Complexity, Acceleration, Globalization — A Challenge for Democracy

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Abstract. This paper is dedicated to the memory of the late Glória Cravo who first invited me to discuss these issues at the "Conversas da dentro e de fora" of the Universidade da Madeira, in 2014.

Democracy

Democracy — the rule by the people — was invented more than 2000 years ago to organize the social life of communities scattered around the Mediterranean, typically much smaller than present day Switzerland. Life then was dominated by the rhythm of celestial bodies: time was measured in terms of years, seasons, months — not much would happen in a day.

When industrialization began to change the world and civil society was born, democracy was reborn with her, and was later contemplated by Winston Churchill[2], saying "Many forms of Government have been tried, and will be tried in this world of sin and woe. No one pretends that democracy is perfect or all-wise. Indeed, it has been said that democracy is the worst form of Government except for all those other forms that have been tried from time to time." Remarkably the first two sentences are quoted much less frequently than the last.

And in fact, nowadays any doubt about the superior quality of democratic government is considered politically unacceptable.

How did the world look 200 years ago when democracy began to spread through Europe in the wake of the French revolution?

Vast, endless, with open space to conquer and to explore or to get lost in, white, uncharted areas were abundant on the world maps. News of an Asian earthquake or tsunami would arrive at our shores many months after the event had happened and would be no more than an item of curiosity without much further effect on our lives.

Now, 200 years later, democratic rule has not only taken hold in most of the developed world but has acquired the status of an ethical postulate. It is considered as an essential attribute of superior social organization and serves to "justify" military intervention such as e.g. in the 2nd Iraq war.

And how does our world look now?

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[2]Speech in the House of Commons, 11 November 1947.

Invented for those small city states of ancient Greece, democracy now has to face the challenges of the "global village" where news travel around the globe in fractions of a second, where events are tightly connected all over the world and effects can spread with lightning speed, and where for example the effect of a tsunami in Japan was able within days to impact the national German energy production portfolio in a profound way from which it has not recovered yet.

How did this happen? What innovation had the most important impact in shaping this world we live in today?

The advent of the PC

On August 12, 1981, IBM rolled out its first "Personal Computer"; digital computing entered the offices and living rooms. Mainframe computers had been around much earlier, they were born in the forties as a twin of the atom bomb. It is the global availability of PC power that made the difference. It made us all see and do things we would not have imagined earlier.

As an example there is the famous Mandelbrot fractal. As we zoom into its finer and finer details, and so on ad infinitum there appears a beautiful dream world of forms and colors. A complex structure indeed. My point here is: the mathematical formula behind it had been catching dust for a hundred years or so, but until the PC came, nobody had the slightest idea of the complex pattern that lay behind it[1].

Richard Feynman, one of the greatest minds of 20th century physics, once said that we lack an intuition for nonlinear phenomena and that perhaps *the emergence of such an intuition might mark a new intellectual awakening of mankind.*

This "new awakening" sounds like science fiction, something out of Kubrick's film "Space Odyssey 2001". Kubrick's film from 1968 was speculating that by 2001, a computer would attempt to get the upper hand over us. The takeover has not happened yet, but we do feel the impact[2]. Even kids to-day have seen the Mandelbrot fractal somewhere or another, and terms from complex systems such as the famous "butterfly effect", have become buzzwords in the socio-economics discourse.

The end of reductionism

What is this impact of omnipresent computing power?

For two millennia, scientific problems had to be drastically simplified before being "understood". The dynamics of protons and neutrons is too hard to handle? OK, so let us describe them by a bunch of harmonic oscillators because those are simple enough to deal with. In physics, but as well in other disciplines such as e.g. economics, simplifications and massive complexity reductions were

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[1]Hear Benoît Mandelbrot himself about the wonders of this computer-based break-through: http://www.ted.com/talks/benoit_mandelbrot_fractals_the_art_of_roughness/transcript?language=en\#t-586141

[2]A dramatic acccount by one who is considered "the father of virtual reality technology" can be found in J. Lanier: "You Are Not a Gadget." Knopf, NY, 2010.

all over the place. In particular collective behavior was often beyond the reach of reliable modeling

Now, with our exponentially growing computing power, complex systems, and in particular the collective behavior of large systems can be studied, and the intuition which Feynman called a New Awakening, is rapidly developing. The tools were there at the dawn of the new millennium, the time was right.

But the computer not only changed our understanding of the world, it has changed our own world, dramatically.

With millions of PCs linked in the Web, our cultural, economic and social world has become a closely connected global network.

Information flies at almost the speed of light. The effect of local disasters or interventions is felt almost instantaneously around the world.

As one of the consequences, Asian workers are now in a very direct competition with their colleagues in the Americas or Europe, the work force has been globalized, and employers go for the cheapest offer worldwide. In the Manila metropolitan region alone , there are more than one million employees working in call-centers for American, Australian and other companies and even universities.

All of this has become an incredible complex socio-economic system, with enormous risks of sudden global destabilization.

What is Complexity?

As an example let us have a look at the Malthusian growth of populations. In this model the new population is assumed to be proportional to the size of the previous generation,

$$P_{n+1} = f \cdot P_n,$$

where f is the fertility rate (Malthus model, 1798), and whenever the fertility f is larger than one, the population will grow; in fact it then grows exponentially.

But the real world is more complex: the effect of competition is felt when populations become big and can be described by

$$P_{n+1} = f \cdot P_n - c \cdot P_n^2.$$

The new population is proportional to the size of the previous one, minus the effect of competition for limited resources, encoded in the parameter c.

Clear, isn't it? Now we expect that the population will saturate at a limiting size, before the quadratic second term becomes too big..

But this is not all that can happen. There can also be oscillations and even chaos as time progresses from one generation to the next.

We should note here two important features of our model:

1. All these scenarios can occur if one varies the fertility rate f or competition c just very slightly! In this sense the evolution of populations becomes *practically unpredictable* since we can never be sure of those parameters with the necessary precision to exclude one or the other scenario.

2. Even if the formula itself is extremely simple, its less obvious consequences were only readily available in the age of the PC.
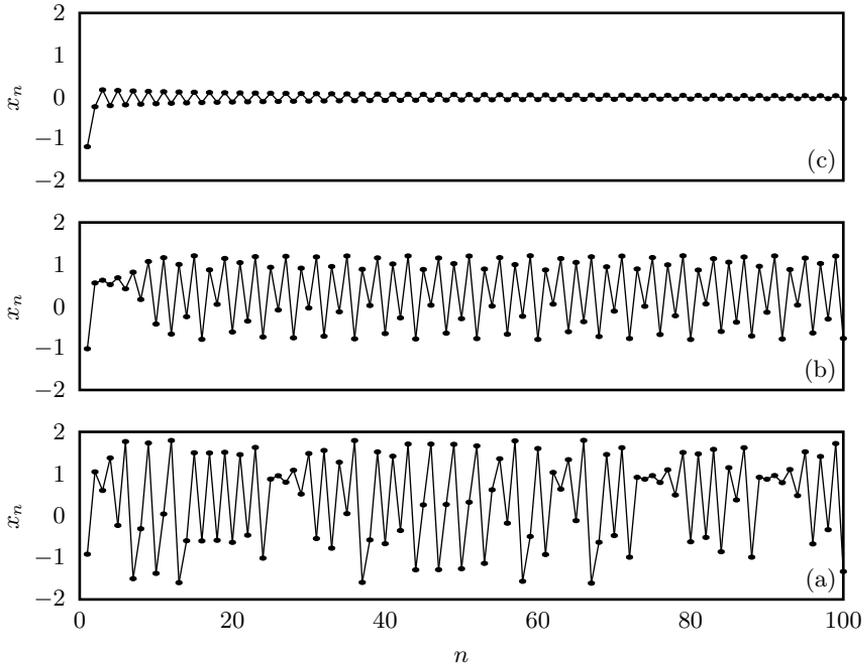
Fig. 1: Three Scenarios: Saturation, Oscillations, Chaos

What then is Complexity?

A concept of such generality necessarily has several definitions. They will be context dependent, but not only. In the context of computation for example, complexity may mean a very complex computer program, or one that takes a long time to run, or one that uses a lot of memory, or one that is simple in all these respects but produces surprising results, like our population model.

For our purposes, we may just characterize complex systems by two properties:

1. Their evolution is difficult to predict. Weather and climate are well known examples of this difficulty.

2. It is equally difficult to predict their reaction to even small variations or interventions ("**The Butterfly Effect**")[1].

Consequences

Crucially important is the lesson that — all the way from the micro-economic, business level to the macroeconomic level of national and international policy

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[1]This practical unpredictability does not invalidate quantitative mathematical modeling. Such models, while not furnishing specific predictions, will display, and alert for, possible types of evolution and outcomes of interventions. As J. Gleick writes: "...a new generation of scientists has come along.... They know that a complex, dynamical system can get freaky. They know, when it does that, that you can still look it in the eye and take its measure." J. Gleick: "Chaos: Making a New Science". Revised edition, Penguin 2008.

making — planning and strategies have to be continuously readjusted to counteract the surprises of the butterfly effect and of random exterior influences.

According to Lenin, the whole national economy should be organized on the lines of the postal service.

In practical Soviet terms, this meant governance through centralized plans, based on an equilibrium model of the economy. The result is well known. When East Germany was irreversibly bankrupt, the Berlin Wall fell and the communist bloc crumbled.

In a modern highly complex economy, long term planning must clearly be replaced by continuous monitoring and feedback loops. The — admittedly rather sophisticated — techniques to compensate random disturbances on the fly go back to Cold War technologies, they were invented under the name of optimal control or dynamic programming, mainly to keep ICBMs on target during their flight so that they would surely hit New York or Moscow in spite of any in-flight perturbations. Economists and more generally people from the humanities tend to be allergic to the notion of control theory — it sounds too repressive to their tender ears. But now economists have discovered a nice new label, that of "adaptive management", it is the same thing, and now increasingly popular, a new buzzword in economics.

Acceleration

Of course the problems of socio-economic complexity have been extremely aggravated by globalization and acceleration. While economic news used to need months to travel around the globe before the advent of steamships, information now flies around the globe with the velocity of light, and hectic reactions are a potential source of serious instability

As an example, financial transaction strategies with the potential to produce crises of a global dimension take place in milliseconds, powered by computer algorithms, without the possibility of adequate human intervention. There have been instances where a large scale financial crash was only avoided by literally pulling the plug of those computers at the New York stock exchange.

Clouds on the Horizon

Like with other revolutionary inventions there is a definite dark side to our exponentially increasing computing and data-handling power.

Paradoxically the net and digital data-handling have produced a new kind of reductionism: to see this, compare the rich and manifold traditional meaning of the word friendship with its reduction to a mouse click in the Facebook world, or the rich and unique spectrum of a Stradivari violin with its reduction under MP3.

Then there is the loss of privacy and freedom of choice: You "pay" for the web with the loss of your privacy, and the web then defines your identity. Google et al. will decide what you will want to see, what to know, what to buy.

And we have to be concerned with a cyberspace beyond the reach of the law. Google and Microsoft were reported to be planning to move activities to the "off-shore".

Larry Page[1], co-founder of Google, said in 2013:

"There's many, many exciting and important things you could do that you just can't do because they're illegal ... we should have some safe places where we can try out some new things and figure out what is the effect on society, what's the effect on people..."

Democracy — Rule by the People?

The democratic decision-making process requires:

- Transparency of the issues

- Transparency of, and confidence in the effectiveness of the strategies available

- Enough time to present and discuss these issues and strategies, and often to test their legal issues in court

- On the other hand, nowadays, an adaptive political management is needed, responding quickly and promptly to unexpected threats and challenges

- We lack sufficient regulatory capacity to deal with banks "too big to fail", to deal with an economy that does not know borders and evades national laws.

We have to cope with the anti-intuitive behavior of complex systems: they are highly non-linear — double in will not produce double out. Raising a tax may produce less instead of more tax revenue because business moves to other markets. Modifications in the health care system may produce utterly unforeseeable effects, and so on and so forth everywhere in government. Politicians will cite their favorite experts, but even experts are at a loss for reliable predictions, To handle the financial crisis competently the German government had to resort to the advice of Germany's leading banker Joseph Ackermann. This was admittedly a blatant case of conflict of interest, but government simply did not have the necessary competence to understand the problems and necessities and to arrive at an independent judgment. In 2009, time of the global banking crisis, the German economics minister asked a cabinet of specialized lawyers to draft a law concerning the administration of ailing banks. Criticized for giving this task to a law firm with important ties to international banking and the ensuing risk of conflict of interest, he protested that the ministry itself simply did not have the expertise to handle this highly complex matter.

In view of present-day complexity and acceleration, it is no surprise that the lifespan of regulations become shorter and shorter before they need to be rewritten[2].

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[1] Quoted from the Open Letter of M. Doepfner to Google's Eric Schmidt, `https://www.axelspringer.de/dl/433625/LetterMathiasDoepfnerEricSchmidt.pdf`

[2] For more on the causes of legislative acceleration see e.g. J.-C. Michéa: *The Realm of Lesser Evil.* Polity Press, Cambridge UK, 2009.

Complexity, Acceleration, Globalization — Some of the Challenges

The list is long — Demography, social disparity, public debt, sustainable energy, ecology, protection of privacy, terrorism, massive immigration, . . .

These are undoubtedly giant questions, touching upon the determinants of society, — and even the man in the street begins to sense the incapacities of the democratic political system.

A Closer Look at Some Recent Issues

After the collapse of the Lehman Brothers investment bank in New York, an ultra-fast and high intensity dialogue between governments and central banks was needed to prevent a global collapse of the financial system.

Then there was the crisis of public debt: bankruptcy of Greece and other countries was avoided through loans and guarantees from richer EU countries. These allocations amounted to a significant fraction of their national budgets.

Most recently, Europe is literally overwhelmed with a seemingly uncontrollable wave of immigration.

In all these cases parliaments were — at best — informed by the executive that the situation was far from transparent, but large financial commitments were without alternative, and were so urgent there was no time for any proper discussion on them.

Very complex and dramatic issues, and parliaments are told that there is no time to discuss them at any length.

It should be recalled that the authority over the national budget, about how to allocate taxpayer money, is the central and most important privilege of Parliaments. Or was it. . . ?

Post-Democracy

No wonder that the public feels at a loss with regard to the big political questions. Low voter turnout is the consequence.

Colin Crouch[1] observes ". . . Even if elections take place and continue to influence governments, the electoral debate is a tightly controlled show, rival groups led by experienced professionals in the techniques of persuasion practice on a limited number of questions selected from these groups. The mass of citizens plays a passive, acquiescent, even apathetic role, merely reacting to the signals it receives. Apart from the spectacle of the election campaign, policy is decided in private by the integration between elected governments and elites. . . ". [2]

One just has to look at the propaganda before elections. The enormous gap between the complexity of the current problems, and the extreme simplicity of the "slogans" of political parties highlights the helplessness of the political class to communicate properly with the electorate, and effectively dissuades the people from exercising its democratic right of voting.

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[1]Colin Crouch: *Post-Democracy*. Polity Press, Cambridge 2004.

[2]For more on this see also Jürgen Habermas: in "Critique et communication: les tâches de la philosophie". Esprit 2015/8, p. 40–54.

Public reactions to this disillusionment of the electorate tend to be politically correct: characteristically, the ensuing discussion focuses almost entirely on somehow keeping democracy going by working on the symptoms. The Secretary General of Germany's oldest and most venerable political party recently proposed to locate polling stations in shopping malls or big railway stations and to keep them open for a week to revive voting interest, instead of facing the delicate question whether the democratic process in its present form might be fundamentally inadequate.

Democracy — Two Imperfect Alternatives

There is Singapore with no natural resources, and a delicate balance between three ethnic groups of very different cultures — Chinese, Malay, and Indian.

Rising from great poverty and massive unemployment it is now one of the richest societies in the world, with very low crime rate and corruption, reasonable human rights, but with a very limited political participation.

Then there is China, often cited for human rights deficits, and with extremely low political participation, but quickly becoming an industrial superpower, global, financial and military, feared by its neighbors of becoming the bully in the region, but also with an impressive record in eliminating poverty. An 88% drop of the number of people living in poverty within the 23 years from 1978 to 2001[1] shows how China is winning the war against poverty, and thus the approval and gratitude of many.

These two models cannot and should not be copied. But it would also be a big mistake not to study them carefully with regard to their important successes.

Summarizing: Questions, Doubts, and Challenges

The most important feature of democracy, the one that is essential to be maintained and protected especially in troubled times, is of course its control of the political process. The problem we need to address here when we look at our role as voters is threefold:

1. Ex ante control is insufficient in view of *Complexity*, which entails intransparence of the issues and unpredictability of outcomes.

2. Ex post control often comes much too late in view of *Acceleration*.

3. Both have limited impact because of the transnational nature of many issues due to *Globalization*.

Can the democratic process effectively deal with increasingly important issues which are — at best — understood only by a small group of experts, taking into account that they occur so fast that there is no time to consult the legislative, much less the electorate, and that they require a considerable amount of continuous adaptive management and imprevisible, ad hoc government intervention?

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[1]See e.g. M. Jacques: "When China Rules the World" Penguin, NY, 2009, p. 162

Or else:

Is it advisable — or is it possibly too risky — to seek and study possible adaptations or alternatives of the democratic process as we know it?

What could be these modifications? How can they ensure quality of the governmental system and civic control of its performance? *What do you think?*