HOW (NOT) TO MAKE TERRORISTS?

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Abstract

Sometimes the actions against terrorism stimulate the formation of new terrorists. This work study different cybernetic models of strategies against terrorism, by considering its feedbacks, and also the interaction between these strategies. Second Order Cybernetics has to be used in order to select between them. A strategy of focused reprisals appears as the better option.

1 Introduction

After the terrorist attack against the Twin Towers, the Government of the USA launched a general "war against terrorism". Nevertheless, its indiscriminate actions have carried counterproductive consequences: the large number of "collateral" civilian victims in Iraq or Afghanistan have carried to swell the ranks of the terrorist organizations [Taylor, 2007][Zelikow, 2009]. On the contrary, in Central America or Ireland the combination of police actions and negotiations has led to the end of terrorist actions and the swap to democratic political activities [Jones and Libicki, 2008][Dave, 2009].

The need of bearing in mind the consequences of the own actions carry to the use of cybernetic models to evaluate the strategy to follow. Moreover, we have also to bear in mind that the opposite side can carry its own strategy. We are going to present mathematical models to simulate these processes.

2 From Terrorists to Sympathizers

We will suppose that there are two sides in confrontation, and that in each side there are "civilian" people and "armed" people. Between the "civilian" people, somebody will be "collaborator", and other will be only "sympathizers". Also, between the "armed" people, somebody will be "terrorists", and other will by "soldiers".

We will suppose that:

1. Sympathizers only act against terrorists of the opposite side
2. Collaborators act against terrorists and soldiers of the opposite side.
3. Soldiers act against terrorists, soldiers and collaborators of the opposite side.
4. Terrorists act against everybody of the opposite side.

Of course, we are supposing that terrorist behavior can exist in both sides. That is to say, we don't buy the thesis that only there are terrorists in the opposite side, simplistically characterized as an "axis of evil". We don't understand either that a terrorist action has to use rudimentary tools as bomb-belts: a bombing on civilian areas will be also a terrorist action. On the contrary, if an armed organization kidnaps civilian people will be a terrorist organization, but not if only ambushes armed patrols: to attack civilian people its is an essential characteristic of the terrorism.

We will ascribe respectively the values i=1, 2, 3 and 4 to the behaviors "sympathizer", "collaborator", "soldier" and "terrorist" as different states of the System, characterized by the distribution of its probabilities **P(i)**.

We will represent by **s(i,j)** he repressive capacity from a behavior **i** on a behavior **j** in a "enemy" System, such that

- s(i,j)=1 if j≥5-i
- s(i,j)=0 if j<5-i

We will suppose that there is two Systems in confrontation, which we will represent by X=1 and X=2 respectively. We will also represent the probability of the behavior **i** in the System **X** by $\mathbf{P_X(i)}$.

Thus, the suffered repression by the behavior **j** in the System **X** will be

$$\sigma_X(j) = \sum_{i=1}^{4} s(i,j) \cdot P_{3-X}(i) = \sum_{i=5-j}^{4} P_{3-X}(i)$$

3 Learning by reinforcement

According to our basic model of probabilistic learning by reinforcement [Pla-Lopez, 1988a,b], the probability of a behavior **j** in a System **X** is given by

$$P_X(j) = \frac{F_X(j)}{B_X} \quad \text{such that} \quad B_X = \sum_{i=1}^{4} F_X(i) \ ,$$

where F_X is a memory accumulator variable and B_X represents the accumulated memory. A positive reinforcement on the behaviour **j** in the System **X** will produce an increase of $F_X(j)$, and a negative reinforcement will produce a decrease of $F_X(j)$. Of course, $F_X(j)$ will always be greater or equal to zero.

If $F_X(j)=0$ for every behavior **j**, then the accumulated memory $B_X=0$, and we will interpret that the System **X** has been destroyed.

We suppose that a repression on a behavior produces

a negative reinforcement on this. Nevertheless, this reinforcement only is produced when this behavior occurs. Therefore, the decrease of $F_X(j)$ will be $\sigma_X(j) \cdot P_X(j)$.

But, on the other hand [Pla-Lopez and Nemiche 2002], we have to consider a "solidarity against repression", so that a behavior in **X** can be positively reinforced by the repression on other behaviors in the same System **X**. The way as this reinforcement is produced will define a strategy against the repression.

4 A Widespread Reprisal

A possible strategy is that every behavior **j** in a System **X** were positively reinforced by the repression on some "softer" behavior in X. That is to say:

- If soldiers, collaborators or sympathizers in the same System are repressed, then the terrorist behavior will be positively reinforced.
- If collaborators or sympathizers in the same System are repressed, then the "soldier" behavior will be positively reinforced.
- If sympathizers in the same System are repressed, then the "collaborator" behavior will be positively reinforced.

Thus, we will have

$$\Delta F_X(j) = \sum_{k=1}^{j-1} \sigma_X(k) \cdot P_X(k) - \sigma_X(j) \cdot P_X(j) \quad \text{if}$$
$$F_X(j) + \Delta F_X(j) \geq 0 \quad \text{, or else}$$
$$\Delta F_X(j) = -F_X(j) \quad .$$

We have implemented this model of strategy in octave, http://www.octave.org , (you can see the source code in http://www.uv.es/pla/models/EMCSR10/terror2.m).

If we bring two Systems face to face with this strategy, which we can name "widespread reprisal", the results is a progressive predominance of the terrorist behavior in both Systems, regardless of the initial weight of this behavior. And, as a consequence of the reciprocal repression, one or both Systems are destroyed: if both Systems had the same initial "size" (which can be measured by the magnitude of B_X), then the System with a greater initial weight of the terrorist behavior will be finally destroyed, with the another System very "damaged"; if the Systems had different initial size, the lesser System will be finally destroyed. Note that not only its "terrorist" components will be destroyed, but the whole System. But the prize of the "victory" of the greater System will be its conversion in a mainly terrorist System.

5 A Focused Reprisal

An alternative strategy is that a behavior **j** in a System **X** were positively reinforced only by the repression on its "symmetric" behavior in **X**. That is to say:

- If sympathizers in the same System are repressed, then the terrorist behavior will be positively reinforced.
- If collaborators in the same System are repressed, then the "soldier" behavior will be positively reinforced.
- If soldiers in the same System are repressed, then the "collaborator" behavior will be positively reinforced.
- If terrorists in the same System are repressed, then the "sympathizer" behavior will be positively reinforced.

Of course, we can interpret the positive reinforcement of the terrorist and "soldier" behaviors as a (focused) reprisal, by increasing repression on sympathizers and collaborators in the opposite System, respectively. But the positive reinforcement of the "sympathizer" and "collaborator" behaviors can also be interpreted as a frightened reaction to the repression.

Thus, we will have

$$\Delta F_X(j) = \sigma_X(5-j) \cdot P_X(5-j) - \sigma_X(j) \cdot P_X(j) \quad \text{if}$$
$$F_X(j) + \Delta F_X(j) \geq 0 \quad \text{, or else}$$
$$\Delta F_X(j) = -F_X(j) \quad .$$

If we bring two Systems face to face with this strategy, which we can name "focused reprisal", the results is a progressive extinction of the terrorist behavior, and after of the "soldier" behavior, and so of the whole "armed" behavior, independently of its initial "size" and of the initial weight of the terrorist behavior.

Of course, a situation without "armed" people will be stable, because there is none repression on any existing behavior.

6 Confrontation between Strategies

With both strategies, each System suffers a Cybernetic Regulation through the feedback which its repression provokes from the opposite System. Note that this feedback is relatively autonomous, and it is not directly controlled by the own System. In the aforementioned cases, the terrorist attack against the Twin Towers provoked a destructive answer of the USA's Army against Afghanistan and after against Iraq. And these actions in turn provoked an increase of terrorist attacks on Western Countries.

Nevertheless, we can introduce the possibility that a System can select its own strategy of answers.

In the previous sections, we have supposed that the two Systems face to face had the same strategy. But if a System has to select its own strategy, it has to consider the possibility that the opposite System had a different strategy.

Thus, we will study the confrontation between two Systems which have, respectively, a "widespread reprisal" strategy and a "focused reprisal" strategy. You can see the source code for this model in http://www.uv.es/pla/models/EMCSR10/terror3.m).

The results of this confrontation is that the System with a "widespread reprisal" strategy is destroyed, independently of its initial "size" and of the initial weight of the terrorist behavior.

Therefore, the only Nash Equilibrium [Nash, 1950, 1951] is the situation in which both Systems have a

"focused reprisal" strategy.

7 Changing strategies through a Cybernetic Regulation of Second Order

We are going to consider the possibility that a System could change its strategy The regulation of this change will be a Cybernetic Regulation of Second Order.

This regulation doesn't act on the "Object System" or "observed system" , which is made up of sympathizers, collaborators, soldiers and terrorists, but on a "Subject System" or "observing system" which can manage the strategy according the observation of its results. Thus, this Cybernetic Regulation of Second Order is subject of the Second Order Cybernetics [Foerster, 1974][Brand, Bateson and Mead, 1976].

In a social evolution, the "Subject Systems" is the Government, ant its change can be produced by a change of leadership in an organization, or as a result of a democratic poll, as in the way from Bush to Obama's policy [Baker, 2009].

In order to simulate this process, we will suppose that a System X will change its strategy every time its accumulated memory B_X were divided by 2. Thus, the System will seek avoid its destruction.

You can see the source code for this simulation in http://www.uv.es/pla/models/EMCSR10/terror4.m), and a graphical representation of the primary and secondary feedbacks in Figure 1.

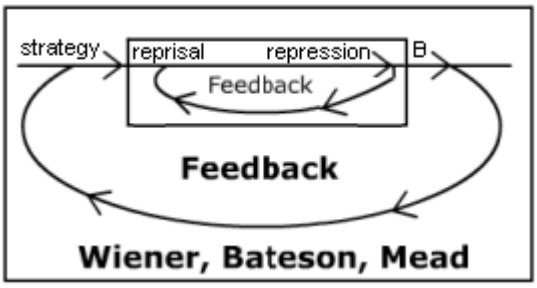

Figure 1

The results of this regulation is that both Systems change its strategy, if it is necessary, in order to adopt the "focused reprisal" strategy. If some System **X** has initially a "widespread reprisal" strategy, the weight of its terrorist behavior increases and its accumulated memory B_X decreases, but after a change of strategy to "focused reprisal", this accumulated memory is stabilized and the weight of the "armed" behavior decrease toward extinction, arriving to a stable situation without repression.

8 Conclusion

Mathematical models of Cybernetic Regulations of First and Second Order can simulate the consequences of the fight against terrorism and advise changes of strategy in order to its overcoming. Of course, other strategies can be considered: the ones which has been showed in this paper are only a first approach to the problem.

But the main question is that the introduction of a regulation from a Second Order Cybernetics carry an increased flexibility of the social systems which help the overcoming of terrorism and the survival of the social system itself. This is, in fact, a virtue of the really democratic social systems.

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