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The Deer Hunter Paradox

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Michael Cimino's *The Deer Hunter* contains a scene so riveting and nuanced that it is destined to enter - if it is not there already - the canon of 'great moments in cinema', along with the baby carriage scene from *Battleship Potemkin,* the shower scene from *Psycho*, and the faked orgasm scene from *When Harry Met Sally*. But dramatic impact aside, an analysis of the first Russian Roulette scene from *The Deer Hunter* also provides a metaphor for virtually the entire corpus of social and political philosophy. A full and more formal cashing out of these parallels is subject for another day - or lifetime![1] But the scene also depicts at least one - but arguably several - egregious errors in interactive reasoning. And so here I want to confine myself to the following question: Are those errors just Kahneman-Tversky-type glitches in the characters' capacities to reason - glitches which are certainly understandable given the highly stressful conditions under which they are required to perform? If so, there is grist aplenty for *psychology* in *The Deer Hunter*, but little or none for rational choice theory. Or does the scene reveal a genuine inadequacy in our current understanding of interactive rationality - the resolution of which would have profound implications for rational choice theory and its myriad applications? I suspect the latter. Let's see if I am right.

I. THE ONE-IN-SIX GAME

There is much worthy of analysis leading up the scene in question, but for our current purposes I will cut straight to the chase. Mike and Nick have been captured by the Vietcong and are being forced at gunpoint to play alternating Russian Roulette (**ARR**). Presumably the VC have opted for **ARR** over *Non-Alternative Russian Roulette* (**NARR**) for the (albeit perverse) added pleasure of knowing that one captive is desperately wishing the death of his own comrade.

The rules of the game - if 'rules' they be - are unclear.[2] But we will assume - as, we will assume, must our reluctant players - that they are as follows:

Compliance:

The VC leader places one bullet in a six-chamber revolver, spins the chambers, then the pistol itself. The player indicated by the barrel plays first. If he survives, the chambers are spun again, the gun is passed to the second player, he plays, the chambers are spun, back to the first player, and so on, until one player is dead.[3] And what the winner wins, presumably, is transfer to

a prisoner-of-war camp that takes greater cognizance of the Geneva and Hague Conventions.

Refusal:

The victims of this macabre spectacle are prodded into compliance with the threat of being thrown into an all-but-submerged enclosure infested with water rats, from which, we are to understand, one's chances of survival are even less than had he continued to participate. In short, we are to suppose that each player prefers life and liberty to life alone, himself to his comrade but his comrade alive to dead, death later to death sooner, and virtually anything to the 'pit'.

Reversal:

But neither is turning the gun on one's *co*-player - in the hope of eliminating him as a competitor - a live option. In principle this should just amuse the VC. After all, all I have done, in effect, is just converted our game of **ARR** to an Alternating *Dueling* Game (**ADG**).4 In **ARR**, neither the first player nor the second has any advantage provided either the game is spun (and therefore of potentially infinite length), or else unspun but consisting in an even number of possible rounds. If uneven, however, the advantage goes to whomever plays second. So by 'reversing' I am, in effect, simply cheating the spin of the barrel. But presumably the VC opted for **ARR** rather than **ADG** because of the added horror of pulling the trigger on oneself. So perhaps, since my co-player would be **5/6** likely to survive, the VC would simply hand *him* the gun and invite him to return the courtesy, only this time *without* spinning the chambers. I would then be placed second in an unspun *five*-round **ADG**. The probability of my dying in **Round 1** would be **1/5**, as distinct from the mere **1/6** I had just imposed on him. If I survived **Round1** and the gun was returned to me, I would be imposing **1/4** on him in **Round 2**, but at the cost of incurring **1/3** for myself in **Round 3**. And, of course, **1/2** for him in **Round 4** would cost me dearly in **Round 5**!

But, of course, the game would never be allowed to go this far. For whoever held the gun in **Round 4** would be a fool to let it out of his hand for **Round 5**. So whoever held it in **Round 3** would be a fool to let it out of his hand for **Round 4**. And so on. In short, if I am contemplating turning the gun on my co-player rather than myself, I might just as well plan to keep firing at him and hope the VC do not intervene. But, of course, they *would* intervene, because this is not the kind of entertainment they are looking for. So reversal is no more an option than refusal because it will likely invite a like penalty.5

Rebellion:

This, of course, leaves rebellion, which is not an option because there is only one bullet in the gun. If I turn the gun on my captors I have a **1/6** chance of scoring a hit. And of course if I fail I might as well continue, since now I have **1/5**, then **1/4**, then **1/3**, then **1/2**, then certainty. So clearly the VC will intervene,

probably by means of a bullet in my back.

Paradoxically enough, my only hope is that I hit on the first pull. For then our circumstances would be identical to those that must have obtained at the time of my capture. That is, in the firefight leading up to my surrender, surely I killed at least one of their comrades. Only subsequently did I drop my weapon and throw up my hands. If they were not disposed to take revenge for their fallen comrade then, why do so now? So, given that all I hold in my hand is an empty gun, why shoot me?6

At the very least, however, I can expect the same penalty I would have incurred had I either refused or reversed. So, as I say, rebellion is not - or at least not yet - a live option either.

To the bafflement of the VC - and to the bafflement of Nick, who is informed of Mike's plan just before they are brought up from their holding pen for their encounter - Mike asks for not one but *three* bullets in the gun. With some initial suspicion the VC accede. But their apprehension eases when Mike draws **Round 1** and *plays* it. And it eases still further when Mike then instructs an obedient Nick to play **Round 2**. On **Round 3**, of course, Mike turns the gun on his captors. As one of them goes down Nick grabs his rifle, and together he and Mike dispatch the remaining VC, eventually making it back to behind their own 'lines'.

Our questions are twofold. First, this 'happy' ending notwithstanding, what did Mike think he was doing? And second, supposing our answer is that, "He was just acting rationally!", why did the VC let him do it? Let's see.

II. SHOOTOUT

Mike has been thinking. He realizes that there are *two* games going on here, one between captives, and one between captives and captors. The VC want him to focus on the former. And, as we have seen, they have set the two games up so that *he* is always better off focusing on it. But Mike is also keeping an eye on this second game. And he is especially anxious to see if he can reconfigure things so he can *re*focus on it. For what is *really* going on here, he realizes, is just a straightforward game of *Shootout* (**SO**).

Of course, were the VC interested in 'playing fair', they would have re-armed both captives and then, on the count of three, the two sides would just have had it out. But the wages of having lost yesterday's battle are that the VC - we count eight of them - are taking the Americans on one at a time. A six-in-six gun against eight fully loaded automatics would be fairer than a five-in-six one, a five-in-six fairer than a four-in-six, and so on. But what the VC have been offering up to now is (what we might call) the *minimally* fair fight, i.e. a *one*-in-six gun against eight fully loaded automatics. Mike is simply proposing a fairer fight - though he is *hoping*, of course, the VC will mistake this proposal as having something to do with the *other* game.7

Mike has reasoned further that drawing on the VC - what we erstwhile called rebellion - in the one-in-six game would be tantamount to suicide. At most he would have one or two pulls on the trigger before being cut down. So to rub salt into the wounds of his powerlessness, the VC have offered him an *alternative* game. Take the one-in-six shot he *would* have taken at them and take it at him*self*. And why is this a live alternative? Because provided the chamber is empty, the same alternative will be offered to his co-player, then back to him, and so on, until one of them finds a full chamber. And the incentive, presumably, for choosing this alternative game is that, once all but one player is dead, the VC will withdraw whatever conditions are imposing this unfair version of **SO.**

Fair enough, thinks Mike. But, to equivocate, not *very* fair. It could certainly be made fairer by allowing him *two* bullets. (By this 'it', remember, Mike is thinking of the **SO** game, not the alternative one, i.e. **ARR**.) Fairer still by allowing him three, and so on. He realizes he cannot ask for six. But this is not because eight VC, each with a fully loaded automatic, would necessarily refuse to take him on with a six-in-six gun in the **SO** game. Rather it is because a six-in-six gun precludes the *alternative* game, and it is *that* game that the VC are concerned to promote. And *why* can Mike not ask for a six-in-six gun in the alternative game? Because whoever drew **Round 1** would have no choice but to refuse, reverse, or rebel. Refusal would not be an option. And, as we have already seen, neither would reversal. So he would have to rebel, which is just to play **SO** with a six-in-six gun, which is not the game the VC are interested in playing.

Then how about asking for *five*? If the first player survives, the chambers will have to be spun, since otherwise the second player will be in the same position as the first player in the six-in-six game. So the five-in-six game is just the one-in-six game save with a probability of survival so low that it will toggle to **SO.** So asking for five would be futile. And, in all likelihood, likewise for four. Less so for three. And less so again for two. And one is just the game we are already playing.

Note that I say that asking for four would 'in all likelihood' be futile. I say this because nothing in the first-order utility function of any (n<6)-in-six game *necessitates* that it toggle to **SO.** That is, it is true that the expected utilities of playing the alternative game and toggling to **SO** *vary inversely and directly, respectively, with the number of bullets in the gun.*[8] But it is also true that there is very little improvement for the gunfighter outnumbered eight automatics to one-revolver in going from a one-in-six revolver even to a six-in-six. This is because he is still likely to get only a round or two off before he is cut down. So what Mike needs is not just a conversion to **SO**, but conversion to an **SO** in which he has some hope of survival. And for that, he seems to have decided, not only does he need to play the alternative game with rules friendly to conversion to **SO.** He also needs to toggle to **SO** under conditions friendly to converting the eight-automatics-to-one-(n<6)-in-six-revolver gunfight to one with

better odds. Even a *six*-in-six gun against eight VC all on Valium would leave two VC standing. He can never hope to *equalize*. But he can hope to *minimize* the inequality. But even if he gets his own hands on an automatic, he is still too outnumbered. So, in short, he needs Nick's help in the forthcoming **SO**. And he will incur for himself - and impose on Nick - whatever risks he deems necessary to *get* to that optimal point.

But *not,* nota bene, categorically! He needs Nick to *either* take the bullet in the alternative game - in which case Mike emerges its clear winner - or else to help in the **SO.** So notwithstanding that Nick is probably named in honor of the patron saint of Christmas, his role in *The Deer Hunter* is more akin to that of the sacrificial lamb of the Passion. That, as it turns out, Nick's life is saved along *with* Mike's by his willingness to self-sacrifice sustains the analogy. One crucial difference, however, is that Nick does so inadvertently, as little more than a dupe. Still ...

III. THE THREE-IN-SIX UNSPUN GAME

Mike has already taken pains to have engaged the VC leader in a contest of machismo. If the latter has to think too long and hard, he loses face, both to Mike and to his own subordinates. So he accedes. He places three bullets in the gun, spins the chambers, and then the gun itself.

It is unclear whether the chambers are to be spun between rounds at this point or not. First we will assume they are not. (Momentarily we will analyze the spun scenario.) So at this juncture note - and not just in passing - that there are twenty ways in which the chambers can be loaded. Let **1** be the name of the chamber positioned under the hammer after the gun is loaded *and* spun. Then the bullets can be distributed:

123, 124, 125, 126, 134, 135, 136, 145, 146, 156,

234, 235, 236, 245, 246, 256,

345, 346, 356, and

456.

Now note that these twenty positions can be subdivided into three sets, within which each is a priori phenomenologically indistinguishable. The **three-in-a-row** set includes

123, 126, 156, 234, 345, and 456.

The **alternating** set is made up of

135 and 246.

And the remaining twelve arrangements,

124, 125, 134, 136, 145, 146, 235, 236, 245, 256, 346, and 356,

 form the **two-and-one** set. Within the phenomenologically three-in-a-row set, however, the **126** and **156** are lemons. They *look* as sweet as the **123, 234, 345**, and **456**, but they do not provide a three-in-a-row in *fact.*. But, as I say, from the perspective of the *loader* they are as good as the other four.

So, how should one load the chambers? Were Mike or Nick loading, to determine which of the three patterns available he should chose one need only average the expected rebellion utilities (**ERU**s) of each of the three categories and opt for the highest. (**ERU**s will be characterized momentarily.) As it happens, however, the VC leader does the loading, so presumably he will chose the pattern with the *lowest* average **ERU**. In this case, as we will see, each of the three loadings have the same **ERU**. So I mention the 'loading game' here only because there might be other Deer Hunter-esque scenarios in which the **ERU**s of the loadings are *not* equal. Eventually I hope to construct a more general theory of which this one will prove nothing more than a special case.

Now here is the rub. If Mike and Nick can hold off their rebellion until after **Round 1** - assuming, of course, the first player survives it - they are then facing

234, 235, 236, 245, **245, 345, 346, 356**, and **456.**

  Since, as we are about to see, **ERU**s diminish as we move down arrangements as first listed - and since, after **Round 1**, **234** becomes equivalent to **123**, **235** to **124**, and so on - eliminating the first ten arrangements has the effect of raising the average **ERU** from the average **ERU** of all *twenty* loadings to the average **ERU** of only the first ten. So in complying in **Round 1**, Mike pays a **10/20** chance of incurring death for a **10/20** chance of raising the average **ERU** of a **Round 2** rebellion by the difference between the two average **ERU**s.

And had that been enough to warrant toggling from **ARR** to **SO**, that is when the second player should have rebelled. But, apparently, it was *not* enough. The second player now incurs a **6/10** chance of death for the privilege of being able to eliminate all but

345, 346, 356, and **456.**

Since these now shift over and become **234, 235, 245**, and **345**, the average

ERU rises again. The **Round 3** player *could*, of course, pay the **3/4** chance of death it would cost him to pass the **456** (now a.k.a. **123**) gun on to his partner. But at that point the game would have to be stopped. And if the game were stopped and the gun re-spun, the players would have incurred **10/20**, **6/10**, and **3/4** chances of death in **Rounds 1**, **2**, and **3** respectively, for absolutely nothing! So rebellion is mandated no later than the *end* of **Round 3**.

But that final **3/4** is a terribly high price to pay for a three-in-a-row that one *might* have had for nothing. In fact that he could *only* have had for nothing. That is, by complying in **Round 3** he has a **1/4** chance of delivering the **456** gun into own hands. And by *rebelling* in **Round 3** he has a **1/4** chance of already *having* the **345** gun in his hands! By rebelling in **Round 3** he runs the risk of giving himself the **346** or the **356**. But neither is that much worse than the **345**. So he should rebel *at* **Round 3**. But, as we will see, if the **Round 3** player should rebel rather than comply, the VC should never have let him have the gun after **Round 2**!

IV. REBELLION UTILITIES

Assigning expected utilities in situations like these is iffy, but the following information provides us at least *some* guidance. The VC leader is unarmed. Each of Mike and Nick has a VC guard on either side of him. By deflecting the barrels of their automatics upwards or to the side at the moment of rebellion, the rebels can be reasonably certain that the rebelling player can have two or three free pulls before any of the four guards can recover, and/or any of the remaining three VC will be mustered from their slumbers.

Suppose - as turns out to be the case - it is Mike who rebels. Then Mike needs to fell one of Nick's guards so that Nick can grab that guard's automatic as he goes down and then join in the rebellion. Accordingly, assuming that at such close quarters no shot will go amiss, I shall assign - but only for simplicity, and at that only as a very rough approximation - a kill each for a full chamber in **Pull 1** and/or **Pull 2**. But because the chances of getting off subsequent pulls diminish thereafter, I shall assign a half a kill for a full chamber at **Pull 3**, 1/4 for **Pull 4**, 1/8 for **Pull 5**, and 1/16 for **Pull 6**. The rebels need a total of eight kills, at least five of which will have to come from the automatic seized by Nick. So the sooner Nick can commandeer that weapon, the higher the **ERU** of the loading giving rise to that commandeering. So we can say that **the ERU of 123 > the ERU of 124**, **the ERU of 124 > the ERU of 125**, and so on to **456** with the lowest. And so we can say that

> **it is rational to rebel at point x if and only if the ERU of rebellion at that point is greater than the expected utility of compliance (ECU) at that point.**

Recall further that a loading that eventuates in *both* Mike and Nick

surviving has a higher utility than one which leaves only one of them standing. But a scenario in which Mike is the sole survivor in the alternative **ARR** game is preferable (for Mike) to one in which Nick is the last and sole man standing in the **SO** game. And, presumably, mutatis mutandis for Nick. Accordingly, in any *spun* game - be it the one-in-six or the three-in-six - the **ECU** for Mike of *Nick*'s compliance is always slightly higher than the **ECU** of his own. Mutatis mutandis for Nick. But for any given player the **ECU** of his (or his co-player) complying remains constant from round to round. So *if* it is rational for one player to rebel at point x, it is likewise rational for the other to rebel at point x+1 or x-1. So *if* it is rational to rebel at any point, it is rational to rebel immediately.

Not so - or at least not obviously so - in the *unspun* game. In the *unspun* game - be it the one-in-six or the three-in-six - the **ECU** for Mike of Nick's compliance is always *considerably* higher than the **ECU** of his own. And for any given player the **ECU** of his complying *decreases* significantly from round to round; and the **ECU** for him of his *co*-player complying *increases* significantly from round to round. So, all that said, here is ...

V. THE PARADOX AND THE PROOF

Neither the **346** nor the **356** yields sufficient utility to warrant compliance at **Round 3**. And if the VC know that, then, as I say, they should not have given the gun to the **Round 3** player. But then if that is the case, the **Round 2** player should never have let it out of his hands at the end of **Round 2**. In fact, what is the difference between the **Round 3** player rebelling at the beginning of **Round 3** and the **Round 2** player rebelling at the end of **Round 2**?! So the **Round 2** player should rebel at the end of **Round 2**! But, as before, if the **Round 2** player is going to rebel at the end of **Round 2**, the VC should never have let him have the gun after **Round 1**! But that being the case, the VC should never have let him have the gun *for* **Round 1**!

Furthermore, the **6/10** chance of death the **Round 2** player would be incurring in complying in **Round 2** is a very high price to pay to deliver the rebellion bundle of **345, 346, 356**, and **456** into his own hands. For he has a **1/10** chance of already having in his hands the **234**, which is equivalent to the **345** he would have a **1/4** chance of giving himself if he complied. But we do not have to speculate about the sagacity of this trade-off. Nor about the relative utility yields of the **235, 236, 245**, and **256**. For from the simple fact that he would have to rebel *after* **Round 2**, the VC could not let him have the **Round 2** gun. But that means that the Round 1 player could not let it out of *his* hands! And since the Round 1 player would have to rebel after Round 1, the VC could not let *him* have the gun either! So, it would seem, it is *as* unreasonable for Mike to ask for the three-in-six gun as for the four, five, or six. And yet Mike *did* ask for it. And *they gave it to him*! So clearly something is amiss. But what?

Let's formalize our reductio for the unspun three-in-six case. It rests, as

already noted, on the following recursion cycles. Assuming that

1) one can only either comply or rebel, that

2) every action is either rational or irrational, and that

3) if it is rational for a player to rebel it is irrational for the VC to let that player have the gun, and noting that

4) it is *categorically* irrational to comply in Round 4, it follows from **(1)**, **(2)** and **(4)**, that

5) it is rational to rebel in Round 4. But

6) if it is rational to rebel in Round 4, then it follows from **(1)**, **(2)**, and **(3)** that **it is irrational for the VC to let the Round 4 player have the Round 4 gun in the first place**. So from **(5)** and **(6)** it follows that

7) its irrational for the VC to let the Round 4 player have the Round 4 gun. But

8) if it is irrational for the VC to let the Round 4 player have the gun, it is irrational for the Round 3 player to let it out of his hands at the end of Round 3. So from **(7)** and **(8)** it follows that

9) it is irrational for the Round 3 player to let the gun out of his hands at the end of Round 3. Since

10) the only way he can prevent it being taken out of his hands at the end of Round 3 is to rebel with it, from **(9)** and **(10)** we get

11) it is rational to rebel at the end of Round 3. But

12) if it is rational to rebel at the end of Round 3, then it follows from **(1)**, **(2)**, and **(3)** that **it is irrational for the VC to let the Round 3 player have the Round 3 gun in the first place**. So from **(11)** and **(12)** we get

13) it is irrational for the VC to let the Round 3 player have the gun. But

14) if it is irrational for the VC to let the Round 3 player have the gun, it is irrational for the Round 2 player to let it out of his hands at the end of Round 2. So from **(13)** and **(14)** it follows that

15) it is irrational for the Round 2 player to let it out of his hands at the end of Round 2. But since

16) the only way he can prevent it being taken out of his hands at the end of Round 2 is to rebel with it, from **(15)** and **(16)** we get

17) it is rational to rebel at the end of Round 2. But

18) if it is rational to rebel at the end of Round 2, then it follows from **(1)**, **(2)**, and **(3)** that **it is irrational for the VC to let the Round 2 player have the Round 2 gun in the first place**. So from **(17)** and **(18)** we have

19) it is irrational for the VC to let the Round 2 player have the gun. But

20) if it is irrational for the VC to let the Round 2 player have the gun, it is irrational for the Round 1 player to let it out of his hands at the end of Round 1. So from **(19)** and **(20)** it follows that

21) it is irrational for the R1 player to let the gun out of his hands at the end of Round 1. And since

22) the only way he can prevent it being taken out of his hands at the end of Round 1 is to rebel with it, from **(21)** and **(22)** we get

23) it is rational to rebel at the end of Round 1. But

24) if it is rational to rebel at the end of Round 1, then it follows from **(1)**, **(2)**, **and (3)** that **it is irrational for the VC to let the Round 1 player have the Round 1 gun in the first place**. So from **(23)** and **24)** we can conclude that

25) it is irrational for the VC to let the Round 1 player have the gun from the outset.

Quod erat demonstrandum. The VC should never have allowed Mike and Nick to play with a three-in-six unspun gun!

VI. THE SUB-LEMMA FOR NOT FORFEITING THE GUN

The only premise recursions independent of **(1)**, **(2)**, **(3)**, and **(4)** are **(10-16-22)**, and **(8-14-20)**. **(10-16-22)** seem to be true enough. But what about **(8-14-20)**? Why *not* let the gun be taken out of one's hand?

Our answer *has* been that by forfeiting the gun at the end of **Round 3**, the VC will simply spin it before handing it on to the **Round 4** player. So Mike and Nick would have just gone through **Rounds 1** through **3** for absolutely nothing! But then the same could be said - could it not? - of each of the potentially infinite series of *one* round games that were played prior to Mike

asking for more bullets. Every time a pair of rounds is completed without 'resolution', those rounds were played for 'nothing'! But every time a *round* is played it is played for anything *but* nothing. So the "x is played for y" relation neither aggregates nor decomposes. What of it?! Besides, in the three-in-six game in which the gun is returned to the VC for re-spinning after **Round 3**, the **Round 4** player is then, in essence, playing **Rounds 1** and **3** of an unspun three-round three-in-six game. If both players survive, then the player who only had to play **Round 2** in this game will have to play **Rounds 1** and **3** in the next one. And so on. So the arrangement is not 'unfair'! So, **(8)**, **(14)**, and **(20)** are mistaken. So the reductio does not go through.

But this is too quick. As the **Round 3** player I might be disposed to comply rather than rebel if and only if I understand that if I survive, my co-player will be required to play **Round 4** with an *un*spun gun. If this is the case and the VC know it - or even if it is not the case but they believe it is - I cannot be given the **Round 3** gun. But now suppose the **Round 2** player will not comply unless he believes the **Round 3** player will, and he believes the **Round 3** player will not comply. So neither can the **Round 2** player be given the gun. And likewise with the **Round 1** player. So notwithstanding the *a priori* fairness of the three-round three-in-six game, it cannot be gotten off the ground! Thus, I submit, **(8)**, **(14)**, and **(20)** stand.

VII. THE REDUCTIO EXTENDED TO THE ONE-IN-SIX UNSPUN GAME

None of which, in and of itself, is all that surprising. But now consider the following extension of the proof:

The only difference between a three-in-six game and a two-in-sixer - and then between a two-in-six game and a one-in-sixer - is the number of recursions required to reach the same conclusion, i.e. that one ought not to be given the gun in the first place because he should rebel the moment it is given to him. Instead of *three* recursions of the six-line cycle employed above, we simply add another six-line cycle for the two-in-six case, thereby merely delaying the conclusion to line **(31)**, or another two six-line cycles for the one-in-six case, thereby delaying it to line **(37)**. So, *quod erat demonstrandum*,

37) it is irrational for the VC to let t he R1 player have even

a *one*-in-six gun from the outset for an unspun game.

And this is, surely, a very surprising result indeed! The VC erred grievously in acceding to the three-in-six unspun game. Mike compounded that error by not rebelling in **Round 1**, and again by forfeiting the gun after a successful compliance. The VC reiterated their error by allowing the gun to be passed to Nick. Nick compounded Mike's error by not rebelling in **Round 2**, and again by forfeiting the gun after *his* successful compliance. And the VC erred a third time by allowing the gun to be passed back to Nick. But what we have

discovered *now* is that

37) it would have been an error for the VC to have

acceded to even a *one*-in-six unspun game.

And this in spite of our having long since granted that

38) it would be irrational for Mike or Nick

to rebel with a one-in-six gun!

VIII. AND THENCE TO THE ONE-IN-SIX SPUN GAME?

But did we decide that it would be irrational for Mike or Nick to rebel with a one-in-six gun *because* they could assume the gun would be spun? No. We decided it would be irrational for Mike or Nick to rebel with a one-in-six gun because rebelling with a one-in-six gun is tantamount to suicide! So what we have discovered, it seems, is that rebelling with a one-in-six gun can be rational or irrational depending on whether the would-be rebel anticipates that the gun will be spun after a successful compliance.

Fair enough. But then suppose he does not *know* whether it will be spun or not? Or, even if he does, suppose he knows his *co*-player does not know whether the gun will be spun or not after *his* successful compliance. Or even that he does not *know* whether his co-player knows whether the gun will be spun or not after his successful compliance. What should he do?

It might be supposed that the slightest doubt on either score will force the player with the gun to rebel, albeit suicidally. But even this is too quick. Why not comply and let one's *co*-player commit the suicidal rebellion, thereby winning the **ARR** game by default? Why not indeed?! But of course if Mike can think to think this way, so can Nick. And it is *this* feature of the one-in-six game that is allowing the VC to allow Mike and Nick to play the one-in-six game.

If this is what is allowing the VC to allow Mike and Nick to play the one-in-six *spun* game, why is it not allowing them to let them play the one-in-six *un*spun game? After all, from the perspective of the **Round 1** player - say Mike - what distinguishes the two games? That *after* successful compliance, in the spun case Nick will be in the identical position he was just in, whereas in the unspun case Nick will be playing a one-in-*five* game. Rebellion with a one-in-five gun is as suicidal as rebellion with a one-in-six gun. So if it would have been rational for Mike to comply in **Round 1** in the unspun game, it would likewise be rational for Nick in **Round 2**. Likewise then for Mike in **Round 3**, for Nick in **Round 4**, for Mike in **Round 5**, and then for Nick in **Round 6**. But it would *not* be rational for Nick to comply in **Round 6**. So neither could it be

rational for Mike to comply in **Round 1**. Apparently, then, *that* rebellion is suicidal is not a knock-down argument against it. So the only knock-down argument must be that it is suicidal *and* unavoidable. It is unavoidable in the unspun game, because of recursion. But since the spun game lacks this recursion feature, suicide *is* avoidable. It can be avoided by one's co-player either complying unsuccessfully or else rebelling. Since one's co-player will *not* rebel, this leaves his unsuccessfully complying. And this *is* just what the VC are counting on Mike and Nick counting on.

IX. CONSEQUENCES

So, what follows from all or any of this? Well, among other things, that there are some situations - more instructively, situations involving this *recursivity* feature - in which the rationality (or irrationality) of an action seems to be, in a highly instructive sense, *independent* of that action's expected utility. Provided only that the action at the *head* of the recursion would be countenanced because of *its* expected utility, an action down the recursion line can *inherit* that sanctionability even if it's own expected utility would counsel against it. And *that*, I submit, might have very important consequences indeed. For example:

The core explanatory primitive in the game theoretic reduction of social and political philosophy is the Prisoners' Dilemma (PD). But PDs come in two varieties: those in which the gain in aggregate expected utility from mutual defection to mutual cooperation - a.k.a. the cooperative dividend - is divisible, and those in which it is not. In the case of the latter the PD is solved by instituting (or acquiescing to) some external enforcement mechanism like Hobbes' Sovereign, or some internal mechanism like ingesting Gauthier *constrained maximization* pill. But where the cooperative dividend is divisible, resolution of the dilemma - even supposing a mechanism for resolving it is available - awaits resolution of the Bargaining Dilemma embedded within it. Suppose, for example, you and I severally can produce one and two widgets respectively, but together we can produce seven. We can access this four-widget dividend if and only if we can agree on how to split it. Since it would be irrational for you not to agree to a net gain of one, it would be irrational for me to settle for anything less than a net gain of three. But likewise reason you. And so we are back to where we started from. Only this time instead of being in another PD we are actually in a series of Chicken dilemmas, one for each of the concessions each of us could - though we would rather not - make to the other.

But, as it happens, the single most recalcitrant *problem* in the entire corpus of game theory is how to hone this overdetermination in Nash equilibria in Chicken. And what *Deer Hunter* has to tell us is *why*. *Why* does the rationality of my acceding to a net gain of even one penetrate to inform the irrationality of your acceding to anything less than three, and likewise in reverse? Because the rationality of my broad compliance penetrates to inform your narrow compliance. Why likewise in reverse? Because this penetration

reverses. And so why - in the absence of a pre-commitment strategy in the meta-game - are we destined to crash? Because *this reversive penetration is recursive*. In other words, rational choice theory is stymied in Chicken because it is stymied in *Deer Hunter*. And it is stymied in *Deer Hunter* because *it has yet to develop an account of maximizing under conditions of recursive reversivity*.

What might such an account look like? Here I can only handwave. And not *just* because space does not permit a more satisfying treatment. What I *suspect* is that it is in *Deer Hunter* that rational choice theory has met its Wittgenstein's ladder. That is, the *Deer Hunter* paradox is a member of the *set* of logical paradoxes that arise from either Cantorian diagonalization or looping. But instead of getting an infinite regress - as one does in most diagonalization or looping paradoxes - what we get in *Deer Hunter* is an outright contradiction. In any event what we get is that rational choice theory is either consistent but incomplete or else complete but inconsistent.

How does one resolve inconsistencies and/or incompletenesses elsewhere on the logical landscape? By going *extra*-logical. But that is another paper.9 Just how much damage all this does in the meantime to the received theory of rational choice, I leave for another day. Or lifetime.

Endnotes

1A book-length manuscript on the implications of *The Deer Hunter* for game theory is currently in its all-but-final throes. But I suspect even it will prove only the tip of a very deep iceberg indeed.

2As indeed - by virtue of the underdetermination of rule by *any* data - are the rules by which *we* live with one another!

3'Dead' is harsh. But such are also the wages of freeway driving. Furthermore, insofar as longevity is a function of wealth, we could as readily imagine our captives, or our*selves*, playing ARR for dollars. If the chamber is full we die not now but twenty years earlier than we would otherwise. In fact, is not that precisely the choice situation facing a Third World street urchin contemplating whether to attempt or forgo the mugging of a wealthy First World tourist? Nor need outcomes always be so dire or expressed so negatively. Instead of focussing on our deaths, we could think about the chances we take - chances imposed on us by others - for quality of life. For example, it is not just that my second-hand smoke might kill you. It is also that it *stinks*! So now think about dining at an otherwise excellent restaurant but with no no-smoking section. How many smokers in the restaurant will it take to warrant deciding to eat elsewhere?

4One contribution made by game theory to social and political philosophy that makes it such a breakthrough is that by identifying game-tokens by their payoffs and then their types by their choice matrices, one can thereby collapse all kinds of 'distinctions without a difference' that have for centuries mired the thinking of laypersons and philosophers alike. Thus, for example, there can be no difference - certainly none worth going to war about - between a socialist political economy with incentives for productivity and a capitalist one without constitutional constraints on government taxation powers. So, what is in a name? A rallying cry for some *other* agenda. An agenda we would do well to pull out from its dust-jacket. Likewise with liberty- and equality-talk. If it were true that we put criminals in jail *as* punishment, not *for* it, then if I were the last law-abiding citizen, I would be the only one in jail. If it were true that Rawls' famous Equality Principle took lexical priority over his Difference Principle, then South Africa under Apartheid would have been trying to keep its own backs *in* rather than the Mozambique blacks *out*! So, not unlike in Introduction to Business, the first thing we should be teaching in Introduction to Philosophy is, "People, attend to the bottom line!"

5Many situations share this recursion feature, such that once one gets started it is best to just 'damn the torpedoes' and keep on going. Coups d'etat are often like that. And it is precisely *because* they are like that that they sometimes succeed when otherwise they would run out of steam. So one way to reduce their chances of success is to deprive them of this feature. One does that by, for example, making it a practice *not* to execute unsuccessful would-be coup leaders and their followers. Unfortunately, granting such amnesty also tends to encourage assaults on the palace. And so this too is an equilibrium problem.

6This paradox is often manifested in very comical ways. Saddam Hussain draws his line in the sand. The Americans step over it. "Okay," he warns, "now this time I really mean it!" And so on. The most rehearsed advice for these situations is to adopt a pre-commitment strategy. That is, notwithstanding that it would be irrational for me to retaliate against this particular provocation, I transparently hardwire myself to so anyhow. (See, for example, Gregory Kavka's *Moral Paradoxes of Nuclear Deterrence*, Cambridge U.P., 1987)

7This business of dissimulating as to which, of the various simultaneous games we have going with one another, some move I am making belongs, does considerable work in political economy. Here is a case in point. At the Canadian Philosophical Association (CPA) meetings in Charlottetown, Prince Edward Island, in the spring of 1992, after rancourous debate the CPA passed a resolution calling on each Department in the country to seek a 25% female professorate by the year 2000, and 40% by ten years thereafter. One Department - which shall remain unnamed - vigorously supported the motion, appearing thereby - and, it seems, successfully - to put the lie to its reputation as having been tardy in joining the ranks of the 'politically correct'. What the pro-quota lobby failed to notice, however, was that the re-ranking from merit-only to gendered implicated by the resolution meant that the burden of any sub-

optimal appointments would fall not at all on Departments at or near the top of the plumb line, increasingly as one moves down it, and then inversely as one approaches the bottom, where, all the qualified women having already been taken, excellent male candidates who would erstwhile have been unavailable could then be snapped up for a song. The Department in question was, of course, just so ideally situated, and has since managed to improve its standing by *both* measures: qualify of appointments *and* (at least the appearance of) political correctness. Thus the problem with the Principle of Double Effect - or any other principle involving autonomous effects - it that it is often impossible to determine which effects are autonomous and which are intended. In short, the road to paradise *is* paved with good intentions. But it is the sub-bed that one has to look out for!

[8]ARR is precisely the game the Russian peasant was being forced to play on the German front from 1914 to 1917. And in some cases with payoff matrices not dissimilar to those in *The Deer Hunter*. The conversion to Shootout could not, and did not, take place until the combination of a rising kill ratio at the front (number of bullets in the gun for the one game) and arms in the hands of the revolutionaries (number of bullets in the gun for the other) reached the requisite critical mass to countenance the conversion. Tsar Nicholas erred grievously in hoping he could keep the game from toggling by offering only marginal and incremental improvements. But to be fair, these are hard balances to get just exactly right. What distinguished 'civilized' societies, like that most of us enjoy, from more 'barbarous' places like those the smouldering and blood-soaked ruins of which fill the CNN screen every night, is just that we have mechanisms for monitoring and responding to sub-communities that are nearing their toggle points, whereas these 'savages' do not.

[9]See my manuscript on "Extra-Logicality".