A Modern Postmodern Urbanism The Systemic Retroactive game (SyR) between Bottom-up and Top-down

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Abstract

These couple of pages discuss upon the retroactive influence (*Systemic Retroactive game*, or *SyR*) between people's behaviour and environment. The latter is intended as physical environment (type of cities, climate, geography…), normative environment (laws), moral environment (religions, families cultures), values and life styles (politics-economics systems, families and neighbourhood habits). Individual behaviours can generate an emergent phenomenon (*Autonomous Post-Emergence*, or *APE*) which becomes 'independent' from them even if maintained and changeable from them, and which influences (*top-down* feedback) the individual behaviours, which influence it, which influences them, which influence it... Market-economy, globalization, religions, cities, political-economics systems, are example of *APE*.
The characters of people and societies are built throughout history by an interconnected mix among geography, climate, trades and chance: all together create a specific economic-moral-religious-political system rather than another, therefore the *APE* is born and starts its *SyR* dance with its own creators: is Consumerism created by our consumption needs, or are our consumption needs created by Consumerism? Do religions and political-economic systems create our personal values and uses, or vice versa?
In a certain way, it is a mix of both: the *APE* and its agents influence and *mutually* change each other in their *SyR* dance-tension: *urbs* is the physical result of *civitas*; in turn *urbs* influences *civitas* which influences *urbs*…
The discussion ends by defining a *Modern Postmodern* vision, mixing the positive contributions of both bottom-up (Postmodern) and top-down (Modern) philosophies.

Keywords: Complex Systems, Modern Postmodernism, Bottom-up, Top-down, City, Modern Postmodern Urbanism.

Introduction

Following the romantic reaction to modernism, which began in the 1960s, against "the abstract platonic structures" of the modern universalism (Ellin 1999), we started to personalize our visions and models of cities (D'Acci 2013a,b,c).
Quoting Lynch, "cities are too complicated, too far beyond our control, and affect too many people, who are subject to too many cultural variations, to permit any rational answer. […] Someone might say 'I like Boston', but we all understand that this is merely a trivial preference, based on personal experience" (Lynch 1984).
Since the beginning of the postmodern urbanism reaction, urban sociologists began criticizing the environmental determinism of urban designers who do not consider how people perceive places. The consequent new field of environmental psychology underlined the "individual's personal identity in relation to the physical world through memories, ideas, feelings, attitudes, values, preferences, meanings, and conceptions about behaviour relevant to the physical settings in his or her daily life" (Proshansky 1990).
In the 20s the system theory approach was dominant and suggested, during all the 50s, that systems were regarded as being centrally ordered, as a hierarchical sum of subsystems

dominated by negative feedback, which implied a predominant controlled equilibrium status. Examples of these systems were also cities and regions. However, cities are never in equilibrium, they are constantly changing and dominated by positive feedback, not by negative's (Batty 2012). A standard theory of cities was developed until the middle of the 20th century as an economic and transportation model based mostly on the monocentric city. Ideas and models were built on statistical aggregations of units, as for example models based on macro economics (econometric models, population models, Keynesian models).
In the 1970s[1] the idea changed[2]: city was observed as controlled by positive feedback and not anymore from the top-down but from the bottom-up. A single agent may be able to reconfigure a complex system (systems that have the potential to reconfigure themselves in ways that may be surprising[3]), but the potential still exists for the system to change without us knowing the actions of any particular agent (Batty 2012). Models were specified in more detail as, for example, by disaggregating into several types of populations, types of personal habits, etcetera. Fundamental elements themselves are to be represented: the so known agents.
"In recent years it has become increasingly clear that the dynamics of cities can be best captured by looking at them as complex systems governed by many degrees of freedom, interacting on different space and time scales in a non-linear fashion" (Albeverio, Andrey, Giordano and Vancheri, 2008, p. v).
The "new generation of thinking, based not on aggregative, equilibrium-seeking assumptions, consistent with models of how activities produce emergent social structures from the bottom up" (Epstein and Axtell 1996), lies with a "new forms of representation at a fine spatial scale, in which units of space are conceived as cells and populations as individual agents, are currently changing the way we are able to simulate the evolution of cities" (Batty 2005).
Models based on multi-agent decisions are becoming the dominant paradigm in any social simulation, due primarily to an agent-based worldview suggesting that complex systems emerge from the *bottom-up*, are highly decentralised, and are composed of a multitude of heterogeneous objects called agents (Crooks, Castle, Batty 2008).
"Urban and regional modelling is a part of the broader and now fashionable field of complexity science […] there is a history of 50 years or more of serious development and therefore a substantial body of literature and ideas" (Wilson 2012).

The Systemic Retroactive game between bottom-up and top-down

Cities are mirrors of societies which are mirrors of cities. Societies and cities – their physical skeletons – are created by the constant game (as cooperative as antagonistic), between private and public interests, personal and aggregate preferences/needs; and private and public interests depend on cultures, religions, politics, etc. This is what, at last, mostly, shapes cities.
For example the private interest in the case of land owners could be to maximize the personal economical profit. On the contrary, the public interest is (or it should be) to maximize the social wellbeing of, ideally, all city dwellers.

[1] Actually, this global view change happens even earlier: "It was not Galileo or even Newton but Darwin that split this top–down world" (Batty & Marshall 2012).
[2] "[…] models were derived from work in a sub-area of artificial intelligence called distributed artificial intelligence (DAI). DAI aimed to solve problems by dividing them amongst a number of programs or agents, each with its own particular type of knowledge or expertise. In combination, the collection of agents would be better at finding solutions than any one agent working on its own. While DAI is primarily concerned with engineering effective solutions to real world problems, it was soon noticed that the technology of interacting intelligent agents could be applied to modelling social phenomena, with each agent representing one individual or organisational actor." (Gilbert, N. & Terna, P. 2000).
[3] "A complex system is an entity, coherent in some recognisable way but whose elements, interactions, and dynamics generate structures and admit surprise and novelty that cannot be defined a priori. Complex systems are more than the sum of their parts […]" (Batty & Torrens 2005).

Investment decisions of private owners and investment decisions of town-regional councils is the system parameter which drives the economic system, and the "city system", away from equilibrium. "Investment flows have the equivalent property to 'energy' in an ecosystem and these set up gradients between locations in the rate of return on property investments" (Samet 2013).
The forces of attraction and repulsion between land use build the set of enduring spatial relationships which is the core in structuring urban growth (Batty & Stanilov 2011).
The morphological urban effect (the physical emergence of the agents interactions), of the *bottom-up* can be seen by passing through the history of cities, such as some spontaneous primitive villages, part of Medieval cities and Muslim cities, industrial Elizabethan cities, etcetera, as well as by the structural study of some present cases of spontaneous urbanism (i.e. favelas) and, in a certain way, the post-modern urbanism as reply to the modern's.
As opposite force (but not necessarily *completely* opposite) to the *bottom-up*, there is the *top-down*/urban planning role. On many occasions, the *laissez faire* gave way to greater or lesser measures of planning and public regulations. This is historically shown by emblematic *top-down* examples such as the ex novo Greek and Roman colonies, the ex-novo Medieval cities, the ideal city of the Renaissance, the American cities, the post-industrial cities, the Barcelona of Cerda, the Paris of Haussmann, the rings of Vienna, the soviet master plans, and so forth until some recent examples such as the Chinese cities under Maoism and later under the more open Xiaoping's "Four Modernizations", the Singapore of the Cambridge-educated Lee, Los Angeles, Canberra, Brasilia, Navi Bumbai, Dubai, Tianjin, etcetera.
Without touching deep reasoning such as comparative economic, political and philosophical-religious systems, we can reasonably say that both of the extreme cases, either just *bottom-up*/*laissez faire* or just *top-down*/regulations, showed their limitations. For example, having chosen in the past fossil fuels as a main energy source rather than investing in clean and renewable ones; having chosen to prioritize and encourage private transportation by cars rather than massive efficient public transportation (rail transport or other); having created entire 'dormitory urban areas' by urban zoning; having ruined air, streets, squares, mental and physical health by using our cars rather than bikes, public transport or walking; the unliveable industrial cities built by following the "invisible hand" philosophy; increasing (or not trying to reduce) world problems such as water, energy, pollution, deforestation, etcetera, with our personal habits (what we chose to eat, to use, to do, do rubbish collection or not, saving electricity or not, thermally well isolating our houses or not, etcetera).
When we talk about 'way to see' phenomena, may appear clear that 'things' emerge[4] from the bottom-up: intelligence, consciousness emerge from a net of neurons, each of which is not intelligent or conscious, and each of which does not even know that its little single role allows such a big thing as intelligence and consciousness; each atom inside something alive is not alive, and it does not know that it is contributing to make something alive; similar reasoning can be done thinking about complex systems in general.
When we talk about 'actions' influencing other 'actions', or arising from other actions, *bottom-up* and *top-down*, self-organizations and planning, may go hand in hand: one can be the consequence of the other, and/or vice versa.
We can call *Systemic Retroactive game* (*SyR)* this braided causal relations across different scales and feedbacks: individual behaviours generate an emergent phenomenon which becomes 'independent' from them even if maintained (and changeable) from them, and whose behaviour influences (*top-down* feedback) the individual behaviours, which influence it, which influences them, which influence it…
It is like if the emergent phenomenon, after emerging, becomes a 'single agent', which we can call *Autonomous Post-Emergence* (*APE*), inside the retroactive game with the other 'single agent' which is the 'people behaviour', where 'people behaviour' can differ among individuals

[4] "[…] a phenomenon is emergent if it requires new categories to describe it which are not required to describe the behaviour of the underlying components […]" (Gilbert, N. & Terna, P. 2000).

and depends from the personal interaction with the emergent phenomenon; the sum of each individual behaviour generates the emergent phenomenon itself. Therefore, an *APE* is intrinsically a Complex System, as emergence from the non-linear interactions among agents who do not imagine (and often they also do not know and do not realize *that* they made it, and *what*), but it is also something 'more', as, once it emerged, it gets, in a certain way, independent.

Examples of complex systems which are also *APE*(*s*) are market-economy, globalization, religions, cities, political-moral-economics systems, and so forth.

For example, *urbs* is the physical result of *civitas; urbs* influences *civitas* which influences *urbs*, etc…

Or again, the characters (built throughout history by an interconnected mix among geography, climate, trades, chance), of people and societies, all together create a specific economic-moral-religious-political system rather than another, and then the *APE* is born and starts its *SyR* dance with its own creators: is Consumerism created by our consumption needs, or are our consumption needs created by Consumerism? Do religions and political-economic systems create our personal values and uses, or vice versa?

In a certain way, it is a mix of both: *SyR* and its agents influence and mutually change each other.

'External' components such as chance[5], climate, geography, flora, fauna, isolated or opened location, etc. (probably the main component), and such as cultural impositions/absorptions[6], are part of the ingredients which, throughout history (past, present and future), silently or not, progressively or not[7], form behaviours and attitudes, which, together with external components, influence societies, religions, politics, economics; once these emergent phenomena (democracy, despotism, capitalism, feudalism, socialism, …, moral-religious-ethical principles, and their physical manifestation, as cities) are "created", they are something new and, especially, 'independent' from whom created them. This new emerged thing is something 'alive' whose future behaviours and effects could not be easily controlled by the entity (the agents) who generated (and still generate) them. Agents and *SyR*, influence each other.

Citizens behaviours-needs influence urban planning (i.e. dwellers love using bikes and walking rather than wasting money, time, physical and mental health by using cars, therefore the town

[5] Occidental culture has a base on the Greek's: what if Miltiades, at the end of his victory in Marathon, had not noticed that the Persian ships, instead of sailing back, where turning towards Athens which was undefended? And/or what if the Greeks had ran just a bit slower and had not arrived to Athens 1h earlier than the Persian ships? What if Martel had lost in 732? "[…] the Arabs would surely have conquered all of what is now France and Germany, and destroyed the monasteries. In which case, we might all be Muslism, like so many of the peoples of the world today" (Gombrich 1985, p. 121). What if *that* little mosquito had not stung Alexander Magnus killing him for malaria (it is one of the versions of his death) in the middle of his great plan to "combine the wisdom and splendour of the East with the clear thinking and vitality of the Greeks, and so create something entirely new and wonderful" (Gombrich 1985, p. 69)? What if Colombo had been believed by some rich Italian rather than Spanish? Half America, at that time, probably it would have been Italian rather than Spanish. Past, present and future are a continuous succession of events, a lot of which random and with immense consequences.

[6] Mass-media, wars, commerce relationships, etcetera. 'Imposition', when certain civilizations impose with force their culture to another civilization; 'absorptions' when this cultural transfer happens in a spontaneous way, as for the Romans: even if they were the 'conquerors', ended up absorbing part of the Greek culture, even if they were the 'conquered'; or, using the words of Duruy, "the conquest of Greece by Rome was followed by the conquest of Rome by Greece. *Graecia capta ferum victorem cepit*" (Duruy 1884).

[7] Sudden events such as "the political unification of China in 221 BC; Alexander's crossing of the Hellespont in 334 BC, the Arabs' eruption out of Arabia in AD 633, and the Mongols' eruption out of the north-east Asian steppes in the thirteenth century. There have been still more portentous events that have been gradual: for instance, the development of Greek and Chinese philosophy and of Jewish monotheism, and the spread of the missionary religions and of agriculture and of the harnessing of water-power" (Toynbee 1972, p. 13).

council decide to plan parks, pedestrian areas and cycle paths rather than transform squares into parking and boulevards in motorways), and citizens actions themselves (private investment, preferences about where to live, where to walk, how to commute, where to open shops, business, etcetera), which, together with the geographical conditions and historical events, are the ingredients shaping cities.
In turn, cities, once made, influence citizens, their habits, even their way to see and think, and, again, citizens influence cities, and so on. For instance, the hub of Greek and Roman cultures was the public life, therefore their cities were full of public spaces. In turn their cities, so built, amplified and/or encouraged public life. Or: citizens could not use bikes because cycle paths are missing, and cycle paths could be missing because no one is willing, or pushing, to use bikes, and the less people who use bikes the less they even think they could be used; or, the more they use cars, the more no one feels to use bikes (not just because of cultural habit, but because streets are too dangerous).
When these influences are objectively negative (pollutions, stress, daily wasting of time for commuting, crime, low quality of life, segregations, urban sprawl or over density, obesity, etc.) and predictable, why not try to avoid them at their origin rather than wait decades and change them just after having continuously suffered their negative effects rather than before?
From this point of view, Agents-Based-Modelling (*Bottom-Up*/citizens behaviour) offers future scenarios which, depending from the negativity or positivity of them, we (*Top-Down*/urban planning) can decide to facilitate or to avoid.
Reminding the *Systemic Retroactive game* (*SyR*) between an *APE* and its agents, and quoting the *Negative Transitory Cycles*/*Net Positive Development*[8], it would be better to anticipate (*Top-Down*/Planning and *Bottom-Up*/personal behaviour) the negative consequences of the *SyR* for directly jumping the *Negative Transitory Cycles* (Fig. 1).

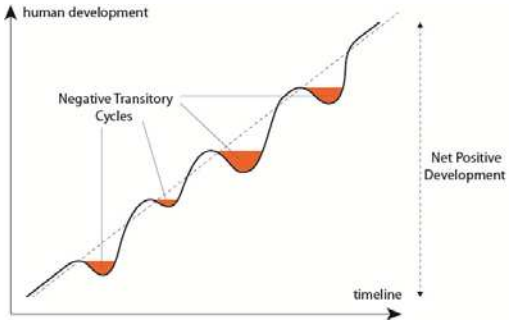

Fig. 1. Negative Transitory Cycles and Net Positive Development

Example of *Negative Transitory Cycle* is the life cycle of many squares and streets, and almost each historical centre in our cities: they were born, often centuries ago, in a pedestrian status (not for forward-looking merit but more simply because there were no cars), then they evolved in expanses of smoke and sheet steel (because of the 'fault' of both: individual behaviour – using the car rather than public transport, biking, walking – and planning – encourage the use

[8] "History shows how humanity development has sometimes momentarily decreased in certain aspects during periods of time, lasting from a few decades to a few centuries; we can refer to them as Negative Transitory Cycles (NTC). However, when we look at the same history in a larger temporal perspective, we can see that, on average, our life has improved, both in quality and duration; we call this Net Positive Development (NPD). The desire to progress is part of human nature; it is an inevitable, automatic process that we should drive forward in the cleverest way, attenuating, as much as possible, future Negative Transitory Cycles and heightening Net Positive Development. Looking back at past improvements and believing in human intelligence, we like to think that our development will drive us toward a greater level of well-being and progress […]" (D'Acci 2011).

of cars rather than facilitate biking, walking or improving the efficiency and economy of public transport), then they are now starting to return pedestrian. This re-transition in some case is in a forced way, by planning and laws, even with strong opposition from the populations which still want to go, parking and passing through the city centre by car; in some opposite cases it is the population who force planning and laws because they want pedestrian areas; in some other cases there is a mutual influence.
Another example could be the global energy systems, based mostly on polluting and non-renewable, and/or dangerous sources: after seeing their consequences (global warming, diseases for environmental pollutions, etcetera) we are now trying a deep change.
However this big change has an additional cost now which there would not have been if it had been done in the past. In fact, the cost to invest in research and clean energy may be relatively the same now or in the past, but starting just now means that we have to add the costs of all the damages that wrong *SyR* had done till now.
Just to give some economics measure idea, thanks to clean technologies, by 2050 Europe could save up to € 88 billion a year in health care and equipment to control air pollution, by reducing air pollution in cities which causes various medical diseases (European Commission 2012).
Another example could refer to our present main way to commute: road traffic injuries caused 1.24 million deaths worldwide in 2010 (World Health Organization) and more could happen in 2013[9].
Ideally, even better than solving the problem downstream (i.e. electric cars, efficient and ecological public transport systems), would be solving the problem upstream by reducing commuting as much as possible.
If we (Top-down) build cities with a homogenous spatial distribution of job locations-services variety, infrastructures, centralities, urban quality and residences, we may drastically reduce the need to commute (that means less pollution, less medical diseases and deaths, less wasted time[10]), indirectly also reduce spatial segregations and crime, and we can also offer a *beautiful* city to everyone rather than just to the rich. These above examples came in part from *SyR* games.
These morphogenesis process (Knox 1995, p 22), which create and reshape urban forms over time, together with personal behaviours, constantly alters cities.

Conclusion

Our world view is, consciously or not, constantly shifted between two kind of sights: scientific and humanistic. According to Snow's thesis, "the breakdown of communication between the 'two cultures' is a major hindrance to solving the world's problems" (Portugali 2011, p. 10).
This separation is observable also in urban study approaches: scholars who, by scientific methods tempt to develop a science of cities, and scholars who approach cities with a more humanistic philosophy.
During the first part of the 20th century, we see both sides developing in parallel such as the humanistic perspective of Mumford and the quantitative perspective of Christaller, Losh, Reilly and others.

[9] www.worldometers.info/
[10] In Thailand 37 million hours is spent travelling to work everyday (http://www.worldmapper.org/display.php?selected=141). In Ningbo city the commuting time in 2001 was 120 minutes, a 50% increase from 1990; similar results concern the cities of Guangzhou and Yangzhou with their commuting time in 2001 of 90 and 150 minutes. The value due to lost time could be calculated as the total annual amount of time vanished in commuting multiplied by the average income per hour and, for all China, increased from around € 1.5 billion in the 1980, to more than € 72.8 billion in the 2002. In the same country, between the same years, the cost of automobile accidents shifted from around € 724 million to more than € 7 billion (Wen & Chen 2008).

In the 1950s a *quantitative revolution* happened, which has "strongly criticized and even de-legitimized the scientific validity of what they have referred to as descriptive approaches" (Portugali 2011, p. 10).
As history teaches us, we live in a sort of perpetual cycle of revolutions and recalls, so that in the early 1970s urban social theories, through Structuralist Marxist and phenomenological idealistic perspectives, strongly criticized the positivistic-quantitative approach.
The last couple of decades have seen both: social theory urban approaches adopting postmodern, poststructuralist and deconstruction philosophies, and quantitative spatial sciences.
The current dominant bottom-up decentralized vision of phenomena as complex system, reminding in parts the Postmodern urbanism philosophy, looks at "society as highly connected but irredeemably plural and contradictory" (Lynch 1984, p.46).
As Toynbee poetically synthesises the western democratic ideal to attempt to reconcile two spirits almost diametrically opposed ("The spirit of nationality is a sour ferment of the new wine of democracy in the old bottles of tribalism", Toynbee 1979, p. 34), history also teaches us the advantages in borrowing the best of each thought along timelines and cultures.
A wise use of the top-down centralized vision of the Post liberal, Modern urbanism, should aim to understand (bottom-up) agents behaviours – often driven by reductive, selfish and short-term views – in order to suggest (top-down) planning which – in comprehensive, long-term view – follow them (when the overall effects of the agents action is positive) or impede them (when they have negative effects such as pollution, congestion, crime and segregation, waste of space, material and energy, unequal enjoyment of city beauties, no green and proper agreeable and liveable public spaces for everyone in cities, etc.).
Theory "must speak to purposes, and not about inevitable forces" (Lynch 1984, p. 41). However, these purposes (top-down), if they don't want to continue "the failure of an entire discipline, which originated at the end of the nineteenth century around ideas of top-down control" (Pagliardini, P., Porta, S. and Salingaros, N.A. 2010, p.331), should first understand, and therefore feel, the bottom-up processes which dry on the basis this complex whole which a city is.
By avoiding overlooking just Top-down philosophy, as well as just Bottom-up, we can define a *Modern Postmodernism* vision, mixing the positive contributions of both: understanding pluralism, genius loci, local values, multi-agents preferences and behaviours, spontaneous regulations; driving cities with long-term and collective wellbeing views.
Where the latter point should be aware of the bottom-up role, without pretending that everything just easily (and statically) depends from Top-down actions, at the same extent as we should recognize that bottom-up dynamics depends from top-down actions too, and, especially, that intelligent *SyR*s may avoid decades (or less, or much more), of negative effects.
By quoting a Dante masterpiece: "Considerate la vostra semenza - fatti non foste a viver come bruti - ma per seguir virtute e conoscenza" [Consider your roots - you were not made to live as brutes - but to pursue virtue and knowledge] (Dante Alighieri, Divina Commedia, Inferno canto XXVI, 116-120, Author translation), we close this short reasoning reminding the final *SyR* aim (common of that of *knowledge* in its wide meaning), which should be to improve the quality of life of as many agents of the game as possible, and, thanks to wise *SyR*s, sooner rather than later.

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