –makers cannot put much confidence in his opponents willingness to keep agreements and has to choose in own policies in full awareness of it⁸².

Another marked aspect of non-cooperation with regard to the superpowers has been, only non-cooperation provided for the vista on which lay greater guns of deterrence. From the first game the superpowers became aware that non-cooperation is the predominant

⁸¹ A. Rapoport calls it a sucker's pay-off.

⁸² Harsanyi, "Rational Behavior and Bargaining Equilibrium in Games and Social Situations", p-278.

strategy of the new nations. Thus, though for the first time they cooperated, the second time the case was different. It has been demonstrated by Luce and Raiffa that even if the game of Prisoner's dilemma is repeated a finite number of times, then also the equilibrium strategy continued to be a sub optimal one⁸³. But, in this case we see that (NC, NC) brings optimal solution for both of them and both are better off by non-cooperating. Hence even the learning and interaction process was not sufficient enough to make them cooperate. Here choosing of strategies became important for both because one wrong choice with regard to strategy might have affected the entire system. This has been the benchmark of the prisoner's of insecurity. The bargaining and negotiation techniques are dynamic hence there is always a chance of newer additions and alternatives in the process, which might involve serious changes in the strategic maneuverability of other actor subsequently, affecting the original actor.

Moreover, this non-cooperation led to further non-cooperation not only between the emerging nation-states but also between the superpowers. To a common man NPT ^{has} been a breach by the emerging nuclear states, but to the policy makers as well as to the defence planners NPT was made and preserved to be breached. After that, Strategic stability was supposed to be maintained by superpowers by using 'for peaceful purposes', the policy of deterrence and mutual assured destruction (MAD) – the ability of each side to respond to a first strike of the other⁸⁴. On the other hand to resist the deterrent strategy there was further escalation of arms by the new nuclear states.

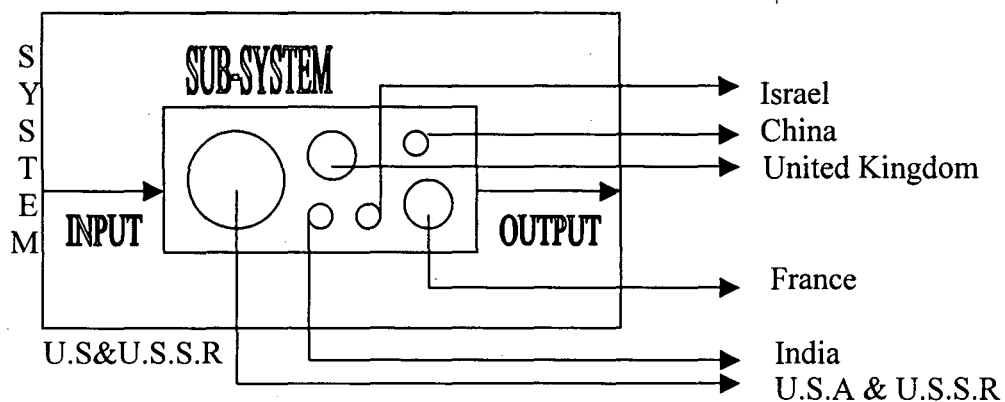
⁸³ Kaushik Basu, "Information and Strategy in Iterated Prisoners Dilemma", p-293

⁸⁴ Steven Brams, M Davis, P Straffin, "Geometry of the Arms Race", p- 583.

Before trying to find out the fundamental aspects of superpower games we should not forget that superpower gaming has been affected by the externalities where newer states with divergent options imposed or tended to impose costs or benefits.

Some central aspects of superpower gaming in arms control negotiations can be identified. These are

1. Superpower gaming has been predominantly a gaming of subsets and subsystems. It has always been difficult to find out the source of gaming as well as the end to gaming. Every game happened in reference to some other larger game and it is quite unfeasible to study the process in isolation. The system within which the process was going on was a system defined by the superpowers and every other was a part of the system with no access to the decision-making of main system.



2. Common conjecture leading to common knowledge has been one of the predominant factors that affected superpower gaming. James D. Marrow speaks correctly about three probable causes why gaming parties may have a common conjecture. These are experience, focal strategy and preplay communication. In the case of these powers

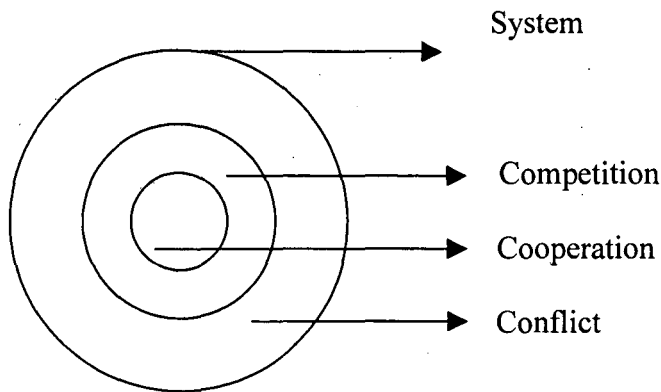
even the conjectures matched because they had the same kind of interest towards the regulation of arms race at least in the short run.

3. The gaming process has been determined by the superpowers subjective ways of conceiving security. The dimensions of security were defined and a paradigm was built within which 'security-insecurity' syndrome was to work. Both have build up arms on a basis of a perceived security threat. Moreover, the opposite of security i.e. insecurity helped them to escalate.

4. The gaming process has never involved total cooperation for both the parties given the best of conditions. Cooperation has been primarily situational. Trivers (1985) coins a strategy called 'SUBTLE CHEATER' that begins by cooperating at one degree less than total cooperation. This is more relevant when the game is extended for a longer duration. Another strategy relevant to this is Axelrod's, 'Tit-For-tat' and 'tit-For-Tat', in which the degree of retaliatory response is one degree less or more, respectively, than the other's defection.

5. Conflict has been the central aspect of the entire process. Both cooperation, conditional cooperation happened within the dimensions of conflict. Thus competition as well as cooperation was subsumed inn the arena of conflict. Moreover, both co-operation, or non-cooperation or non-cooperative cooperation happens within the dimension of competition to maintain strategic conflict. Conflict of interests between superpowers did

not always imply a conflict of their strategies on one hand, and conflicting strategies did not always imply that they wanted a conflict.



6. Strategic decision-making of these powers was based on the assumption of redistribution of the pay-off's. That is one of the primary reasons for cold cooperation. Their way of conceptualizing pay-off can be divided into initial and final pay-off's. They firmly believed that their pay-off values will be always be on the rising curve and will fetch positive redistributive effects. Their way of conceptualizing pay-off was further based on their way of conceptualizing real and virtual pay-offs. The system can be termed as a rotational redistributive system where each game was a sub-game, each set a sub-set and each system a sub-system. Hence if the first game fetched 5 then the second game fetched 6 or 7, but never less than or equal to 5. Olson (1965) tried to analyze a game situation in which actors chooses to accept the burden of payment for collective good so as to enjoy its redistributive effects in the long run.

CHAPTER-5

CONCLUSION

Non-Proliferation Treaty exists as a dead letter. At the beginning of a new millennium, both erstwhile U.S.S.R. and U.S.A. stands unmasked before the global international order and disarmament thus far has proved to be a pious dream⁸⁵. The nascence of the new eon has not been able to stop the marked deterioration in world security and even if a bomb goes off in 'anger' it can put an end to the entire human civilization. There has been a conspicuous absence of a political setting defined by the dimensions of time, space and other related variables within which negotiations could move along with brandishing efforts. The superpowers have always whipped the devil round the stump. The strategic maneuvers of U.S.A. and former U.S.S.R. in disarmament negotiations were primarily ruled by breaches, deceptions and misconceptions. Anyone looking at the question of arms limitation and control ends up finding a Fresco of unfinished or patched up designs scattered across a crazy-quilt political landscape, littered with good intentions and a few braised national egos⁸⁶.

Diffusion of nuclear knowledge and the subsequent development and manufacture of weapons using that knowledge is the major problem that the earth is facing today. A wide range of administrators, foreign policy decision makers and molecular physicists are well conversant with the power of fission bombs. The arms race has also de-stabilized newer systems as well as the emerging sub-systems. The catalytic wars and the proxy wars have shown that none of the major world powers did really learn to explore optimistically the use of fissionable materials. The grand purpose of a non-proliferation system should have

⁸⁵ R W Howe, "Weapons: The International Game of Arms, Money and Diplomacy", p – 234.

⁸⁶ R W Howe, "Weapons: The International Game of Arms, Money and Diplomacy", p – 225.

been undoubtedly to gain control on some international basis over the production of fissile material⁸⁷.

Nuclear Non-proliferation Treaty had the broadest of review in the year 1985, a year that marked the major changes in the international scenario. This treaty was regarded as an omnibus that included crisis, proliferation, nuclear energy, development and trade, international safeguards, peaceful nuclear explosions, testings, and ultimately the strategic arms race⁸⁸. In the first and second NPT conferences that took place in 1975 and 1980 respectively was mainly concerned with bilateral talks and mainly centred on SALT1 and SALT2 agreements. By the time the third conference took place the world was too much with arms. Even no amount of progress was visible at the last conference in the year 1995. By the time the treaty exhausted its time both erstwhile U.S.S.R and America became potent enough to maintain strategic hegemony. NPT was extended till 2000 but defense policy makers seem unmoved. The world has even seen the violation of treaties like CTBT enforced in the year 1996. So NPT with all its virtues and vices has failed.

The policy of all these powers has been to look at one way and to row another. Nuclear weapon is the executive tool of these powers to gain in dominance over economic institutions and political processes. Nuclear weapons are benevolently empowered with its capability to define the functional paradigm of conflict as also specifying the direction to which the conflict resolution mechanisms have to work. Global arms trading with all

⁸⁷ Leonard Beaton, "Must the Bomb Spread", p – 108.

⁸⁸ David Dewitt (ed).,"Nuclear Non-Proliferation and Global Security", p-4

its bestial characteristics continue to flourish though there have been through changes in the size and quality of the armaments. Today's era is the era of light and small weapons. Most of the governments continue to nullify all arms control measures by adopting stringent security policies with special emphasis on light nuclear weapons.

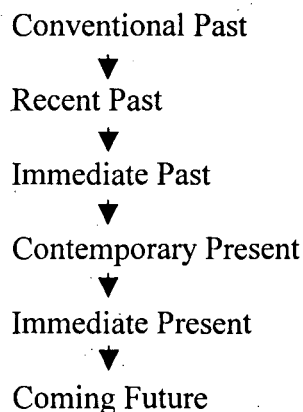
Some proposed measures to bring in arms control and disarmament.

1. There should be a mechanism providing common information on the developments. This common information device should let us know the amount of weapons both in terms of quality and quantity that exist. This information system should also let us know the amount of unused weapons both in space as well as on the earth. All the prisoner's of insecurity are mainly guided by disinformation. The system of central and common information will further enhance the spread of nuclear knowledge among the third world states.

2. Armaments and its related technologies should be objectively defined in terms of quality and quantity. The qualification will help in identifying nuclear, semi-nuclear, quasi-nuclear and chemical weapon systems. Henry W.Schaefer (1986) speaks about quantification to differentiate between force reduction and force understanding. "Missile Display Conferences to Evaluate Possible Threats" (MDC) might help to detect and get the relevant information regarding the quantification of existing nuclear arms.

3. Justice delayed is justice denied. The first major problem that is inherent in different negotiations has been the arms controlling mechanism's failure to relate it to the dimension of time. To understand the social processes and political happening in its right

context there should be a time frame to measure the major historical developments of all related aspects of war and peace. The time frame can be given as:



Even in negotiations like NPT and SALT1 there has been a conspicuous absence of a specified time by which the nuclear de-escalation has to happen and unfortunately we all are dead in the long run. Disarmament negotiations have to be studied on the basis of time frames because that will let us know what type of weapons were used at a given point of time. It further will speak about the tactical decision-making of the belligerent nations on the basis of time. Conventional past speaks about a time when conventional warring technologies were used. Moreover, studies of the time frames speak about the warring history of a nation as well as focuses upon those places where it had been vulnerable. Recent past is a time which is past but the happenings of that time is still lingers on. Immediate past will refer to those negotiations that recently failed to arrest armament escalation. Contemporary present will reflect those negotiations that are presently in the process and immediate present will be the position of nuclear arms now. This is a well-known equation, sometimes called the equation of radioactive decay. It represents the amount of radioactive material left after an initial quantity, has been disintegrating for time t ; also the number of organisms left a constant excess of death

rate over birth rate and many other mathematically analogous situations. In words, the armament level of a disarming state should decrease, according to our model, by a constant factor over constant intervals of time⁸⁹.

4. There should be a strong international central authority to settle international disputes pacifically. It should be proportionally represented by all nation-states. An entirely new authority or U.N modified to its exactitude can be entrusted with this responsibility. A central authority or an authority central to its role will be able to define the real capability of an already declared or an existing nuclear nation. The central authority will decide upon questions of arms freeze or arms control and ultimately disarmament.

5. There should be decentralization of power with regard to the central functioning of international authority. The international authority should consult its decision units before taking any central decision pertaining to the problems of war and peace.

6. All those literatures that favour armaments buildup should be banned. Leonard Beaton (1966) spoke about restricting the publication of information related to strategic defence. Throughout the history of strategic armaments buildup it has been seen that existing literatures supported it or criticized it. Both support and criticism gave importance to nuclear arms thereby helping in its proliferation.

⁸⁹ Anatol Rapoport, "Fights, Games and Decisions", p - 40

Even at a juncture when millions of fates are decided by the logic gates of digital technology, problems of verification and counter verification still persist. Problems of verification have eventually led to spying and counter spying and that too of the conventional mode. Though in the context of recent times, the computers, fed with sophisticated software technologies, take most of the decisions pertaining to war, yet the behavioural political dimension is never subsumed in the arena of tactical defense dimension. But computer models on war games can do little beyond illuminating nuclear exchange-ratios and some problem of logistics at a fairly basic level⁹⁰.

It is still not to be denied that the electorate plays a major role in shaping foreign policy decision-making of different nations. Barring the global elites, who have been determining the fortune of scores of people across the globe, the electorate has also lent a hand in framing and formulating security policies. In the Cuban missile crises President Kennedy was literally forced by the electorate as well as the congressman to take action against Cuba. In U.S.A. it was only in the late 80's of the 20th century that people realized the trauma of a nuclear war and the amorality of arms proliferation. In the erstwhile U.S.S.R. till the Brezhnev era, people were blinded out by the 'regressive progress' of space-based multifunctional systems and the development of other tactical weapon systems. The role of electorate in framing nuclear policies can be more lucidly described when we catch up the case of Labour Party in England, which won the elections in 1964 on the basis of its anti-nuclear slogans but failed to keep up the promise. Labour again romped back home with a landslide victory in 1966 with a share of poll increase from

⁹⁰ Frank Barnaby (ed)., "Future War: Arms Conflict in the Next Decade", p-161.

44% in 1964 to 48% in 1966⁹¹. Thus even a civil society with a self conscious community has not been civilized enough to decipher the subtle implications of armaments build-up.

With the breakdown of U.S.S.R. and with a rise in global trading the term 'superpower' sounds obsolete, though the strategic dominance of a modified version still persists. Social conditions under the system of bipolarity has changed with the division of Russia and with the U.S. backed up trade liberalization regimes. But still the highly industrialized nations continue to invest heavily on arms development making the world military expenditure greater than the resources allocated towards the development of health and education. It is much higher than the official aid provided to the under developed countries of Asia, Middle East and Africa. Even the under-developed and the developing nations linger on the wish to enhance their strategic capability and share the bargaining platform with the big powers. Eventually, the more nuclear powers there are, the greater is the opportunity for miscalculation and error, or deliberate nuclear attack⁹². Francesco Calogero (1982) rightly surmised that the worldwide spread of nuclear know how and materials, associated with the diffusion of nuclear energy will undermine the technological barriers to nuclear weapon proliferation, which will sooner or later crumble the NPT regime.

Even the Secrecy of information is not to fetch any desirable effects. Leonard Beaton (1966) speaks about restricting the publication of information relevant to the use of

⁹¹ Data Source – Pears Encyclopedia.

⁹² Thomas I. Saaty, "Mathematical models of Arms Control and Disarmament", p – 5.

nuclear technology. David Krieger, the President of Nuclear Age Peace foundation, in November 1998, attacked vehemently the theory of secrecy in nuclear policy followed by various nations. In the United States, the nuclear weapons policy is set forth in a Presidential Decision Directive, which is not made available to the public. Information pertaining to the sophisticated new weapon systems is also kept surreptitious in today's Russia. Hence this 'information-disinformation' syndrome is likely to expedite the process of misconceiving and misinterpreting preferences and strategies of actors in a conflict situation.

Linn I. Sinnott speaks about 'false alarms', affecting the strategic maneuvers of belligerent nations. According to him if the frequency of a false alarm is more than real chances of war or 'near war' situations are less. He argues that false alarms are done with the help of remote sensing using laser technology. But ultimately these space-based multifunctional systems will make up a certain strike capability complex⁹³. Linn I. Sinnott in his advancement of the argument on false alarms speaks about 'decapitation', a strategy in which one nation, fearing an imminent attack by the other, strikes at the opponent's national leaders and command centers.

The more nuclear powers there are, the greater is the opportunity for miscalculation and error, or deliberate nuclear attack⁹⁴. In terms of international relations the equivalent of price stickiness is a tendency for armament levels within a balance power system to resist rapid or frequent changes, upwards or downwards. No one will rationally follow a

⁹³ Anatoly Gromyko, "Breakthrough: Emerging New Thinking", p – 47.

⁹⁴ Thomas I. Saaty, "Mathematical models of Arms Control and Disarmament", p – 5.

unilateral disarmament downwards with the result that he suffers a relative power loss. And everyone will follow a re-armed upwards, thus depriving him of his looked for power gain⁹⁵. Sometimes disinformation or a lack of perfect information leads to misconceptions misjudgments and ultimately to misunderstandings. Some kind of accommodation and Co-operation develops between the contending parties in the long run when both are aware of each other's destructive capability.

Anatol Rapoport (1960) while speaking about arms proliferation, disarmament and armaments build up says that the level of expenditure on arms maintains balance of power or stability of the system. Again the expenditure on arms determines the amount and intensity of hostility or cooperation. The net amount of hostility should be taken as the difference between armament expenditures and international trade of the nations⁹⁶.

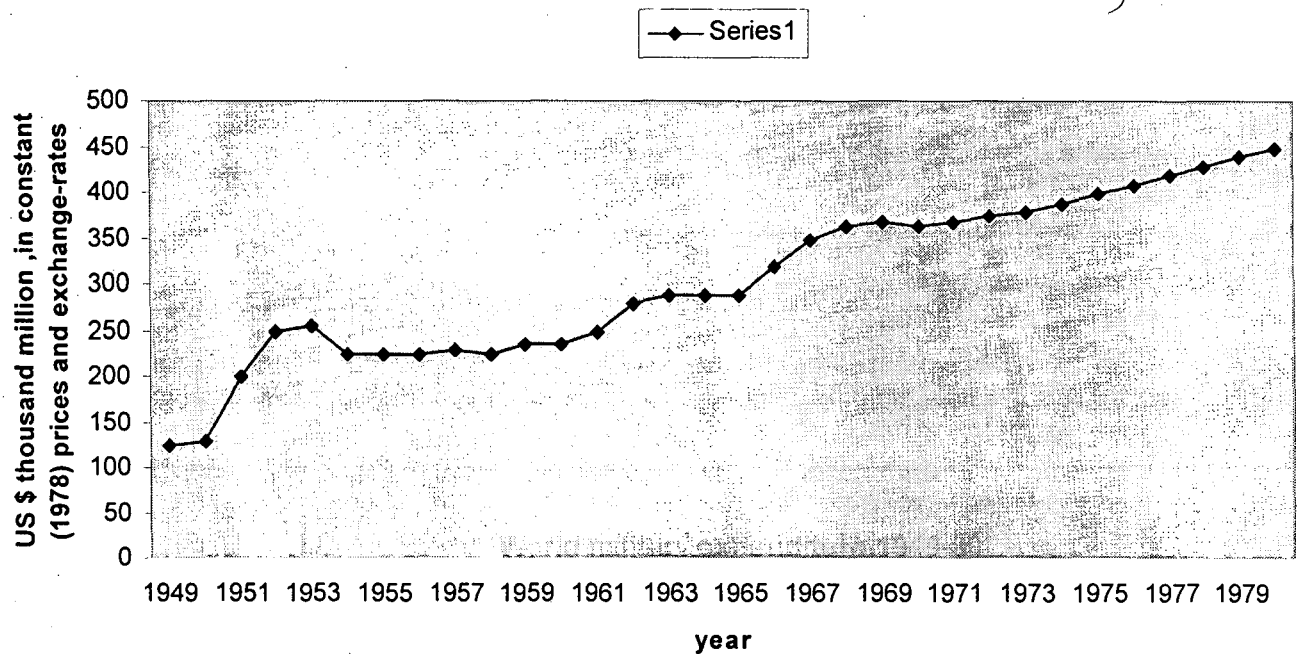
Thus nations were evaluated on the basis of nuclear might.

The following graph shows that world military expenditure has been steadily increasing since the end of the Second World War. In terms of increase, it had the largest increase from 1951-55, and in the 60's of the 20th when stringent measures were taken towards arms control and non-proliferation, military expenditure has been constantly rising.

⁹⁵ Ian Bellary and D. Blaker (ed.), "The Verification of Arms Control Agreements", p – 10.

⁹⁶ Anatol Rapoport- "Fights, Games and Decisions", p– 36.

World military expenditure, 1949-80



Alvin Rubinstein (1993) speaks of 'mutual tensions' that concretized Khrushchev's 'forward policy' in non-contagious areas of the third world, and his decision to construct an oceanic naval force violating maritime law. Moreover, he argues that was a shift in soviet foreign policy from a continental based strategy to a global one. Simultaneously, United States was busy moving on the lines of containment and U.S.- Soviet global rivalry unfolded in a tight bi-polar one.

Henry Schaefer (1986) blatantly accepts that U.S. has failed to keep the promise of restricting or controlling arms. He speaks about U.S.S.R. and other European country's folly to keep up to the standards of arms control, making U.S. move on the lines of mutual deterrence and mutual assured destruction. He calls the relationship between

disarmers and arms controllers as a 'marriage of convenience'. Moreover, as projected intra war force residuals gained in significance, more refined calculations of force balances at various potential levels, become essential both for force planning and gauging potential arms constrains⁹⁷.

Whether it is a race of arms or it is a race of establishing supremacy through initiating disarmament negotiations, the race can only be won in a canter and for that the efficient functioning of the military-bureaucratic-political structure becomes indispensable. The ebullient option left before this structure was a total control over information systems. The role of information in strategic decision-making has been intriguing. The reconnaissance satellites, the area surveillance satellites, the anti-satellite satellites, as well as the early warning satellites are empowered to scan a wide-ranging area of strategic interest by using high-resolution cameras. Unfortunately, for all these technological developments, the space has ceased to remain as a 'zone of peace'⁹⁸ and empowering these satellites has only led to the militarization of outer space. Further developments have made photography possible under very low light intensity i.e., under moonlight or even starlight. The photographic cameras use ultra sophisticated vidicon tubes that are efficient enough to provide resolutions like normal photographic cameras⁹⁹. Since the beginning of the Sputnik era in October 1957, there has been an indiscriminate use of the outer space violating major controlling agreements like the Outer Space Treaty passed in the year 1967.

⁹⁷ Henry W. Schaefer, "Nuclear Arms Control: The Process of Developing Positions", p – 17.

⁹⁸ Jasani uses this term.

⁹⁹ B. Jasani (ed)., "Outer Space: Battlefield of The Future?", p– 27.

Nuclearization of space is passively related to space exploration. Barring U.S.A and former U.S.S.R, who started their space missions from the mid 50's of the 20th century, the Europeans were no less ahead in space exploration. The lack of a European military space programme at a level comparable to that of the Soviet or Americans was not seen with good eyes and all measures were taken to enhance the technological know-how and launching capabilities¹⁰⁰. The coming table will reveal the enthusiasm of the European nations towards building a congenial space.

Table- 4. The first estimate of ESRO's budget published in 1961. (Converted into millions of dollars)

Year	Payloads	Launch costs		Vehicles	Tracking and data handling	Fellowships	Total
		Rockets	Satellites				
1954	8.1	2.8	0.0	0.3	0.6	0.3	12.1
1955	14.0	2.0	0.0	0.8	7.0	0.3	24.1
1956	18.8	1.6	0.0	0.8	8.1	0.3	29.6
1957	17.9	1.6	3.6	4.4	2.8	0.3	30.6
1958	17.6	1.6	5.3	6.1	3.0	0.3	33.9
1959	17.6	1.6	11.1	12.0	3.0	0.3	45.6
1960	17.6	1.6	11.2	12.0	3.0	0.3	45.7
1961	17.6	1.6	11.2	12.0	3.0	0.3	45.7

Source: Herbert Friedman, "International Co-operation in Space", Harvard University Press, U.S.A., 1994. Page – 6. The Original source is Sri Harrie Massey and M. O. Robbins, History of British Space Science (Cambridge: Cambridge University Press, 1966).

We are not only threatened by the 'new weapons technology' which is today 'inadvertently' used in the making of light weapons, we are also in jeopardy because of the decision makers keenness to enjoy the positive feedbacks of redistribution through 'oil trade-offs' and 'nuclear arms trade-offs'. The redistribution thus helped both the powers to maintain stability in terms of military vis-à-vis nuclear resources. The amount of resources that is allocated towards the manufacturing of sophisticated nuclear arms has always been 'sky-rocketing'. Had this amount of money been channelised towards the

¹⁰⁰ Herbert Friedman (ed)., "International Cooperation in Space", p-3

upliftment of development sectors of the domestic economy, the world order would have been defined in a different way.

There is no denying the fact that global politics, which has emerged after the 2nd World War, has been strongly influenced by cultural forces like race and religion. A thorough theoretical disposition of this emerging trend is identified in the works of Samuel P. Huntington who speaks about the dominance of culture and civilization over other related variables.

The air is clean and superpower gaming in arms control negotiations implying intricate theoretical and practical aspects of international politics is no longer a secret. According to P. J. Friel the cornerstone of U.S. strategic policy with respect to the Soviet Union was deterrence maintained through the possession of an assured destruction capability. Their prioritizing deterrence has fantastically increased the number of armaments. Their playing with defence deals till the early 90's of the twentieth century have reversibly increased the number of arms producing nations. Moreover, with the cost of new technologies going down and with the massive spread in technical information, nations with low per-capita income are trying to afford to get the weapons of mass destruction. Frank, in his important work observed that "tighten end-use controls over weapons without effective controls over the spread of technical information concerning their manufacture would probably increase the number of arms producing nations while reducing the number of 'over the counter sales'¹⁰¹. According to Hedley Bull, because of protracted arms control negotiations, there might one day emerge a 'common strategic

¹⁰¹ R W Howe, "Weapons: The International Game of Arms, Money and Diplomacy", p-234.

ideology' characterizing the positive and negative roles of strategic weapons. But even by applying game theory it is hard to identify a really common strategic ideology in arms control negotiations.

Problems of applying game theory in arms control negotiations.

1. Global political decision-makers use more than one strategy to reach at a particular decision. James D. Marrow opines that mixed strategy equilibria should be preferred to pure strategy equilibria in models of international conflict. On a mixed strategy game one player can choose either of the two strategies based upon the probable strategy of the other. But whether it is game of pure strategy or it is a game of mixed strategy there is always a mix of cognitive and rational process while framing strategies. Alex Mintz (1997) analyses the impact of cognitive and rational approaches in decisions of war and peace. His study deals with the actual decision making behaviour as well as the impacts of other variables on the framing of policies.

2. Another major fundamental problem of applying games in situations of conflict is the assumption of rationality. In a two-person game; an outcome is called rational if it fetches the largest value to the actor. Rational choice explanations thus depend upon the 'means-end' theory of rational action. An action is rational when players performing within a narrowly constrained and neatly defined situation, makes optional choices using his means to reach a desired end. Thus the 'means-end' theory tries to explain a variety of forms of human behaviour. Any fully rational agent who wills an end necessarily wills the means to the end. The problem lies with how a thing is willed and whether reaching the end with the help of means can maximize individual utility.

For both actors the outcome represented through values in pay-off matrix determines the degree and intensity of the rational strategies of actors in a conflict situation. Simon points out that in the game of chess, players are simply unable to use their optimal strategies because of measuring and computation problem¹⁰². Speaking about limited rationality, he argues that human brains are not sufficient enough to store and process every information in its exactitude. Those games in which a problem like this is manifest are called games of 'imperfect recall'. Moreover, most of the times, because of uncertainty and risk there is an absence of pure strategy in the case of arms control negotiations. A pure strategy is something, which the player will play knowing that the other person plays the right strategy. The problems of making decisions under risk first appeared in the analysis of a fair gamble, and here again the desire for a utility concept arose¹⁰³. According to Philip D. Straffin (1975), if one player knows that the opponent is playing a mixed strategy and will continue to do so, and then the player plays that strategy which has the largest expected value. Thus, even irrational games can be studied within the paradigm of rationality

3. A major difficulty in applying game theory to the study of bargaining or negotiation is that the theory is not designed to deal with words and gestures especially when they are deliberately ambiguous as moves. Verbal sallies pose two unresolved problems in game – theoretic modeling: (1) how to code words (2) how to describe the degree of commitment.

¹⁰² Harsanyi, "Rational Behavior and Bargaining Equilibrium In Games and Social Situations", p-17

¹⁰³ Luce and Raiffa, "Games and Decisions", p-19

4. Another major problem in applying game theory has been that most of the games are played under imperfect and incomplete information. Imperfect information assumes that one actor is not conversant with other actor's personal history and chance moves. Incomplete information assumes that player's are not aware of the other player's utility functions. This is one of the major reasons why Bayesian games of incomplete information are recently used to study strategic developments.

5. Another difficulty in applying the theory of games to superpower conflict has been the subjective identification of a situation of gaming. Superpower gaming has been a continuous process and to find it isolatedly is prone to aberrations. Moreover, every game has been a part of the larger game. Both a macro study of micro aspects and micro study of macro aspects simultaneously is a tough exercise.

6. Finally, applying game theory to arms control treaties involve problems because games necessarily function within a conflict situation while arms control negotiations might not overtly involve active conflict. Most of the strategic maneuvers in disarmament treaties indicate cooperation at least explicitly.

But still game theory is a tool that helps us to identify an interaction process. The application of the theory of game to superpower conflict and cooperation subsequently reveals certain deficiencies and prospects of this research.

Problems and prospects of my research

1) Disarmament and arms control policies can't be studied without the knowledge of the domestic policies. In other words domestic policies shape security options of nation-states. Changes in the domestic policies like policies on environment are very much related to security policies. Environment can be further classified into geographical environment and political environment. So when the geophysical setting of a certain place is affected its security policy automatically changes. A lucid manifestation of this aspect, can be derived from the amount of controversy in U.S.Senate with regard to harsh environmental policies adopted by Bush govt.

2) In real state of affairs, 'Superpower gaming' happened in a situation, either created or defined by a system, where many actors barring the powers themselves attempted to maximize their profit, but each having limited control over the variables that determine it, only negatively affected the gaming process. This has been the case mostly with the emerging nation-states whose will to participate in the gaming process did make situations complicated. Moreover, politics has his own language and both the global decision-makers as well as the pawns have been victims to it. Again, a move by one player opened up newer vistas for all other players thereby rendering changes in policy languages within the common set comprising security policy objectives. So to subjectively describe it as a superpower system or a subsystem will be fallacious.

3) An intellectual spin-off to assess the real capability of these powers has been fallacious. There is in fact no solution to decipher the complex aspects of 'real-virtual' syndrome.

4) This research work fails to take into its purview other aspects of bipolar and multi-polar politics. Hence, it can only reveal a partial picture of the entire decision-making processes. It further fails to take into account the role of UNITED NATIONS towards restoring the international political order. There is no gainsaying the fact that the gaming process as well as the bargaining techniques has been severely affected by the role of U.N.

5) The methodology used in this research can provide some insight to models on application of game and bargaining to the problems and prospects of peace. Moreover, very little has been done in this field and researches in this field has been highly thwarted because of shifting biases and individualistic orientations of the social researchers.

6) As an interdisciplinary study this research work may enhance further studies in interdisciplinary approaches. The main aspect of an interdisciplinary study is its ability to balance subjective, objective and technical things pertaining to research. But there is no denying the fact that by applying a mathematical tool to a political process is always prone to error. Even by applying an all-pervasive and all-encompassing theory like 'game theory' it is not also feasible to understand the deeper implications of policy making of a diffused polity.

At the end of the day, NPT with all its reviews and conferences has failed to check the elephantine growth of arms across the globe. All the peace-restoring mechanisms have

failed to foster healthy development of mankind and an international system is evolving that is leading us towards a multipolar nuclear world. The process of escalation and de-escalation that started with the superpowers is a global phenomenon now. Nations still carry on with the task of maintaining arms race though markedly of a different kind. Harrison Wagner suggests that arms races are more a function of each nations ability to detect and respond to violation of agreements to limit arms development¹⁰⁴. Ultimately going by the interpretation of Nietzsche, we can say that the processes of synthesis and evaluation are not running towards somnambulant equilibrium, they are tending towards phase shifts— where the atom will dictate terms upon humanity and will arrogantly say, *“Every name in history is I”*.

¹⁰⁴ Peter Ordeshook, “Game Theory and Political Theory”, pp-221-222.

APPENDIX-A

NUCLEAR NON-PROLIFERATION TREATY

Signed at Washington, London, and Moscow July 1, 1968

Ratification advised by U.S. Senate March 13, 1969

Ratified by U.S. President November 24, 1969

U.S. ratification deposited at Washington, London, and Moscow March 5, 1970

Proclaimed by U.S. President March 5, 1970

Entered into force March 5, 1970

The States concluding this Treaty, hereinafter referred to as the "Parties to the Treaty",

Considering the devastation that would be visited upon all mankind by a nuclear war and the consequent need to make every effort to avert the danger of such a war and to take measures to safeguard the security of peoples,

Believing that the proliferation of nuclear weapons would seriously enhance the danger of nuclear war,

In conformity with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons,

Undertaking to cooperate in facilitating the application of International Atomic Energy Agency safeguards on peaceful nuclear activities,

Expressing their support for research, development and other efforts to further the application, within the framework of the International Atomic Energy Agency safeguards system, of the principle of safeguarding effectively the flow of source and special fissionable materials by use of instruments and other techniques at certain strategic points,

Affirming the principle that the benefits of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties of the Treaty, whether nuclear-weapon or non-nuclear weapon States,

Convinced that, in furtherance of this principle, all Parties to the Treaty are entitled to participate in the fullest possible exchange of scientific information for, and to contribute

alone or in cooperation with other States to, the further development of the applications of atomic energy for peaceful purposes,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament,

Urging the cooperation of all States in the attainment of this objective,

Recalling the determination expressed by the Parties to the 1963 Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end,

Desiring to further the easing of international tension and the strengthening of trust between States in order to facilitate the cessation of the manufacture of nuclear weapons, the liquidation of all their existing stockpiles, and the elimination from national arsenals of nuclear weapons and the means of their delivery pursuant to a Treaty on general and complete disarmament under strict and effective international control,

Recalling that, in accordance with the Charter of the United Nations, States must refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations, and that the establishment and maintenance of international peace and security are to be promoted with the least diversion for armaments of the worlds human and economic resources,

Have agreed as follows:

Article I

Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

Article II

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

Article III

1. Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this article shall be applied to all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.

2. Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this article.

3. The safeguards required by this article shall be implemented in a manner designed to comply with article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international cooperation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this article and the principle of safeguarding set forth in the Preamble of the Treaty.

4. Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of this Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than the date of such deposit. Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations.

Article IV

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.

2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

Article V

Each party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a nondiscriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

Article VI

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control.

Article VII

Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.

Article VIII

1. Any Party to the Treaty may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to the Treaty. Thereupon, if requested to do so by one-third or more of the Parties to the Treaty, the Depositary Governments shall convene a conference, to which they shall invite all the Parties to the Treaty, to consider such an amendment.

2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. Thereafter, it shall enter into force for any other Party upon the deposit of its instrument of ratification of the amendment.

3. Five years after the entry into force of this Treaty, a conference of Parties to the Treaty shall be held in Geneva, Switzerland, in order to review the operation of this Treaty with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realized. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary Governments, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

Article IX

1. This Treaty shall be open to all States for signature. Any State which does not sign the Treaty before its entry into force in accordance with paragraph 3 of this article may accede to it at any time.

2. This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United States of America, the United Kingdom of Great Britain and Northern Ireland and the Union of Soviet Socialist Republics, which are hereby designated the Depositary Governments.

3. This Treaty shall enter into force after its ratification by the States, the Governments of which are designated Depositaries of the Treaty, and forty other States signatory to this Treaty and the deposit of their instruments of ratification. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to January 1, 1967.

4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

5. The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession, the date of the entry into force of this Treaty, and the date of receipt of any requests for convening a conference or other notices.

6. This Treaty shall be registered by the Depositary Governments pursuant to article 102 of the Charter of the United Nations.

Article X

1. Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.

Article XI

This Treaty, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF the undersigned, duly authorized, have signed this Treaty.

DONE in triplicate, at the cities of Washington, London and Moscow, this first day of July one thousand nine hundred sixty-eight

APPENDIX-B

SIGNATORIES AND PARTIES TO THE TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS

(Note: Changes from Fact Sheet of January 23, 1997 indicated in bold type.)

Country	Date of Signature	Date of Deposit or Ratification	Date of Deposit of Accession (A) or Succession (S)
Afghanistan*	07/01/68	02/04/70	
Albania**			09/12/90(A)
Algeria			01/12/95(A)
Antigua and Barbuda			06/17/85(S)
Andorra			06/07/96(A)
Angola			10/14/96(A)
Argentina			02/10/95(A)
Armenia			07/15/93(A)
Australia*	02/27/70	01/23/73	
Austria*	07/01/68	06/27/69	
Azerbaijan			09/22/92(A)
Bahamas, The			08/11/76(S)
Bahrain			11/03/88(A)
Bangladesh*			08/31/79(A)
Barbados	07/01/68	02/21/80	
Belarus			07/22/93(A)
Belgium*	08/20/68	05/02/75	
Belize			08/09/85(S)
Benin	07/01/68	10/31/72	
Bhutan*			05/23/85(A)
Bolivia	07/01/68	05/26/70	
Bosnia & Herzegovina			08/15/94(S)
Botswana	07/01/68	04/28/69	
Brazil			09/18/98(A)
Brunei*			03/26/85(A)
Bulgaria*	07/01/68	09/05/69	
Burkina Faso	11/25/68	03/03/70	
Burundi			03/19/71(A)
Cambodia			06/02/72(A)
Cameroon	07/17/68	01/08/69	
Canada*	07/23/68	01/08/69	
Cape Verde			10/24/79(A)

Central African Republic			10/25/70(A)
Chad	07/01/68	03/10/71	
Chile			05/25/95(A)
China			03/09/92(A)
Colombia**	07/01/68	04/08/86	
Comoros			10/04/95(A)
Congo			10/23/78(A)
Costa Rica*	07/01/68	03/03/70	
Cote d'Ivoire*	07/01/68	03/06/73	
Croatia			06/29/92(S)
Cyprus*	07/01/68	02/10/70	
Czech Republic*			01/01/93(S)
Denmark*	07/01/68	01/03/69	
Djibouti			10/16/96(A)
Dominica			08/10/84(S)
Dominican Republic*	07/01/68	07/24/71	
Ecuador*	07/09/68	03/07/69	
Egypt*	07/01/68	02/26/81 ¹	
El Salvador*	07/01/68	07/11/72	
Equatorial Guinea			11/01/84(A)
Eritrea			03/03/95(A)
Estonia			01/07/92(A)
Ethiopia*	09/05/68	02/05/70	
Fiji*			07/14/72(S)
Finland*	07/01/68	02/05/69	
Former Yugoslav			
Republic of Macedonia			04/12/95(A)
France			08/03/92(A)
Gabon			02/19/74(A)
Gambia*, The	09/04/68	05/12/75	
Georgia			03/07/94(A)
Germany*, Fed. Republic of	11/28/69	05/02/75 ^{1,2}	
Ghana*	07/01/68	05/04/70	
Greece*	07/01/68	03/11/70	
Grenada			09/02/75(S)
Guatemala*	07/26/68	09/22/70	
Guinea			04/29/85(A)
Guinea-Bissau			08/20/76(S)
Guyana			10/19/93(A)

Haiti	07/01/68	06/02/70	
Holy See*			02/25/71(A) ¹
Honduras*	07/01/68	05/16/73	
Hungary*, Rep of	07/01/68	05/27/69	
Iceland*	07/01/68	07/18/69	
Indonesia*	03/02/70	07/12/79 ¹	
Iran*	07/01/68	02/02/70	
Iraq*	07/01/68	10/29/69	
Ireland*	07/01/68	07/01/68	
Italy*	01/28/69	05/02/75 ¹	
Jamaica*	04/14/69	03/05/70	
Japan*	02/03/70	06/08/76 ¹	
Jordan*	07/10/68	02/11/70	
Kazakhstan			02/14/94(A)
Kenya	07/01/68	06/11/70	
Kiribati*			04/18/85(S)
Korea, Democratic People's Republic of			12/12/85(A)
Korea*, Republic of	07/01/68	04/23/75	
Kuwait	08/15/68	11/17/89	
Kyrgyzstan			07/05/94(A)
Laos	07/01/68	02/20/70	
Latvia			01/31/92(A)
Lebanon*	07/01/68	07/15/70	
Lesotho*	07/09/68	05/20/70	
Liberia	07/01/68	03/05/70	
Libya*	07/18/68	05/26/75	
Liechtenstein*			04/20/78(A) ¹
Lithuania			09/23/91(A)
Luxembourg*	08/14/68	05/02/75	
Madagascar*	08/22/68	10/08/70	
Malawi*			02/18/86(S)
Malaysia*	07/01/68	03/05/70	
Maldives*	09/11/68	04/07/70	
Mali	07/14/69	02/10/70	
Malta*	04/17/69	02/06/70	
Marshall Islands			01/30/95(A)
Mauritania			10/26/93(A)
Mauritius*	07/01/68	04/08/69	
Mexico*	07/26/68	01/21/69 ¹	
Micronesia			04/14/95(A)
Moldova			10/11/94(A)

Monaco			03/13/95(A)
Mongolia*	07/01/68	05/14/69	
Morocco*	07/01/68	11/27/70	
Mozambique			
09/04/90(A)			
Myanmar (Burma)			12/02/92(A)
Namibia			10/02/92(A)
Nauru*			06/07/82(A)
Nepal*	07/01/68	01/05/70	
Netherlands*	08/20/68	05/02/75 ³	
New Zealand*	07/01/68	09/10/69	
Nicaragua*	07/01/68	03/06/73	
Niger			10/09/92(A)
Nigeria*	07/01/68	09/27/68	
Norway*	07/01/68	02/05/69	
Oman			01/23/97(A)
Palau			04/12/95(A)
Panama	07/01/68	01/13/77	
Papua New Guinea*			01/13/82(A)
Paraguay*	07/01/68	02/04/70	
Peru*	07/01/68	03/03/70	
Philippines*	07/01/68	10/05/72	
Poland*	07/01/68	06/12/69	
Portugal*			12/15/77(A)
Qatar			04/03/89(A)
Romania*	07/01/68	02/04/70	
Russia ⁵	07/01/68	03/05/70	
Rwanda			05/20/75(A)
St. Kitts and Nevis			03/22/93(A)
St. Lucia*			12/28/79(S)
St. Vincent & the			
Grenadines			11/06/84(S)
San Marino	07/01/68	08/10/70	
Sao Tome & Principe			07/20/83(A)
Saudi Arabia			10/03/88(A)
Senegal*	07/01/68	12/17/70	
Seychelles			03/12/85(A)
Sierra Leone			02/26/75(A)
Singapore*	02/05/70	03/10/76	
Slovakia			01/01/93(S)
Slovenia			04/07/92(A)

Solomon Islands			06/17/81(S)
Somalia	07/01/68	03/05/70	
South Africa*			07/10/91(A)
Spain*			11/05/87(A)
Sri Lanka*	07/01/68	03/05/79	
Sudan*	12/24/68	10/31/73	
Suriname*			06/30/76(S)(b)
Swaziland*	06/24/69	12/11/69	
Sweden*	08/19/68	01/09/70	
Switzerland*	11/27/69	03/09/77 ¹	
Syrian Arab Republic	07/01/68	09/24/69	
Taiwan ⁷	07/01/68	01/27/70	
Tajikistan			01/17/95(A)
Tanzania			05/31/91(A)
Thailand*			12/02/72(A)
Togo	07/01/68	02/26/70	
Tonga			07/07/71(S)
Trinidad & Tobago	08/20/68	10/30/86	
Tunisia*	07/01/68	02/26/70	
Turkey*	01/28/69	04/17/80 ¹	
Tuvalu*			01/19/79(S)
Turkmenistan			09/29/94(A)
Uganda			10/20/82(A)
Ukraine			12/05/94(A)
United Arab Emirates			09/26/95(A)
United Kingdom	07/01/68	11/27/68 ⁴	
United States	07/01/68	03/05/70	
Uruguay*	07/01/68	08/31/70	
Uzbekistan*			05/02/92
Vanuatu			08/26/95(A)
Venezuela*	07/01/68	09/25/75	
Vietnam*, Socialist			06/14/82(A)
Republic of			
Western Samoa*			03/17/75(A)
Yemen ⁶	11/14/68	06/01/79	
Yugoslavia, Socialist			
Federal Republic of	07/10/68	03/04/70	
Zaire*	07/22/68	08/04/70	
Zambia			05/15/91(A)
Zimbabwe			09/26/91(A)

TOTAL: 185 (Total does not include Taiwan or SFR Yugoslavia, which has dissolved.) NOTES:

a - Dates given are the earliest dates on which a country signed the Treaty or deposited its instrument of ratification or accession.

-- whether in Washington, London, or Moscow. In the case of a country that was a dependent territory which became a party through succession, the date given is the date on which the country gave notice that it would continue to be bound by the terms of the Treaty.

b - Effective 11/25/75.

¹ With Statement.

² The former German Democratic Republic, which united with the Federal Republic of Germany on 10/3/90, had signed the NPT on 7/1/68 and deposited its instrument of ratification on 10/31/69.

³ Extended to Netherlands Antilles and Aruba.

⁴ Extended to Aguililla and territories under the territorial sovereignty of the United Kingdom.

⁵ Russia has given notice that it would continue to exercise the rights and fulfill the obligations of the former Soviet Union arising from the NPT.

⁶ The Republic of Yemen resulted from the union of the Yemen Arab Republic and the People's Democratic Republic of Yemen. The table indicates the date of signature and ratification by the People's Democratic Republic of Yemen; the first of these two states to become a party to the NPT. The Yemen Arab Republic signed the NPT on 9/23/68 and deposited its instrument of ratification on 5/14/86.

⁷ On 1/27/70, an instrument of ratification was deposited in the name of the Republic of China. Effective 1/1/79, the United States recognized the People's Republic of China as the sole legal government of China. The authorities on Taiwan state that they will continue to abide by the provisions of the Treaty and the United States regards them as bound by the obligations imposed by the Treaty.

* Entries with asterisk have NPT safeguards agreements that have entered into force as of 10/31/92.

** Non-NPT, full-scope safeguards agreement in force.

APPENDIX-C

ARMS CONTROL AND DISARMAMENT NEGOTIATIONS (1863-1998).

Instructions for the Government of Armies of the United States in the Field. Prepared by Francis Lieber (The Lieber Code) (1863)

Convention (I) for the Pacific Settlement of International Disputes (29 Jul 1899)

Convention (II) with Respect to the Laws and Customs of War on Land (29 Jul 1899)

Convention (II) for the Pacific Settlement of International Disputes (18 Oct 1907)

Convention (III) Relative to the Opening of Hostilities (18 Oct 1907)

Convention (IV) Respecting the Laws and Customs of War on Land (18 Oct 1907)

Convention (V) Respecting the Rights and Duties of Neutral Powers and Persons in Case of War on Land (18 Oct 1907)

Convention (VI) Relating to the Status of Enemy Merchant Ships at the Outbreak of Hostilities (18 Oct 1907)

Convention (VII) Relating to the Conversion of Merchant Ships into War-Ships (18 Oct 1907)

Convention (VIII) Relative to the Laying of Automatic Submarine Contact Mines (18 Oct 1907)

Convention (IX) Concerning Bombardment by Naval Forces in Time of War (18 Oct 1907)

Convention (X) for the Adaption to Maritime War of the Principles of the Geneva Convention (18 Oct 07)

Convention (XI) Relative to Certain Restrictions with Regard to the Exercise of the Right of Capture in Naval War (18 Oct 1907)

Convention (XIII) Concerning the Rights and Duties of Neutral Powers in Naval War (18 Oct 1907)

Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare (17 Jun 1925)

Convention on the Prevention and Punishment of Genocide (9 Dec 1948)

Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field. WWW version via Center for Information, Law and Policy, Villanova University School of Law (12 Aug 1949)

Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea (12 Aug 1949)

Geneva Convention (III) Relative to the Treatment of Prisoners of War (12 Aug 1949)

Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War (12 Aug 1949)

Convention for the Protection of Cultural Property in the Event of Armed Conflict (14 May 1954). WWW version

Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (5 Aug 1963)

Treaty on the Non-Proliferation of Nuclear Weapons (1 Jul 1968)

Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof (11 February 1971)

Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (10 Apr 1972)

Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-ballistic Missile Systems (26 May 1972); and Protocol of 3 July 1974.

Convention on the Prohibition of Military or any Other Hostile Use of Environmental Modification Techniques (10 Dec 1976)

Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflict (Protocol I) (8 Jun 1977)

Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of non-international armed conflict (Protocol II) (8 Jun 1977)

Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be excessively injurious or to have indiscriminate effects (10 Oct 1980)

South Pacific Nuclear Free Zone Treaty (6 Aug 1985)

Treaty on Conventional Armed Forces in Europe (19 Nov 1990)

Treaty on Open Skies; (24 Mar 1992). Text and annexes from U.S. Arms Control and Disarmament Agency.

Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (13 Jan 1993). Technical Secretariat of the Organization for the Prohibition of Chemical Weapons (OPCW). Ratification status.

Comprehensive Test Ban Treaty (10 Sept 1996). Hyperlinked outline from the U.S. Department of Energy. Text version from the NGO Committee on Disarmament. UN Centre for Disarmament Affairs

United Nations International Convention for the Suppression of Terrorist Bombings (12 Jan 1998)

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