

SOCIOPHYSICS: CAN WE PREDICT SOCIAL AND POLITICAL BEHAVIOR?

Professor : Serge GALAM

Academic Year 2017/2018 : Common core curriculum – Fall semester

COURSE OUTLINE

WARNINGS : a `topic' does not mean one class. The number of topics covered as well as their order will depend on the rate at which the class assimilates the new material. The focus of the course is to develop in-depth understanding of the Sociophysics approach rather than to offer a comprehensive study of its topics. The list below is given as a guideline only.

Topic 1

About the course, what it will be and what it will not be. What is the goal and how it will be implemented.

What makes sense and what does not? What makes a hard science?

Words, concepts, equations, theorems, approximations, experiments, statistics, probabilities, reliability, conviction, conviction beyond reasonable doubt, overlaps and differences.

Issak Asimov (Foundations), the mathematician. Predicting the future?

Physics and the physicist: the power of physics (and its weakness) with respect to the modeling of human behavior.

Can Sociophysics become a predictive tool? Possible futures.

Philosophical and ethical issues connected to THE question: Do humans behave like atoms?

Topic 2

Modeling the dynamics of public opinion within a group of open minded and rational people taking part in a democratic debate.

The unexpected appearance of collective doubts and the way it opens an unconscious path to our common prejudices, cognitive biases and beliefs, breaking down the expected democratic balance of an open mind debate.

The phenomenon of minority spreading: rumors, innovations, and social behaviors.

Conspiracy theories: the cases of 9/11 and the 2015 January Paris killings.

Predicting voting outcomes: the emblematic case of Trump election in the US.

Topic 3

The surprising effect of individual contrarian behavior: voting at the improbable fifty/fifty edge.

The case study of 2000 Bush/Gore election and its subsequent repetitions.

The hung election scenario is not the improbable result of a probabilistic phenomenon but the deterministic outcome of a well defined mechanism.

The resulting danger for democracy and the need to invent new protocols for political governance.

Topic 4

The disturbing impact of stubbornness on the democratic balance of opinion dynamics.

The concept of political bubbles: is it necessary to lie to win a public debate?

Public debates driven by incomplete scientific data: global warming, GMOs, nanotechnologies and the theory of evolution.

Controversies: a case study of the last decade's abnormal death rate for bees.

Unmasking the lobbies acting behind the data. Behind the big data, the big set ups.

Topic 5

Back to physics with a self-sufficient topic: the study of gases.

Deriving the so-called equation of state of the ideal gas using a combination of hand-waving arguments and a blackboard.

The “magic” game of physicists dealing with reality: from the ideal gas to the complex phenomenon of phase transitions such as water changing from liquid to vapor.

The purpose here is not to learn or even remember the equations but to illustrate and understand the powerful way physicists deal with a complex problem.

Topic 6

Discussing polls reliability, their uses and misuses. Why and when do they fail? The necessity of an understanding of the underlying dynamics and the complementary role of Sociophysics to overcome polls intrinsic limitation.

Studying mathematically the effect of unavowed abstention, blank and null ballots on the expected outcome of an election: the case of last French presidential election. What could have happened and what eventually happened.

Topic 7

How to become a democratic dictator?

Starting from scratch to building a powerful totalitarian machinery.

Explaining the stability and sudden collapse of 20th century Eastern European communist parties from a radically different perspective.

Topic 8

Universal mechanisms at work in all forms of terrorism.

Terrorism and the role of passive supporters, a geometrical approach based on the so-called percolation phenomenon.

The impossibility of a military solution and the notion of social space connected to real space.

Discovering the laws governing the phenomenon of radicalization in the case of mixed populations.

New clues to contain and possibly curb the radicalization phenomenon.

Topic 9

A physics topic with the magic world of collective phenomena in inert matter.

The wonderful world of Mr. Ising and its model.

Why such a simple model has produced so many outstanding explanations about so many physical puzzles?

Will the model help solve social and political enigmas in the future?

Topic 10

From magnetism (in inert matter not of "Marylyn Monroe") to understanding group decision-making.

Surprising results on what is and what is not random in the dynamics of sensitive decision-making.

The death penalty, no biased juries or "heads or tails" decisions.

Playing with prejudices to avoid a death penalty.

Advised readings

S. Galam, «Sociophysics: A Physicist's Modeling of Psycho-political Phenomena », Springer (2012)

S. Galam, « Stubbornness as an unfortunate key to win a public debate: an illustration from sociophysics », *Mind and Society* (2015) DOI 10.1007/s11299-015-0175-y

S. Galam and M. A. Javarone, « Modeling Radicalization Phenomena in Heterogeneous Populations », PLoS ONE 11(5): e0155407 (2016)

T. Bouzdine-Chameeva and S. Galam, « Word-of-mouth versus experts and reputation in the individual dynamics of wine purchasing », Advances in Complex Systems 14 (2011) 871-885

S. Galam, « From 2000 Bush-Gore to 2006 Italian elections: voting at fifty-fifty and the contrarian effect », Quality and Quantity Journal 41 (2007) 579-589

S. Galam, « Heterogeneous beliefs, segregation, and extremism in the making of public opinions », Physical Review E 71, 046123 (2005) 1-5

S. Galam and S. Moscovici, « Towards a theory of collective phenomena: Consensus and attitude changes in groups », European Journal of Social Psychology 21 (1991) 49-74

S. Galam, « The Trump phenomenon: an explanation from sociophysics », International Journal of Modern Physics B Vol. 31 (2017) 1742015 (1-17)

S. Moscovici, « Psychoanalysis: Its image and its public », Wiley (2008)

Readings

S. Galam, « Public debates driven by incomplete scientific data: The cases of evolution theory, global warming and H1N1 pandemic influenza », Physica A 389 (2010) 3619-3631

S. Galam, « From 2000 Bush-Gore to 2006 Italian elections: voting at fifty-fifty and the contrarian effect », Quality and Quantity Journal 41 (2007) 579-589

S. Galam, « Heterogeneous beliefs, segregation, and extremism in the making of public opinions », Physical Review E 71, 046123 (2005) 1-5

S. Galam, « Contrarian deterministic effect: the hung elections scenario », Physica A 333 (2004) 453-460

S. Galam, « Application of Statistical Physics to Politics » Physica A 274 (1999) 132-139

S. Galam, « La volonté générale est-elle manipulable », Décisions durables n°18, mars - avril (2014) 60-62

S. Galam, « La fin de l'homme libre », Interview Revue TANK N°4 (Printemps 2013) 19-21

- S. Galam, « Connaissez-vous les contrariants socio-physiques, cette poignée d'individus qui ont fait l'élection de JF Copé ? », Atlantico (www.atlantico.fr), 21 novembre (2012)
- S. Galam, « Le débat est une machine à produire de l'extrémisme », Point de vue, Le Monde.fr 13 avril (2011)
- S. Galam, « Quand la science hésite, la communication décide », Constructif N°27, novembre (2010)
- S. Galam, « Pourquoi des élections si serrées ? », Le Monde, 20/09 (2006) 22
- S. Galam, « Les mathématiques s'invitent dans le débat européen » par P. Lehir (interview), Le Monde, 26/02 (2005) 23
- S. Galam, « Terrorisme et percolation », Pour La Science 306 (2003) 90-93
- S. Galam, « Les réformes sont-elles impossibles ? », Le Monde, 28/03 (2000) 18-19
- S. Galam, « Crier, mais pourquoi », Libération du 17/04 (1998) 6
- S. Galam, « Le dangereux seuil critique du FN », Le Monde, 30/05 (1997) 17
- S. Galam, « The Conversation, Pourquoi et comment Marine Le Pen peut gagner avec moins de 50 % d'intentions de vote », 26 mars 2017
- S. Galam, « How Marine Le Pen could win the French presidential election even if she polls lower than 50% », 2 mai 2017
- S. Galam, « Marine Le Pen, une faille de taille dans le plafond de verre », 26 mars 2017
- S. Galam, « Abstention, France's Last Temptation », The New York Times, International edition, May 6-7, 2017