The cuban missile crisis

The Cuban missile crisis began on 14 October, 1962 when an American U-2 spy plane discovered that Premier Nikita Khrushchev of the Soviet Union was attempting to install intermediate-range nuclear-outfitted ballistic missiles in Cuba.[1]These warheads would have the capacity to destroy a large portion of the United States and therefore posed an enormous threat. When confronted by this immense threat that could presage nuclear war, the American government was forced to take action in order to diffuse the situation. The complexities of this type of decision-making are intricate, yet explainable and fundamentally predictable thanks to modern methods of analysis. As John F. Kennedy phrased it, " The essence of ultimate decision remains impenetrable to the observer-often, indeed, to the decider himself…. There will always be the dark and tangled stretches in the decision-making process-mysterious even to those who may be most intimately involved."[2]I would like to unravel the " dark and tangled stretches" in this process by using game theory to retrodict, or make past predictions of, the different leaders' choices throughout the thirteen day span of the Cuban missile crisis.

Game Theory Basics

When examined through the perspective of the Rational Actor Model, this situation introduces an obvious dilemma. Within this model, governments are treated as the primary actors. The government examines a set of goals, evaluates them according to their utility, then selects the one that has the highest " payoff." In this instance, the United States was involved in a nuclear standoff with the Soviet Union. In the time of this imminent threat of

mutually assured destruction, the correct action needed to be taken as millions of lives were at stake.

Game theory is a branch of analytical mathematics utilized in social science to attempt to mathematically " calculate" decision-making in strategic situations in which an individual's success in making choices is dependent upon the choices of others.[3]It applies to situations (" games") where there are two or more parties (called " players") each attempting to choose between two or more ways of acting (called " strategies"). The possible outcomes of a particular game depend on the choices made by all players, and they can be ranked in order of preference by each player.

In regards to two-person, two-strategy games, as the Cuban missile crisis resembled, there are combinations of strategies for the players that are more or less " stable." This occurs when neither player by departing from its strategy can do any better in the outcome. When both players use these strategies simultaneously, the outcome is known as a Nash equilibrium, named after esteemed game theorist John Nash. A Nash equilibrium does not necessarily produce optimum outcomes for one or both players though. Instead, it can be viewed more as an optimal middle ground in which both players are spared from suffering the worst possible outcome. A Nash equilibrium is essentially what was reached during the Cuban missile crisis.

Chicken Game Model

In game theory, " Chicken" is the typical game used to model conflicts in which the players are on a deadly collision course. The game borrowed its namesake from hot rod movies made famous in the 1950s.[4]In these

movies, the players are two hot rodders and the game is one in which they drive their cars directly at one another, risking a head on collision. If one of them turns away at the last minute, he or she is said to have " chickened out" and is deemed the loser. However, if neither player decides to turn away, both are vulnerable to losing much more, since it is obvious that they will either be killed or seriously injured in the event of a wreck. In the last possibility of outcomes, if both players decide to turn away, neither gains nor loses anything. The payoffs of Chicken can be explained by this basic diagram:

Basic Chicken

John

go straight

turn away

Mark

go straight

-10, -10

5, -5

turn away

-5, 5

0, 0

*Matrix format[5]

This matrix shows that this theoretical game has two Nash equilibria, (5,-5) and (-5, 5), one where one hot rodder turns away and the other goes straight and vice versa. However, since there are two Nash equilibria and no predefined Schelling point, which is a solution that a player will tend to use in the absence of communication or substantial knowledge because it seems instinctive, or relevant to them,[6]there is no indication of which outcome is more likely. This poses a problem for the hot rodders as well as an equivocation for the game theorist since there is the ever present danger of both players falling into the mutual disaster of a collision. When aligned to the Cuban missile crisis, this mutual disaster is the mutually assured destruction of nuclear war.

Application of the Chicken Game Model

Thus unfolds a classic game of chicken with the United States behind one wheel, facing off with the Soviet Union behind the other. Before evaluating the end results of the game, however, it is important to first examine the formulation of strategies. Abiding by the theory of moves, it is of the highest importance to anticipate, whilst concurrently trying to condition, the outcomes and consequences of any major decision or choice of action. Therefore, when deciding on a strategy to employ, each alternative must be weighed and projected completely through its causal fallout. This was the most critical aspect of the game for the Kennedy administration. As Defense Secretary McNamara explained about the situation, " It's not a military problem that we're facing. It's a political problem. It's a problem of holding

the Alliance together. It's a problem of properly conditioning Khrushchev for our future moves."[7]It cannot be said whether he was directly referencing game theory with this statement, but the implications are fitting in the application of such concepts.

Many members of the administration and military leaders felt as though their hands were up in the air, or tied behind their backs, because no one was confident enough to make a final decision under these tense and potentially tragic conditions. The wrong decision could have led to the end of the United States of America. Even so, the urgency of the situation made it necessary for the right decision to be made immediately. Ultimately, every minute wasted was a minute longer the Soviets had to make the ballistic missiles operable in Cuba, therefore time and decision were of the essence.

Group Decision-making and EXCOMM

Group decision is a trustworthy way to make choices because of the benefits the approach produces, as long as social phenomena such as groupthink are avoided. The cooperative planning done by the Executive Committee including Secretary of State Dean Rusk, Attorney General Robert F. Kennedy, John McNamara, Director of Central Intelligence John McCone and the other cabinet members ensured multilateral examination of the situation, fuller consideration of the entire spectrum of relevant points of interest, more ingenuity in the formulation of options and a greater overall sense of awareness and knowledge about the issue. This interplay of a multitude of expertise made an optimum decision likely.

Furthermore, group interaction was the most logical approach when considering the negative effects preempted by a solo decision of President Kennedy. Miles' Law states that " where you stand depends on where you sit."[8]Specifically in this case, one's stance on an issue is significantly affected by their role in the government and where they fall into the operational chain of command. A cooperative decision minimized the role interference that could bias the plan of action.

Possible Courses of Action

After days of deliberation, Kennedy and his advisers came up with six possible options. These options were as follows: 1) Do nothing. Although an option, this course of inaction was not even considered as President Kennedy was sure the domestic fallout would be that of intolerance. 2) Impose diplomatic pressures and negotiate with Khrushchev at a summit. This option was also not popular because it implied that American concessions would be made and President Kennedy was unwilling to show this flexibility out of fear that it would be conveyed as vulnerability. 3) Make a secret appeal to Castro and split Cuba from its ties with the Soviet Union. 4) Send troops to Cuba for a ground invasion. 5) Deploy an air strike on the island in order to destroy the missiles and scare the Soviets of Cuba falling to US control. 6) Implement a blockade of Cuba to keep weapons away. However, whichever method picked had to be carried out without sparking a Soviet reprisal on Berlin.[9]

After further deliberations, these options were narrowed down to two possible courses of action. Either a naval blockade to prevent the shipment of more missiles or a surgical air strike to destroy existing missiles would be

implemented. In response, the Soviets could ultimately only choose between two strategies; either withdraw or maintain the missiles in Cuba. Specifically though, the blockade forced Khrushchev to choose among three immediate alternatives: 1) avoid a showdown by keeping Soviet vessels out of the area 2) submit to the blockade by permitting ships to be stopped and searched and 3) provoke the United States to a first use of force by defying the blockade.

The game outcomes look more like this diagram:

Applied

Chicken

Soviet Union

withdraw (W)

maintain (M)

United States

blockade (B)

3, 3

2, 4

air strike (A)

4, 2

1, 1

Together these strategies comprise the array of options the players have to choose from. When paired, they result in four possible outcomes, which the players are assumed to rank from one to four, with one being the worst, or least beneficial, and four being the best or most profitable outcome. The first number in the ordered pairs for each outcome is the payoff to the row player (United States), and the second number the payoff to the column player (Soviet Union). It is important to remember though that these rankings of the payoffs are only ordinal, meaning they only rank from best to worst, not incorporating the extent or degree to which a player prefers one outcome to another.

Analysis of Applied Chicken Game Model

Needless to say, this matrix of strategic choices and payoffs only provides an elementary depiction of the crisis as it unfolded over the thirteen day period. It must be acknowledged that both players considered more than merely the options listed, as well as modifications and augmentations of each. For example, the Soviets demanded the withdrawal of American missiles from Turkey as a quid pro quo[10]for withdrawal of their own missiles from Cuba. [11]The United States blatantly ignored this request.

Even so, it is common belief that the superpowers were indeed on a collision course during the Cuban missile crisis and therefore the Chicken model is appropriate. Alternatively, neither side was forthcoming in undertaking any irreversible action, such as one of the drivers might do in Chicken by allowing the other driver to see him boldly breaking off the steering wheel of

his car and coincidentally eliminating the option of maneuvering to avoid collision. It is here that the Chicken game leaves voids in application to the crisis.

It can be said that the United States ultimately " won" by forcing the U. S. S. R. to withdraw their missiles. Per contra, Premier Khrushchev was granted a promise that the U. S. would not invade Cuba. This dual-reward represents a result that is basically a compromise- which does not coincide with game theory's prediction for a game of Chicken. The strategies the compromise consists of do not form any Nash equilibriums.

To analyze this, assume that " gameplay" is at the compromise (3, 3) position where the U. S. blockades Cuba and the Soviet Union withdraws its missiles. This outcome is not stable because both players have incentives to deviate to more aggressive strategies. If the U. S. S. R. was to defect by maintaining their missiles, gameplay would shift to (2, 4) granting the Soviets a payoff of four. The same, but reverse, would happen if the U. S. decided to change their strategy to an air strike. This symmetry in the table of payoffs presents a recurring problem in interpreting results of a Chicken game- there is more than one equilibrium outcome.[12]Furthermore, if the players arrive at the mutually worst (1, 1) outcome of nuclear war, both would have undoubtful incentive to move away from it, which makes the strategies associated with (1, 1) just like those with (3, 3); unstable.

Shortfalls of the Chicken Game Model

As shown, using Chicken to try to wholly model the Cuban missile crisis is flawed not only because of the instability of the outcomes but also because

of the parameters. As it happened, the two superpowers did not select their strategies independently of each other, nor simultaneously as assumed in the Chicken game. The Soviet Union chose their actions in response to the already implemented U. S. quarantine. Additionally, the fact that the United States held the air strike option in reserve in case circumstances necessitated escalation of action shows that the first decision was not considered final, and the U. S. felt they still had strategic options open even after imposing the blockade.

Consequently, the Cuban missile crisis can be more appropriately modeled as a game of sequential bargaining where neither player makes a terminal decision, but rather considers different alternatives, and reserves the absolutes in case the opponent should fail to act " acceptably." Before the crisis, the Soviets felt they needed to advance their global strategic position, even though they feared that the U. S. might invade Cuba. Khrushchev decided that positioning the missiles was worth that risk. He and his staff rationalized that the Americans if confronted with this fait accompli, or an action that is completed before those affected by it are in a position to query or reverse it, " would be deterred from invading Cuba and would not any other severe reprisals."[13]Even if they instigated a crisis, they did not see the probability of war being high and therefore they risked antagonizing the United States.

Recourse Game Model and Application

Accordingly, there is convincing evidence to believe that American policy makers did not see the conflict Chicken-like based on how they considered

and ranked possible outcomes. The over-simplicity of using this model was alluded to by historian Philip Zelikow in his analysis of the audio tapes of dialogue within the EXCOMM meetings.[14]In order to more thoroughly explain the crisis, I will further apply game theory to the situation by creating a new, modified version of the Chicken game that I will call Recourse. This representation maintains the same strategies given in Chicken, but redistributes the rankings and interpretations of outcomes. These new classifications align more thouroughly with history than those of Chicken:

Applied

Recourse

Soviet Union

withdraw (W)

maintain (M)

United States

blockade (B)

3, 3

1, 4

air strike (A)

2, 2

4, 1

In the game of Recourse, the possible outcomes are as follows:

B/W: The choice of blockade by the United States and withdrawal by the Soviet Union remains the compromise for both players = (3, 3).

B/M: In the face of a U. S. blockade, Soviet maintenance of their missiles leads to a Soviet victory (its best outcome) and U. S. capitulation (its worst outcome) = (1, 4).

A/M: An air strike that destroys the missiles that the Soviets were maintaining is an " honorable" U. S. action (its best outcome) and thwarts the Soviets (their worst outcome) = (4, 1).

A/W: An air strike that destroys the missiles that the Soviets were withdrawing is a " dishonorable" U. S. action (its next-worst outcome) and thwarts the Soviets (their next-worst outcome) = (2, 2).

Although air strike trumps the Soviet Union at both outcomes (4, 1) and (2, 2), I view the (2, 2) outcome as less harmful to the Soviets. This is because international opinion at the time would condemn an American air strike as an obtrusively offensive move and furthermore a " dishonorable" action of the United States, especially if there was clear evidence that the U. S. S. R. was in the process of withdrawing their missiles already. If no such evidence existed, however, air strike, possibly supplemented with a ground invasion, would be acceptable action to counter the Soviet missiles.

Accuracy of the Recourse Game Model

The statements of U. S. policy makers support Recourse. In responding to a letter from Khrushchev, President Kennedy said, " If you would agree to remove these weapons systems from Cuba . . . we, on our part, would agree . . . (a) to remove promptly the quarantine measures now in effect and (b) to give assurances against an invasion of Cuba,"[15]which is consistent with Recourse since (3, 3) is preferred to (2, 2) by the United States, whereas (4, 2) is not preferred to (3, 3) in Chicken. If the Soviets maintained their missiles, the United States preferred an air strike to the blockade. As Robert Kennedy, the Attorney General under his brother during the crisis, said, " If they did not remove those bases, we would remove them,"[16]which is consistent with Recourse, since the United States prefers (4, 1) to (1, 4) but not (1, 1) to (2, 4) in Chicken.

Similarly, it is well known that several of President Kennedy's advisers were reluctant to initiate an attack against Cuba without first exhausting less belligerent courses of action that could bring about the removal of the missiles with " less risk and greater sensitivity to American ideals and values."[17]This is in accordance with the United States' tendency to always act ethically and the government's perpetual sensitivity to the world's perception of America. Pointedly, Robert Kennedy claimed that an immediate attack would be looked upon as " a Pearl Harbor in reverse, and it would blacken the name of the United States in the pages of history,"[18]which is again consistent with Recourse since the United States ranks A/W next worst (2), a " dishonorable" U. S. action, rather than best (4), a U. S. victory, in Chicken.

Actual " Gameplay"

As it happened, at 7: 00pm on 22 October, 1962, President Kennedy publicly announced that the United States had discovered Soviet missiles in Cuba and decreed a " strict quarantine on all offensive military equipment under shipment to Cuba." Additionally, he demanded that " Chairman Khrushchev halt and eliminate this clandestine, reckless and provocative threat to world peace."[19]After the ships were deployed, all that was left to do was to await a response.

Initially, on 24 October, as anticipated, Khrushchev responded defiantly, saying that he would instruct his ships to ignore the American blockade. However, the next morning, he reconciled and told Kennedy that he no longer wanted to exchange " caustic remarks" and was ready to resolve the crisis. Khrushchev offered his terms, " Give us a pledge not to invade Cuba, and we will remove the missiles," proving that he was genuine when he professed that he was prepared to " dismantle the missiles to make Cuba into a zone of peace."[20]The Soviet Union feared an American invasion of Cuba and saw the blockade as a heartening gesture that allowed concessions to be made without drastic loss.

Essentially, the outcome of this game and the Cuban missile crisis in general can be assessed at 4: 2 in favor of the United States. Although neither side literally gained any reward from the outcome, both avoided any significant loss. Since the United States made the initial offer and compelled the Soviet Union to make the next move, therefore inconveniencing Khrushchev into yielding to the conditions set forth by President Kennedy, America emerges as the winner of the game although the payoff was not maximized.

Although Recourse creates a fitting model, this explanation of events is neither all-inclusive nor infallible. As with any theory, there are conditions that are assumed to, and must be, static that the reasoning is based upon. And in a dynamic world, these criteria are not always satisfied. There are a multitude of external factors that influence decision making, many of which will be discussed in the following sections as they pertain to the Cuban Missile Crisis and nuclear war in general.

Specified Game Theory: Deterrence Theory

Game theory can be applied in a more general sense to other primary aspects of nuclear war, the most prominent of them being mutually assured destruction and deterrence. The application of game theory to these concepts has resulted in the derivation of a number of consequential theories which ultimately resolve in the cost-benefit analysis that game theory focuses on. According to the official U. S. Department of Defense definition, " Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counter action."[21]This definition captures the main premise for the United States' historic reliance on deterrence; however, it does not encompass the entirety of deterrence theory.

In general, deterrence is a complex term that universally means persuading an opponent that the costs and consequences of a specific action will outweigh and trump any potential benefits. The concept of persuading an adversary references the significant psychological aspect of deterrence, which is often an interplay of uncertain concessions and threats that may or may not be bluffs or true promises. More specifically, using the word "

potential" when describing the anticipated benefits shows the future-oriented aspect of any deterrent threat, meaning there is the promise of a certain reaction only in response to the undesired decision of another actor (player).[22]

Capability vs. Credibility

According to accredited deterrence theorist Derek Smith, " Underlying any deterrent threat are the closely intertwined concepts of capability and credibility."[23]The concept of " capability" is reasonably straightforward and readily quantifiable variable, based on each player's arsenal and military forces that are available for use in any engagement; whereas, " credibility" is a much more complex and qualitative variable, which is defined mostly from the anticipated probability that all available forces will actually be utilized, making it trivial. To clarify, for example, a state may have a promising amassment of armed forces, but if the state is governed by domestic doctrine that forbids their use except for in strict cases of homeland defense, then any strategy or threat of external use of force as deterrence will lack credibility.

The Psychology of Commitment Techniques

In order to strengthen the perception of an actor's resolve, a popular strategy is to use " commitment techniques,"[24]or techniques that increase the costs and losses involved in refusing or failing to act. An everyday example of this type of strategy is if someone tells all of their friends that they are quitting smoking for good. From thence on, their friends will act as a constant source of pressure for them to uphold the obligation (commitment)

because they voiced it publicly, and will now be held accountable to it. For a better example, Smith illustrates the military image of " burning bridges" while in combat to make a retreat impossible, which is " an unambiguous method for cementing one's resolve."[25]

Similarly, in the words of Thomas Schelling, " What we have to do is get ourselves into a position where we cannot fail to react as we said we would-where we just cannot help it-or where we would be obliged by some overwhelming cost of not reacting in the manner we had declared."[26]In order to illustrate this concept, Shelling makes reference to how, during the Cold War, the United States posted troops in Western Europe to act as a " tripwire" against Soviet aggression. This was an act that served to fortify resolve, and essentially the United States made the defense of Europe, and their overarching containment strategy a more absolute prospect by effectively eliminating the choice of retreat and abandonment."[27]

The Paradox of Control and MAD

The idea that a player denying himself options can be a productive or beneficial move appears counterintuitive at first. Schelling describes this phenomenon as a " paradox that the power to constrain an adversary may depend on the power to bind oneself."[28]Reexamining a fundamental game of Chicken is a fitting way of clarifying what is meant by that. If the two drivers are about to start speeding towards each other, it would make an extreme statement if one of the drivers decided to break off his steering wheel and show the other driver. After this, the other driver would have no choice but to give up and turn his car or suffer the tragic collision.

Making a bold statement like this can be a very effective way of determining resolve in situations where capability is lacking, however, the important thing to note is that it is always possible that both drivers could choose to make the same decision, which would create an even worse outcome than if the power position had been conceded at the end. The critical factor, then, is actually who is able to make the first move, thereby leaving the remaining with only one " last clear chance" to avoid catastrophe.[29]This catastrophe, in parallel to the Cuban Missile Crisis, is mutually assured destruction.

Furthermore, in addition to committing oneself to a specific course of action, there is also the trivial strategy of issuing a " threat that leaves something to chance," so that the end decision of whether or not to act is not completely controlled by the player that issued the threat.[30]This particular bargaining technique plays on the factor of risk-acceptance, assuming that the opposing side will choose to give in first. Consider the cliché scenario of one person rocking a boat in order to extract concessions from the scared occupants.

Schelling uses the term " brinksmanship" to describe this strategy, the choice of " deliberately letting the situation get somewhat out of hand, just because its being out of hand may be intolerable to the other party and force his accommodation."[31]Going back to the Chicken scenario, this would be verisimilar to one of the drivers publicly consuming a large amount of alcohol or other psychoactive substance before stepping into the car, thus creating uncertainty in the other player's mind that he would be able to avoid a collision even if he actually wanted to do so. This would likely influence the sober driver to concede unless he really wanted to collide, and thus the daredevil player who intoxicated himself indirectly forced the sober player to

capitulate; effecting the outcome he desired by acting outside the bounds of rationality.

Deterrence: " Rationality of Irrationality"

In much of the widely accepted literature published on deterrence, this phenomenon is called the " rationality of irrationality," since one player can draw coercive power from the prospect of being potentially " undeterrable."[32]As stated, whilst this strategy is dominantly compelling, it still welcomes tragedy, i. e. mutually assured destruction, by undertaking irrationality even though the opponent could possibly do the same or is expecting rational behavior from the other actor involved in the crisis. Regardless, despite the strategies and techniques that play out systematically and predictably in game theory and in the aforementioned hypothetical examples, it is always important to remember that the concept of deterrence, and the use of deterrence as a strategy, are built on a foundati