

THE CYBERNETICS OF DON QUIXOTE

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Abstract

Don Quixote is a stereotype of an anomalous behavior in a determined social context, which represents an minority behavior in confrontation with some majority behaviors, and that thus can be repressed by these. Nevertheless, through a Cybernetic Model of Social Evolution, we can analyze the possibility of thriving of a such minority behavior, by means of the Revolt Effect. This Effect can also explain the emergency of anomalous behaviors in the real World, such as the victory of Donald Trump in USA, or other ways of surprising “populist” behaviors, as well as quixotic behaviors.

A General Probabilistic Cybernetic Theory of Learning

We can suppose that the probability of a behavior U is given by

$$P(U) = F(U)/B ,$$

where $F(U)$ is an accumulator variable of memory, and the accumulated memory B is the summation of $F(U)$ for every available U ,

$$B = \sum_U F(U) .$$

$F(U)$ changes through the time according to the value of a goal variable G : if $G=1$, U suffers a positive reinforcement, and increases an unity, and if $G=0$, U suffers a negative reinforcement and decreases an unity. In general, we can suppose that

$$F_{t+\Delta t}(U) = F_t(U) + (2 \cdot PG(U) - 1) \cdot P(U) \cdot \Delta t ,$$

where $PG(U)$ is the probability of fulfillment of the goal when the behavior is U .

Note that the change of $F(U)$ for a behavior U is only produced when the system has this behavior.

If no one behavior U has a probability of fulfillment of the goal greater than 0.5, then every $F(U)$ will decrease, and B can arrive to the value zero. In this case, the system is destroyed.

A Model of Social Evolution

We represent a Social System by a set of individual systems N , with different probabilities of a social behavior U , expressed by $P(U|N)$. Thus, the evolution of a Social System will depend of the probabilities of fulfillment of the social goal G , expressed by $PG(U,N)$.

In the most simple form, $PG(U,N)$ is the product of an intrinsic possibility of satisfaction of the behavior U , $\pi(U)$, and the suffered repression by this behavior in the system N , $\sigma(U,N)$,

$$PG(U,N) = \pi(U) \cdot \sigma(U,N) .$$

We suppose that each behavior U has a repressive capacity, and each system N with a behavior U represses every different behavior. In the application of the model, we suppose that there is full repressive societies with full repressive capacity, and free societies with no repressive capacity. A “Free Scientific Society”, F , would have no repressive capacity and have full intrinsic possibility of satisfaction, $\pi(F)=1$.

Also, if the accumulated memory $B(N)$ of an individual system N were bigger, the change of its probability of behavior $P(U|N)$ would be slower, but also the probability of substitution of the individual system N by another newborn system with equiprobabilistic distribution of the available behaviors would be bigger, through a “natural death” different of the “violent death” which is produced when $B=0$.

In the development of the Model, we have introduced the technological progress through the increasing of the number of available behaviors, the scientific communication through the possibility of learning through the experience of other individual systems, an impact factor dependent of the distance between different individual systems, the adaptation of the produced repression to the suffered repression, a subjective factor through the “resignation” relative to the mean satisfaction in the social environment, the ecological limits of the resources for satisfaction and repression, a dual evolution for the “gregarious” Orient and the “individualist” Occident, a duality North-South and, lately, the role of immigration.

The Revolt Effect

By means of our Model, we have simulated the evolution of the humanity through different phases with different sets of available behaviors, according to the level of technological progress.

Thus, in each phase a predominant behavior arises, which we have associated respectively to Slavery, Feudalisms and Capitalism, beside “State Socialism” in Orient. And we have studied the factors which favor the overcoming of repressive systems toward a Free Scientific System or, on the contrary, the arrival to an Ecological Hecatombe.

But, in the execution of the Model, the emergence of some “anomalous” behavior surprised us. These “anomalous” behaviors had a low probability of satisfaction, and usually were minority behaviors.

And we found that this “anomalous” behaviors emerged in situations of “crisis”, in which every behavior have a probability of satisfaction lesser then 0.5, and destruction of individual systems are produced.

And we understood that, in these situations, the condition of minority was an advantage.

Suppose, for example, that $P_G(X)=0.4$ and $P(X)=0.9$. Then,

$$\Delta F(X) = \Delta t \cdot (2 \cdot 0.4 - 1) \cdot 0.9 = -0.2 \cdot 0.9 \Delta t = -0.18 \Delta t .$$

Instead, if $P_G(Y)=0.2$ and $P(Y)=0.1$, then

$$\Delta F(Y) = \Delta t \cdot (2 \cdot 0.2 - 1) \cdot 0.1 = -0.6 \cdot 0.1 \Delta t = -0.06 \Delta t .$$

That is to say, the minority behavior Y , although has a lesser probability of satisfaction, suffers a lesser negative reinforcement. And just by to be minority.

It is logic: a minority behavior occurs lesser frequently, and therefore suffers lesser negative experiences.

Thus, when the memory accumulator $F(U)$ of the majority behaviors U arrives to zero, only remain some previously minority behavior.

We named this process Revolt Effect, because it expresses a “revolt” of a minority behavior against majority behaviors in a context of crisis.

Nevertheless, this behavior will continue usually suffering negative reinforcement, and when its memory accumulator also arrived to zero, the system would be destroyed.

Therefore, the Revolt Effect is usually ephemeral.

We considered that Revolt Effect could explain historical processes as the Nazism, which emerged through an historical crisis, after a World War, and was effectively ephemeral and involved a big destruction in another World War.

But in the execution of our model, we found that sometimes a “Free Scientific Society” F emerged as an Revolt Effect, but got to linger.

The explanation is that the intrinsic possibility of satisfaction of F is big, $\pi(F)=1$, and if its probability of satisfaction $PG(F,N)$ was low,, was only because it was minority and suffered a strong repression $\sigma(F,N)$ from majority behaviors. And therefore, when these majority behaviors faded off, then the Free Scientific Society could thrive.

Because Trump won

The victory of Donald Trump in USA poll surprised many people, but can be easily explained as a Revolt Effect. We were previously surprised, many years ago, by the emergence of Revolt Effects by running our Model, but in the present, with our Model at hand, phenomena as Donald Trump’s victory are not surprising.

We know that the “State Socialism” was defeated in East of Europe in the end of the XX Century. But after 2008 Capitalism suffered a strong crisis which drove dissatisfaction to many people.

In this social context of crisis, previously marginal behaviors thrive in different places in the World. Sometimes these behaviors have been named “populism”, but it is only a word to denominate very different movements which oppose to unsatisfactory majority politics, usually characterized as “the establishment”.

Thus Podemos emerged in Spain, and in USA the candidatures of Bernie Sanders and Donald Trump arised, with opposed positions but both against “the establishment”.

But the emergence of a Revolt Effect is relatively independent of the merit of an option, and instead derives from the demerits of the previously majority options.

Therefore, phenomena as Donald Trump can be probably ephemeral. But it can drive, if no one alternative arises, to a general destruction through war or Ecological Hecatomb, especially if energy policies which enhance climate change are applied.

Can Don Quixote win?

Can Don Quixote will be an alternative?

Quixotism expresses a position of solidarity and altruism, contrary to insolidarity, chauvinism and xenophobia. Like the “Free Scientific Society” behavior, Quixotism is vulnerable in front of repression when is minority, but can produce satisfaction if arrives to be majority.

Indeed, if many people are reciprocally solidary, then they will help each other and can thrive by producing positive reinforcement.

This is an example of the dilemma of the prisoner: only by overcoming selfishness and getting mutual cooperation is possible to obtain the better results.

The question is that Quixotism can emerge locally as an Revolt Effect. But only can linger and thrive as a global movement.



Bibliography

- Pla-López,R. (1988), "Exploration of Simple Models of Learning", in R.Trappl ed, Cybernetics and Systems'88, Kluwer Academic Publishers, Dordrecht/Boston/London, part 1, 295-302.
- Pla-López,R. (1989), "Models of Historical Evolution: Alternating Ends", en Congrès Européen de Systemique (CES1), Association Française pour la Cybernetique Economique et Technique, Lausanne, tome I, 239-248.
- Pla-López,R. (1990), "Model of Multidimensional Historical Evolution", in R.Trappl ed., Cybernetics and Systems'90, pp.575-582, World Scientific, Singapore (Tenth European Meeting on Cybernetics and Systems Research 1990, Vienna).
- Pla-López,R. (1992), "Model of Adaptive, Historical and Multidimensional Social Learning", en Cybernetics and Systems Research'92, 2, pp.1005-1012, World Scientific, Singapore (Eleventh European Meeting on Cybernetics and Systems Research 1992, Vienna).
- Pla-López,R. (1993), "The Role of Subjective Factor in Social Evolution", in Second European Congress on Systems Science, Praga.
- Pla-López,R. & Castellar-Buso,V. (1994), "Model of Historical-Geographical Evolution", in Cybernetics and Systems'94, 2, pp.1049-1056, World Scientific, Singapore (Twelfth European Meeting on Cybernetics and Systems Research 1994, Vienna). ISBN 981-02-1937-7.
- Pla-López, R. (1994), "A systemic model of social evolution", in Tercera Escuela Europea de Sistemas, pp.219-232, Ajuntament de Valencia/Universitat de València/Conselleria d'Educació i Ciència de la Generalitat Valenciana, València. ISBN 84-88639-40-6.
- Pla López,R. (1996), "¿Cuánto puede perdurar una revuelta?", in 1ª Reunión Española de Ciencias de Sistemas, València. Publicado en "Revista Internacional de Sistemas", vol.8, Nro.1-3, Enero-Diciembre 1996, pp.59-73. ISSN 0214-6533. <http://www.uv.es/~pla/CUANTOPE.DOC>.
- Pla López,R. (1996), "Social and Ecological Consequences of Adaptive Pacifism and Unsubmission", in 3rd.European Congress of Systems (CES'3), Roma. <http://www.uv.es/~pla/socecapa.doc>.
- Castellar-Busó,V. & Pla-López,R. (1997), "A Model of Sustainable Development Opposite to the Ecological Hecatombe", in 14th International Conference of WACRA-Europe on Sustainable Development, Madrid, http://www.uv.es/bus0/wacra/wacra_eng.html.
- Pla-López,R. & Castellar-Busó,V. (1999), "Models of Dual Social Evolution", 4th Systems Science European Congress (CES'4), pp.337-345, València, 20-24 setembre 1999. ISBN 84-7795-233-7, <http://www.uv.es/bus0/modduale/modduale.html> .

Nemiche, M. & Pla-Lopez, R. (2002), "A Learning Model for the Dual Evolution of Human Social Behaviors", in the 12th International WOS Congress and the 4th IIGSS Workshop, Pittsburgh, winner of the *Kybernetics Research Award* and published in *Kybernetes: The International Journal of Systems and Cybernetics*, Volume 32 Number 5/6 2003, pp.679-691, Emerald, ISSN 0368-492X, <http://www.uv.es/pla/models/pittsburgh/> .

Pla-Lopez, R. (2007), "A Simulation of the Duality North-South in Social Evolution", in 7th International Conference on Sociocybernetic "Technology and Social Complexity", Murcia, 18-23 Junio, <http://www.uv.es/~pla/models/murcia07/dualityNS.htm>

Mohamed Nemiche, Ahmed M'Hamdi, Mohamed Chakraoui, Vicent Cavero and Rafael Pla Lopez (2013), "A Theoretical Agent-Based Model to simulate an Artificial Social Evolution" in *Systems Research & Behavioral Science*, Vol 30, Issue 6, start page 693, AID SRBS2238 <http://onlinelibrary.wiley.com/doi/10.1002/sres.2238/full>

Ahmed M'hamdi, Mohamed Nemiche, Rafael Pla Lopez, Fatima Ezzahra SFA, Khabid Sidati, and Omar Baz (2016), "A Generic Agent-Based Model of Historical Social Behaviors Change", en [Advances in Complex Societal, Environmental and Engineered Systems](#), Nemiche, Mohamed, Essaaidi, Mohammad (Eds.) , Springer, ISBN 978-3-319-46164-9, http://www.springer.com/cda/content/document/cda_downloadaddocument/9783319461632-c1.pdf?SGWID=0-0-45-1597840-p180248311