Modeling Arabian Upraise, a System Dynamics Approach: Egypt case study

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Abstract

Revolutionary movements have always served as focal points for social and political scientists' scrutiny. Controversially, despite all efforts the field still seems impotent in predicting the impending collapse of regimes rather upraises of the corps. This paper argues that, the problem has ensued from flawed perception of systematic, endogenous and dynamic nature of social interactions, and by using a "system dynamics model," tends to both elucidate the internal interactions of the phenomena, and evoke the time series behavior of the key factors shaping the outcome. With the structured model in hand, we then proceed to analyze the policies executed and see how they failed their purpose in taking stranglehold over the insurgent movements.

Key word: Revolutionary Movements, System Dynamics

Introduction

Why does an impending revolution that in hindsight seems to be inevitable outcome of the powerful social forces, recited by the most casual observers, surprises so many of the leaders, participant, victims and scholars? Regarding surprised leaders, do the executed policies rather harness the uprise or accelerate them and why? What are the contributions of internet technologies, suppression pattern or international affairs and what are the mechanisms to these contributions?

Political scientists and sociologists offer a great variety of answers to these and related questions. These answers range from very specific explanations focusing on unique characteristics of one particular polity to quite general theories or social dynamics, which are

often contradictory. The issue even gets worse when talking about such palmate and prompt theme like disruptive revolutionary movements.

Indeed, theory in social sciences usually means careful thinking about concepts and definition. It is verbal, conceptual, and discursive. Yet in most of theories in this field, the multifaceted conflicting pressures of real decision making are almost absent. The professional literature in this case usually fails to capture how interactions actually are made, how equilibrium is determined rather than how dynamic behavior arises and instead emphasizes how decisions should be made rather than (Forrester 1987). These deficiencies become more egregious as dynamic and precise nature of political science, doesn't allow a wrong strategy to be repaired without experiencing high costs, while in most of the cases the strategy is irreversible. Ironically, with these serious deficiencies in political analysis, Political sociologists use a limited set of theoretical tools and numbers of scholar with validated quantitative approaches are rare. To quote Skinner:

> *"Twenty-five hundred years ago it might have been said that man understood himself as well as any other part of his world . . . . Today he is the thing he understands least. Physics and biology have come a long way, but there has been no comparable development of anything like a science of human behavior. . . . Aristotle could not have understood a page of modern physics or biology, but Socrates and his friends would have little trouble in following most current discussions of human affairs." (Skinner 1971)*

In other words, insights into the behavior of social systems have not advanced in step with our understanding of the natural world. But why such a difference? In this time , we are experiencing meticulously analyzed and highly confident Engineering systems which are products of most recent analytical approaches and computer simulation, while political and social systems, although far more complex than engineering, still are analyzed and designed based only on intuition and debate. (Forrester 1987)

We believe that answer lies in recognition and perception of the terms, "system" and "system thinking" among social scientists. Although David Easton in *A Framework for Political Analyses* (1979) endeavored to integrate system thinking into analysis of political process but his attempts, literally resulted in only terminological permeation of system analysis—as it is called today. The reason could be that, Easton's own perception had nothing to do with system thinking, with no enclosure of seven critical thinking skills (Richmond 1993), and at best was a mediocre apprehension of general system theory. In addition even with a total understanding of system concepts in political science, we face the lack of methodological technique for analyzing how the "flow of effects from the environment," as Easton has called it in his famous diagram , would modify the behavior of the system (Sandberg 2010); these techniques should have the ability to deal with complex essence of social systems which typically lack data about many

aspects of the system under study, while possessing fragmentary and approximate information about others.

Despite all that mentioned, scholars still seem paralyzed after the disruptive Arabian spring, and trapped in linearized static perspective thriving to find the reason of their petrifaction. This article rather rejects the question "where are we?" and instead accentuates upon the whole idea of "why we are here?" to develop a model for Egypt society, and sees how the differences emerge.

Theoretical Views

The methodological purpose of this article is to show that new analytical approaches such as systems dynamics and its related simulation techniques have made systems analysis not only possible but increasingly useful for political science purposes.

Decision making serves as an intrinsic and fundamental parameter for analyzing any social and political system. System dynamics methodology, views decision processes from a very particular distance; "We are not close enough to be concerned with the mechanism of human thoughts, nor so far away as to be unaware of the decision points and its place in the system "(Forrester 1992).We are neither as close as a psychologist delving into nature of personality, nor as remote as someone unaware of internal structure and decision points of the system. Hence by this approach we have retained our holistic and dynamic point of view and still refrained falling to reduced behavioral and functional analyses as most political scientist did (Elster 1985).

As it is well established all system dynamics modeling practices start with a real world problem or difficulty and are expected to be concluded with policy implementation in the real world to solve the problem (Mashyekhi and Ghili 2010), therefore, the first step through our effort in explaining events in Egypt is to define the difficulty that has intrigued us to conduct this research, following that we should determine the problem, which will form the conceptual framework of our study for initial steps like literature review.

The first problem was the fact that we scholars were taken by surprised by regime collapse in the region was so fundamental that couldn't be overlooked. As Masoud (Masoud 2011) indicates in his very article "…practically every journalist who visited Egypt in the last few years seemed to mark the occasion by filing a piece warning of the regime's impending collapse. But we scholars of the country—none of us blind to the regime's failures and the people's misery—thought that we knew better. The predictions of regime failure had been coming in for so long that we had become inured to them. Mubarak had faced down assassination attempts, an Islamist insurgency, and near-constant economic crisis, and his regime's remarkable durability demanded explanation. But a side effect of our intellectual

exertions was that the theories we generated to explain authoritarian survival also tended to predict it."

It seems that not only we haven't worked on our historical deficiency about corps movement – e.g. Iranian Islamic revolution 1979, the Russian Revolution of February 1917, the French Revolution of 1789—but also tended to devise theories rationalizing our biases, likely to say durable authoritarianism theory. Why do we switch to these shortcuts and why we still haven't possessed an analytical nor descriptive method to fully anticipate revolutionary movements?

In addition, even after the people swarmed into streets and overthrew the regime, analysis and scholars brewing over the issue still seemed confused and paralyzed in linking the roots of the movements on palmate sphere of the society. For example Zakaria (2011) mentioned on Time magazine that "Few thought it ever would come to this. Egypt has long been seen as a society deferential to authority, with a powerful state and a bureaucracy that might have been backward and corrupt but nonetheless kept the peace. "This is a country with a remarkable record of political stability," wrote Ajami in an essay in 1995.

Why would economic progress spur protests? Growth stirs things up, upsets the settled, stagnant order and produces inequalities and uncertainties. It also creates new expectations and demands. Tunisia was not growing as vigorously as Egypt, but there too a corrupt old order had opened up, and the resulting ferment proved too much for the regime to handle. Alexis de Tocqueville once observed that "the most dangerous moment for a bad government is when it begins to reform itself." It is a phenomenon that political scientists have dubbed "a revolution of rising expectations." Dictatorships find it difficult to handle change because the structure of power they have set up cannot respond to the new, dynamic demands coming from their people. So it was in Tunisia; so it was in Egypt. Youth unemployment and food prices might have been the immediate causes, but the underlying trend was a growing, restive population, stirred up by new economic winds, connected to a wider world (Notice that more stagnant countries like Syria and North Korea have remained more stable). "

Or as Hitchens (2011) states: "… So multifarious are the sources of grievance in the Arab world that it could have been any one of a host of pretexts that ignited a revolt, or revolts. This ought to make one beware of too glibly selecting the ostensibly crucial one. Poverty and unemployment? These are so pervasive that they could explain any rebellion at any time—and in any case Tunisians are among the richest per capita in North Africa. Dictatorship and repression?Again, these are commonplaces, and so far the most conspicuously authoritarian despotisms, Syria and Saudi Arabia for instance, have been spared the challenge of insurrection. (May these words of mine go out of date with all speed?). I think that the factor of indignity and shame, of the sort manifested in the anecdote above, makes a more satisfactory initial explanation. And one of the cheering and reassuring things about dictatorship is the way that it consistently fails to understand this element of the equation. How gratifying it is that all such regimes go on making the same obvious mistakes. None of them ever seems to master a few simple survival techniques."

Dani Rodrik (Rodrik 2011) a faculty of Harvard also contended that "…. The HDI is a measure of development that captures achievements in health and education alongside economic growth. Egypt and especially Tunisia did well enough on the growth front, but where they really shone was on these broader indicators. At 74, Tunisia's life expectancy edges out Hungary's and Estonia's, countries that are more than twice as wealthy. Some 69% of Egypt's children are in school, a ratio that matches much richer Malaysia's. Clearly, these were states that did not fail in providing social services or distributing the benefits of economic growth widely.
Yet in the end it did not matter. The Tunisian and Egyptian people were, to paraphrase Howard Beale, mad as hell at their governments, and they were not going to take it anymore. If Tunisia's Zine El Abidine Ben Ali or Egypt's Hosni Mubarak were hoping for political popularity as a reward for economic gains, they must have been sorely disappointed."

Along with Masoud (Masoud 2011) which indicated the stimulators of the movement as, "… large and growing corps of angry young people with no jobs and no prospects, the repeated thwarting of the voters' will; crumbling public infrastructure whose sole purpose seemed to be supplying newspaper headlines about train crashes and ferry sinking; Corruption so brazen that it was often written into law; and daily acts of casually dispensed brutality…"

And, as Korotayev and Zinkina (2011) proved in their demographical structural analysis that "…in the past 20 years Egyptian unemployment was fluctuating at a rather high level (8–12%). However, after the launch of economic reforms in the mid2000s it started to decrease in a rather stable manner. Predictably, there was some increase—though not so pronounced as in most other countries—in unemployment level as a result of the global financial economic crisis, but in 2010 unemployment went down again., unemployment level in prerevolutionary Egypt could not be called "extremely low", but against the global background Egypt compared rather well. Its unemployment level was less than in the USA, the EU, France, Poland, Turkey, Ireland, almost twice lower than in Latvia and Spain etc."

Though these highly characterized analyzers ingeniously tracked some very elements for these grass root mobilization but they actually based on analyzer's mental models and presumptions—captured only a segment of the phenomena and have proceeded asserting this image in their reinforcing mental learning loops. Hence, when putting these segments together to acquire a holistic insightful scene, you will face severe contradiction, as you may have perceived from those manuscripts mentioned.

Why we have failed in extracting this full concept of Egypt status quo? How we could match these discrete conceptions which often lead to antagonistic conclusions? Social interactions occur in a complex context, albeit defining complex as dynamic, limited information, cofounding variables and ambiguity. In this context, eliciting and mapping the participators mental model, while necessary is far from being sufficient. The temporal and spatial

boundaries of our mental models tend to be narrow. “They are dynamically deficient, omitting feedbacks, time delays, accumulations, and nonlinearities” (Sterman 2000). However, most of the real world problems, yield precise inclusion of these factors. Since complexity of our mental models vastly exceeds our capacity to understand their implication, Simulation seems to be the only way to contribute the many parameters of the complex world to our mental models and to test them. In this way emerges the System Dynamics methodology, designed to tackle with complex problems in real world.

After we have gone through a level of literature review, we could start to articulate element of our problem definition which mainly includes dynamic hypothesis and reference modes. System dynamics methodology entails that, if possible and database is available the author should demonstrate the dynamic behavior of the main variables of problem over some period of time named, reference mode, also an initial explanation of the causes of the reference mode is called dynamic hypothesis. The explanation of the underlying causes should be endogenous. These are represented for the case in detail in proceeding lines.

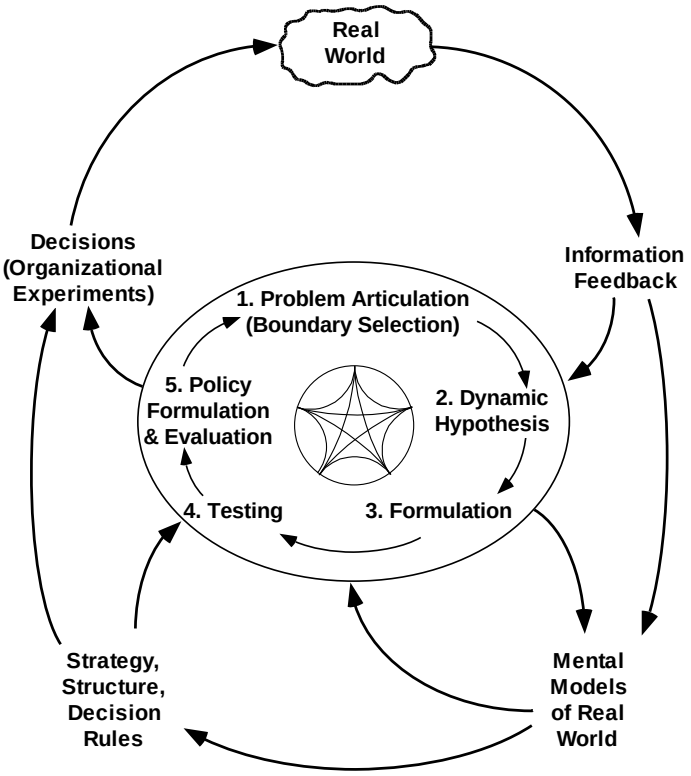


Figure 1. Effective modeling involves constant iteration between experiments and learning in the virtual world and experiments and learning in the real world.
© Courtesy to Sterman (2000).

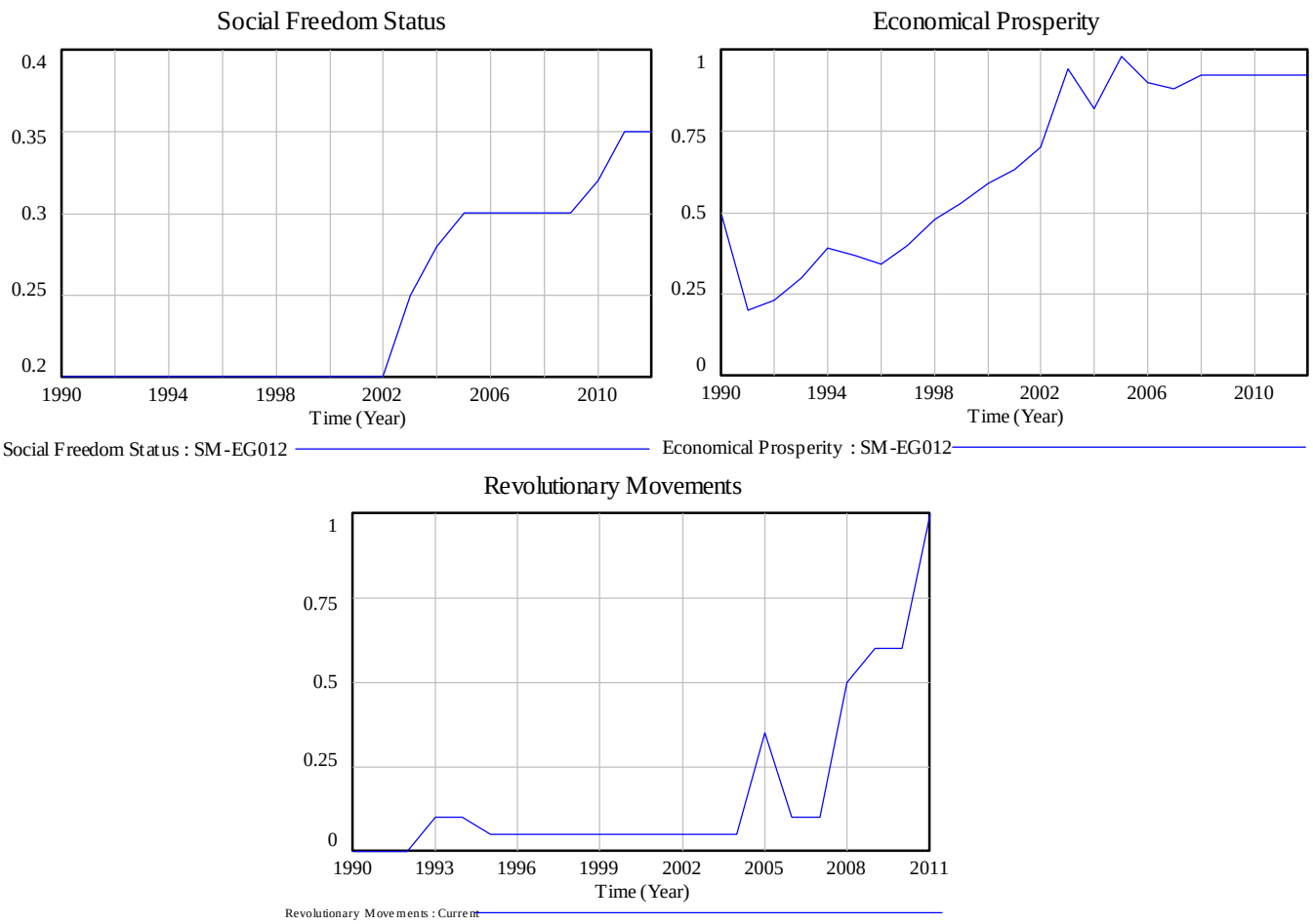


Figure 2. Reference modes for dynamic hypothesis

Endogenous explanation contains feedback loops or circular causations and interactions between factors that create the reference mode. Endogenous explanation does not explain the changes of the variables in terms of factors that are not affected by those changes. Endogenous explanation is in accordance with the feedback view of the world that is the main pillar of system dynamics philosophy and methodology. Many people correctly consider the feedback perspective as the philosophical foundation of system dynamics. (Forrester 1994)

In studying Egypt's status quo, the first problem is to obtain a coherent holistic view, so that deepens our comprehension of the case. It is predicted that as we go forward, coming upon with new ambiguities—especially contemplating policies—the problem definition and purpose of the model will evolve too.

Investigating Egypt's social and governance sphere, there are three classes of data available that could be utilized by our model, one of these include the rich detailed demographical time series of economical condition, gathered by large amount of studies in this

field. The other one is the descriptive scrutiny of the nation's freedom and political status. Most of the data in this area are in form of descriptive static information evoked by grounded theory, while our method needed dynamic time series which narrowed our choices for selection. And the third group of information, which is merely descriptive, reported by the observers, we quantitated this information and used them to validate the model's output.

Figure 2 represents three reference modes, each emanating from one of mentioned classes. The variable *Economical Prosperity* was designed and formulated particularly for this model. Indeed, as we needed a concept to cover influence of all aspects of economical wellbeing on the way people form their expectations and perceptions, usual detailed and specified indexes wouldn't do the trick.

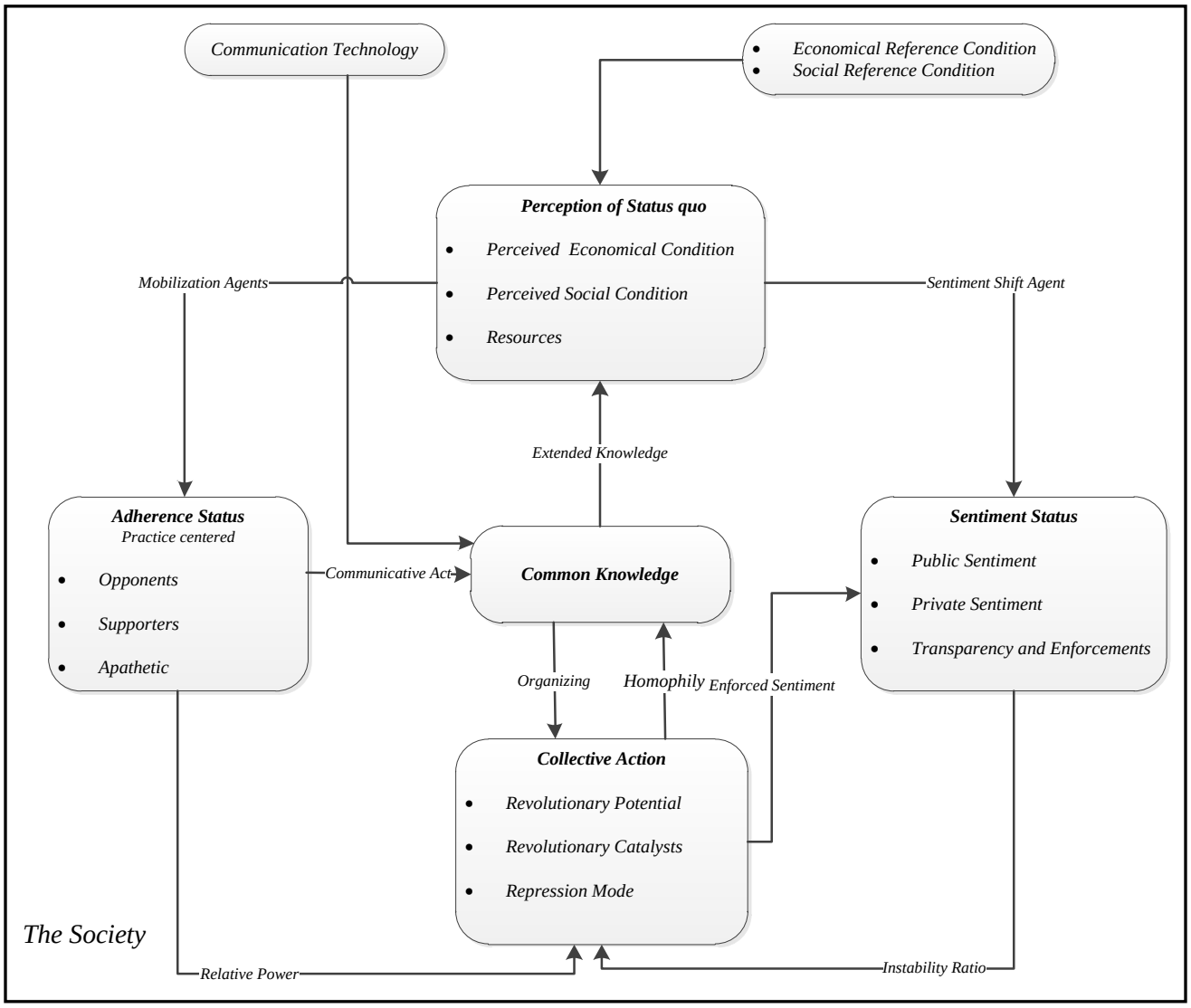


Figure 3. Sector map of the phenomena

Using *Legatum Institute's* prosperity index formulation, but more simplified based on purpose of the model , the formula was basically a weighted function of variables such as GDP growth rate , Unemployment and Gini coefficient which was rescaled to fit into a logical interval regarding other variables of the model. The function fell in the interval [0, 2] which constructs a spectrum of impoverished to flourishing social economy; the data for Egypt lay in the interval [0, 1] indicating an impoverished to an average economy.

Worth of considering is that the model uses differential values of these variables. As a result it is not the absolute values, but the trend of the diagram which should be emphasized.

The social freedom status variable was constructed to represent the permeation of democratic legislation and constitution in the governing regime and also an index for human right factors. The policy IV database (Marshal and Jaggers 2008)served the best regarding this variable. We applied only a slight rescaling over polity IV database on Egypt.

The third diagram is very representative for a kind of data Forrester calls them mental data base or observation experience. We formed the graph and invoked political and social experts' opinion, to quantify and rate the social mobilizations in Egypt relative to 2011 revolution. The criterions were number of citizen involved, constitutional effect and the impression on public opinion —national and international. As seen, the graph sharply reflects major protests like 2005 Alkifaya movements, protest against Israel-Gaza issues, 2008-2009 workers strike and also crises leading to the revolution.

After we identified our main reference modes, a dynamic hypothesis was needed to explain and link the behavior of them. Utilizing system thinking skills (Richmond 1993) in the study of the case and related literature a primary map of the phenomena, called sector map—figure 3—was formed which will be explained in detail in proceeding lines: The first sector which to some extent is the milestone of the model and feeds other parts, is *Perception of Status quo*. In general, three rather complementary theories have been advanced in order to explain why and how mass mobilization becomes possible, but the most compatible theory with behavioral analysis is the one that regards mass mobilization as a rare and exceptional psychosocial or existential condition which results from the development of an intolerable gap between popular expectations and the possibility of meeting them. From this psychosocial perspective, for example, persistent poverty or persistent prosperity do not lead to mass action; rather it is going from prosperity to poverty or from poverty to prosperity that creates the gap between expectations and the possibility of meeting them. According to this famous Davies J-Curve theory, collective action may take place at the point where the gap is most intolerable (Bashiriye 2009).

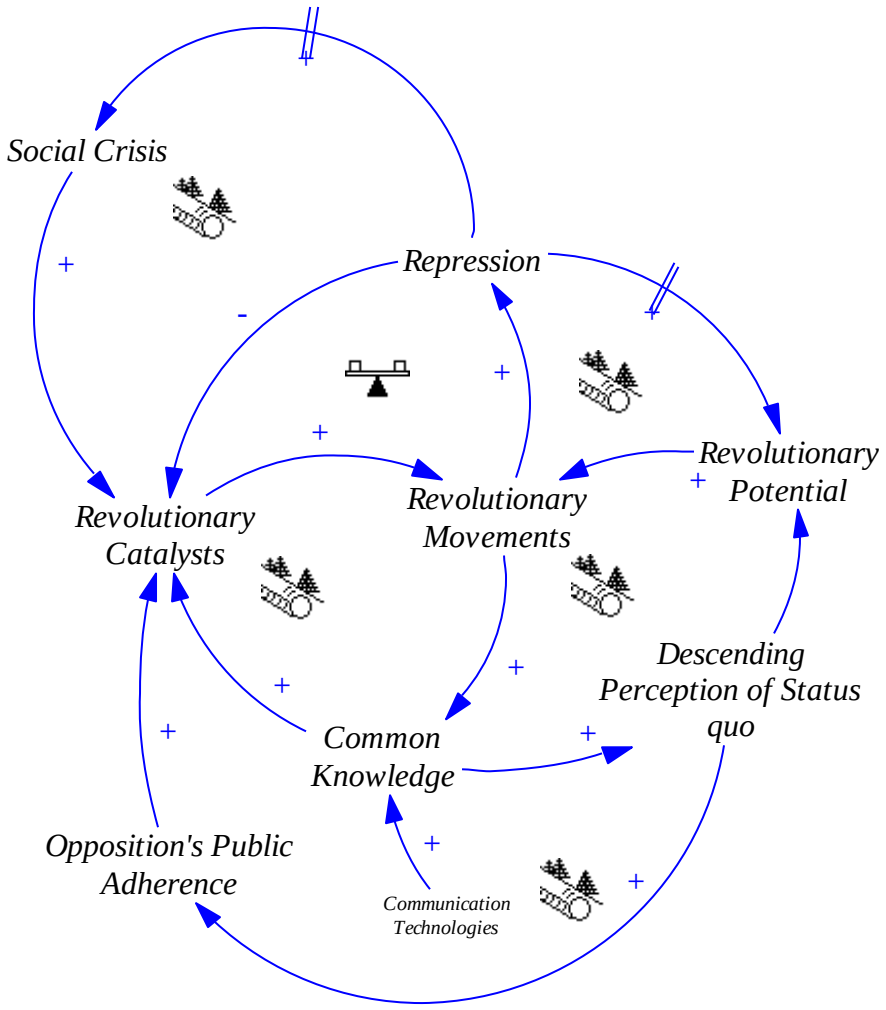


Figure 4. Casual loop Diagram
Positive feedbacks dominating the case generate a domino effect pattern with low leverage points for policy making.

All decisions depend on the mental models. Expectations about future behavior of the system forms critical component of these mental models. Expectations are usually modeled in system dynamic as adaptive learning processes such as exponential smoothing (Sterman 2000). The function we applied here was result of a behavioral theory of how people form expectations, and took into account the time required for people to collect and analyze data, the historic time horizons they use, and the time required to react changes. This function generated the expected rate of change in the input variable, expressed as a fraction of the input variable per time unit. The input to this function was the gap between desired and actual state of the system formed in mental models.

In the sector *Sentiment Status* we represented a feature, shared by certain major revolutions, that they were not anticipated. This explanation was hinged on the observation that people which come to dislike their government are apt to hide their desire for change as long as the opposition seems weak. Because of this preference, a government that appears unshakeable might see its support crumbling, following a slight surge in the opposition's apparent size, caused by events signification and of themselves. Unlikely thought the revolution may have appeared in foresight, it will in hindsight appear inevitable because its occurrence exposes panoply of previously hidden conflicts (Kuran 1989).

Though we modeled the idea using two stocks of *Public and Private Sentiment*, which distinguished between individuals' privately held political preferences and those they espouse in public. These two stocks were related two each other with a rate, called *Transparency Rate* representing the society's freedom in expressing their beliefs. The central argument goes as follows: A privately hated regime may enjoy widespread public support because of people's reluctance to take the lead in publicizing their opposition to change of the Private Sentiment (Kuran 1989) which probably ensues from the intrinsic repression structure of the regime.

The shift in *Private Sentiment* is governed by the extent to which the expectations formed in mental models fail to be fulfilled and this is how the sector *Perception of Status quo* affects *Sentiment Status*.

The *Adherence Status* depicts three different groups of citizens which were considered to have different practical behavior in the model, supporters, opponents and those who are apathetic. As the history of mass mobilization shows, the phenomenon is not a mechanical one, resulting from some "objectively" undesirable socio-economic and political conditions per se; it is the "subjective" channeling of those objective conditions which is the key element. In a word it is a behavioral process. This behavioral structure was modeled in the form of a three cascade chained stocks assigned with rational initial values regarding Egypt case in the start of the simulation -1990- and the change of the entry and exiting rate of these stocks was determined by the same pattern mentioned in the *Sentiment Status* sector. It should be mentioned that, although both adherence and sentiment status, assemble similar process to form their rates for change, but still there is a major difference between them. *Sentiment Status* bodes for a completely conceptual process in the minds of every individual in society while *Adherence Status* is a merely practice oriented sector which determines, i.e. if all of other structures of the model were suited for a revolutionary movement what would be the potential number, for each of these three groups, albeit there exists a coupled correlation.

The next sector was named *Common knowledge* which with no exaggeration could be identified as the most vital structure throughout the whole phenomena. I would like to elaborate it with an illustration called "*Two General's Paradox*"; Two armies, each led by a general, are preparing to attack a fortified city. The armies are encamped near the city, each on its own hill. A valley separates the two hills, and the only way for the two generals to communicate is by

sending messengers through the valley. Unfortunately, the valley is occupied by the city's defenders and there's a chance that any given messenger sent through the valley will be captured. Note that while the two generals have agreed that they will attack, they haven't agreed upon a time for attack before taking up their positions on their respective hills. The two generals must have their armies attack the city at the same time in order to succeed. Thus they must communicate with each other to decide on a time to attack and to agree to attack at that time, and each general must know that the other general knows that they have agreed to the attack plan. Because acknowledgement of message receipt can be lost as easily as the original message, a potentially infinite series of messages is required to come to consensus. Note that it is quite simple for the generals to come to an agreement on the time to attack. One successful message with a successful acknowledgement suffices for that. The subtlety of the Two Generals' Problem is in the impossibility of designing algorithms for the generals to use to safely agree to the above statement (Gray 1978); but if these two generals had some kind of bilateral communication mean per say a radio telephony , victory was imminent.

The same works for social forces too, considering every individual as a general; a short inquiry indicates that recent revolutions are along with new communication technologies—out of government restricting control. For “color revolutions” of the former communist states it was mobile phones, for saffron revolution in Burma was YouTube and for the Green movement of Iran was Twitter and Facebook (Deibert and Rohozinski 2010).

Multilateral communication tools are crucial to organize grassroots movement. Also these communication tools provide possibilities for pluralizing the flow of information and widening the scope of commentary, debate and dissent, altering expectation formation process caused by the ability to contact with a larger public sphere all over the world (Diamond 2010)In addition revolutionary movements themselves could serve very well to enhance the common knowledge of those parts of the society which don’t have access to these tools. Briefly, common knowledge aims the crucial pillar of authoritarian rule which is control of information.

Based on personal experience and observation of Green Movement’s acts in Iran; so far opposition has intended to organize many demonstrations but only a fraction of them—precisely 54 percent—faced massive public response and participation, studying the patterns of these successful calls and unsuccessful ones, we reached an structure explaining the behavior, by identifying and distinguishing two concepts: *Revolutionary Potential and Catalysts*.

These two concepts, though correlated, represented extremely different behavior. *Revolutionary Potential*, mostly seen as the only driver of collective action in the scholars, is the persistent flow of dissent formed by citizens, as an abstract concept, which in turn emanates from the instability generated in the *Sentiment Status* sector; though *Revolutionary Potential* is necessary for collective action but is not sufficient, and high levels of revolutionary potential doesn’t entail a collective or insurgent action considering factors like, falsified preferences, fear , repression, organization and etc.

However, *Revolutionary Catalysts* serving like a spark to gunpowder warehouse, exhibits an impulsive nature with oscillation, which in fact could be the reason for Green Movement's oscillating emergence on streets or the impulsive rise of Arabian people. This behavior rises from the nature of the concept which is an interaction among variables such as social and environmental crisis—that could be internalized in model as regime's policy backfire—opposition's organizing power and mobility; intended to surpass the mind barriers of citizens, compelling them to manifest their defiance more blatantly. This variable lies in five interval in a spectrum of [0, 5] depending on the severity.

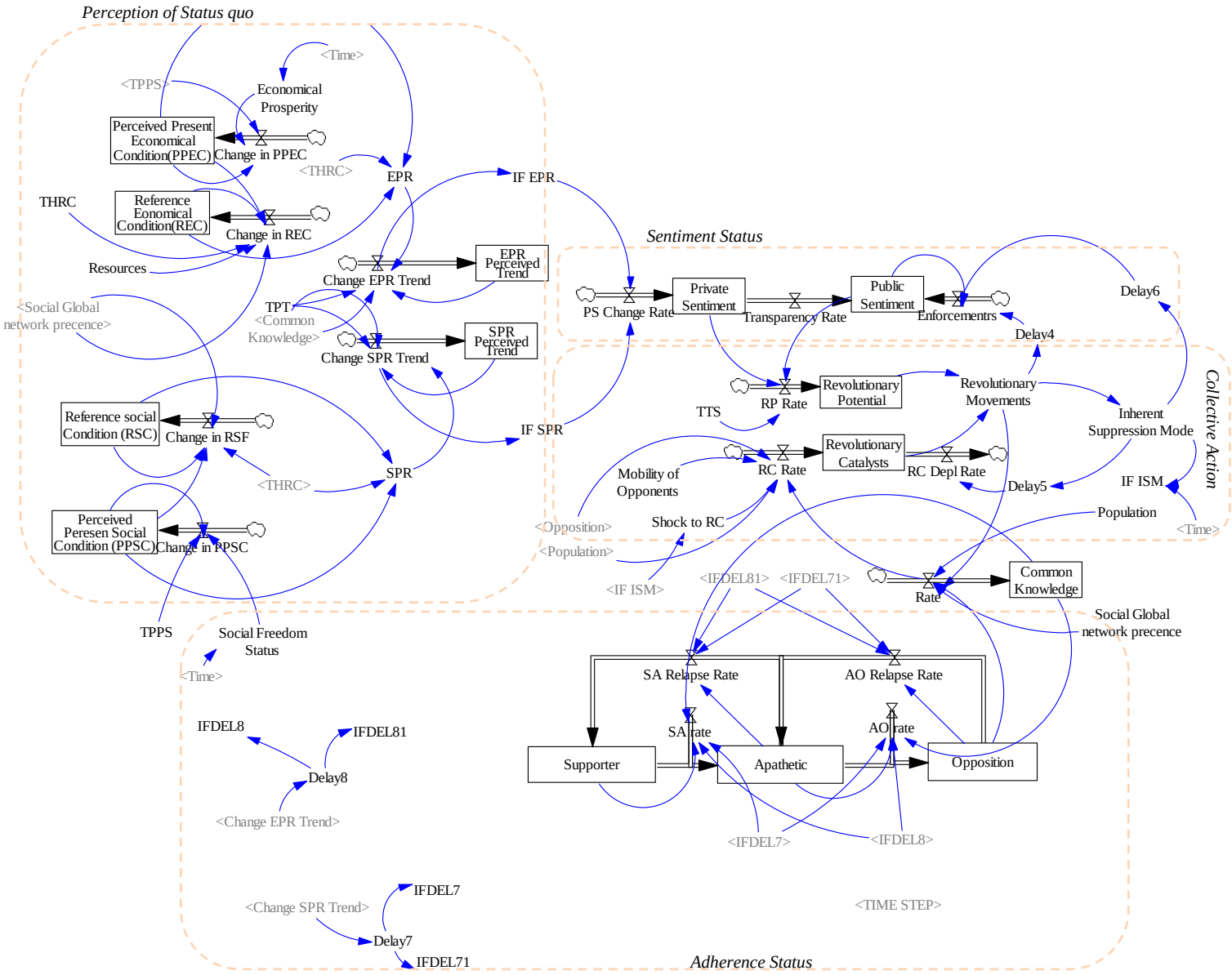


Figure 5. Stock and Flow diagram.

Of course in autocratic regimes, where a collective action exists it is followed by repression. Nevertheless the repression structures, sources and severity differ along authoritarian spectrum, and the model should reflect these diversities. Also feedback links of repression to other parts of the model, as mentioned in the preceding lines, plays main role in generating crucial behaviors of the model.

Results

Figure 6 represents the model of generated behavior of *Revolutionary Movements* in comparison with observed one. As depicted, the model has successfully generated the behavioral trend (the peak and turn points). However, it failed to predict the precise value of the system regarding the reference mode. Two key explanations are available: (1) The data fed into model wasn't precise and calibrated enough; considering the case we are studying, which highly lacks verified calibrated data (e.g. delay times, repression mechanism and etc.), that couldn't be so irrelevant. (2) The reference mode which was sketched based on experts' opinion is biased by their mental model, but concerning the number of experts interviewed and their diverse roots this possibility is weak though persistent.

The subtlety of this deficiency can be overlooked as Forrester (Forrester and Senge 1980) states that''... forecasting is not an appropriate or valid test for either an econometric model or a system dynamics model, and one should examine models in the context of how different policies within the model change the nature of ongoing behavior''. Also many system dynamics practitioners desire to shift managerial emphasis away from forecasting and towards understanding and policy design. Sterman (2000) argues that ''. . . the purpose of modeling is not to anticipate and react to problems in the environment, but to eliminate the problems by changing the underlying structure of the system.''

Albeit, it is strongly proved that System dynamics models can provide more reliable forecasts of short—to mid—term trends than statistical models, and thus lead to better decisions, when fed with detailed and calibrated data. Other simulated behavioral variables, reported in figure 7, were rational too.

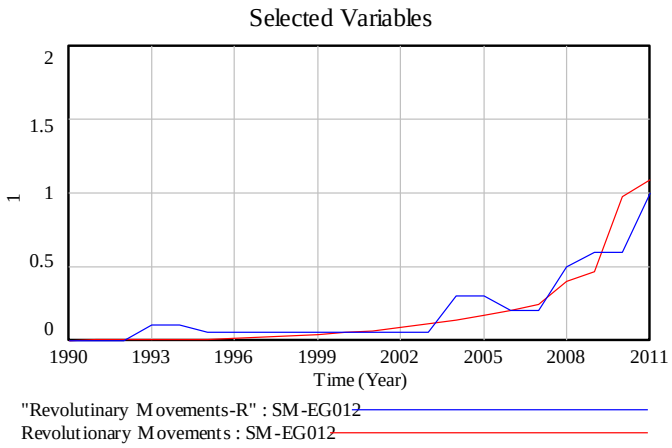
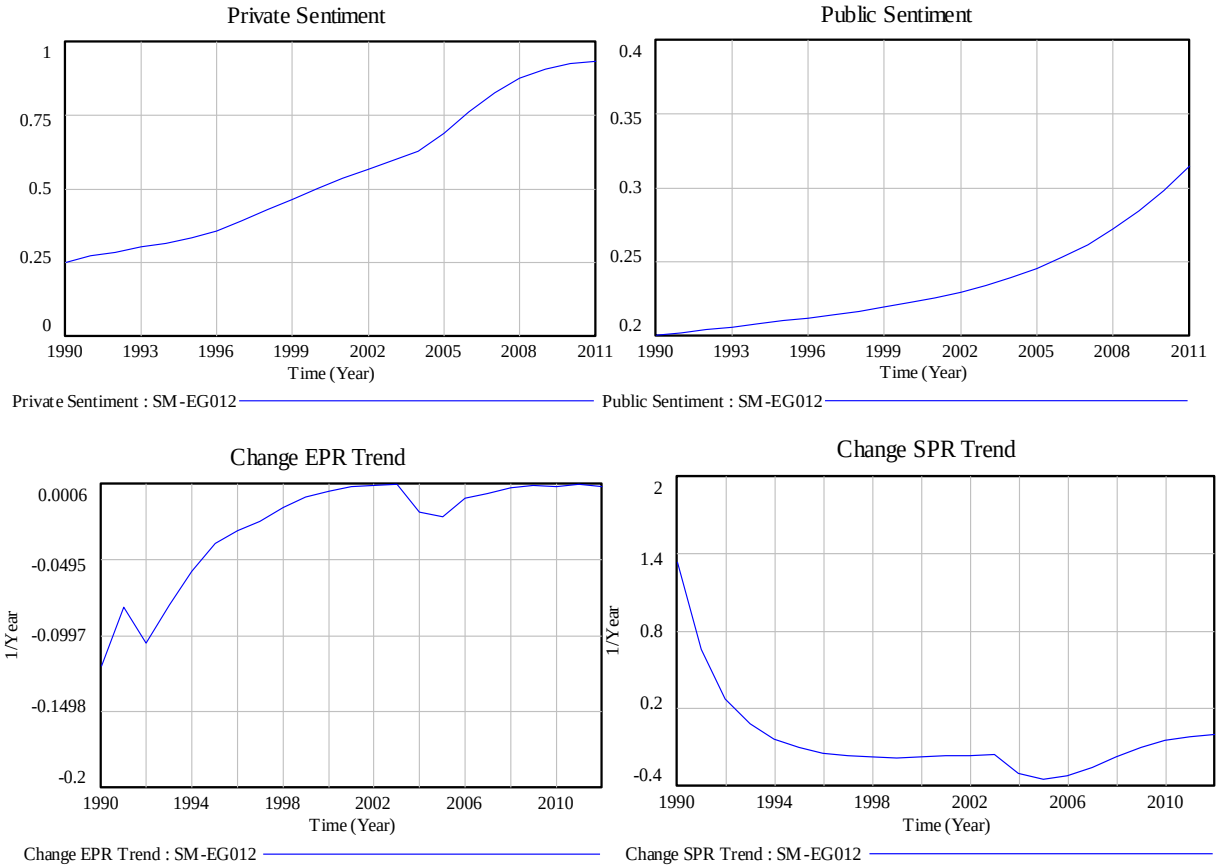


Figure 6. Base case forecast.
Revolutionary Movements, Simulated (red) and Observed (blue).

Change SPR and EPR Trends which are a quantified representative of citizen's perception of social and economical status respectively, compared with their mental models and expectations. Since these variables indicate the differential change for trend value, decreasing or a negative amount describes an alleged decline of social and economical well-being perception in citizens mental models, pushing *Private Sentiment* toward opposing the contemporary status.



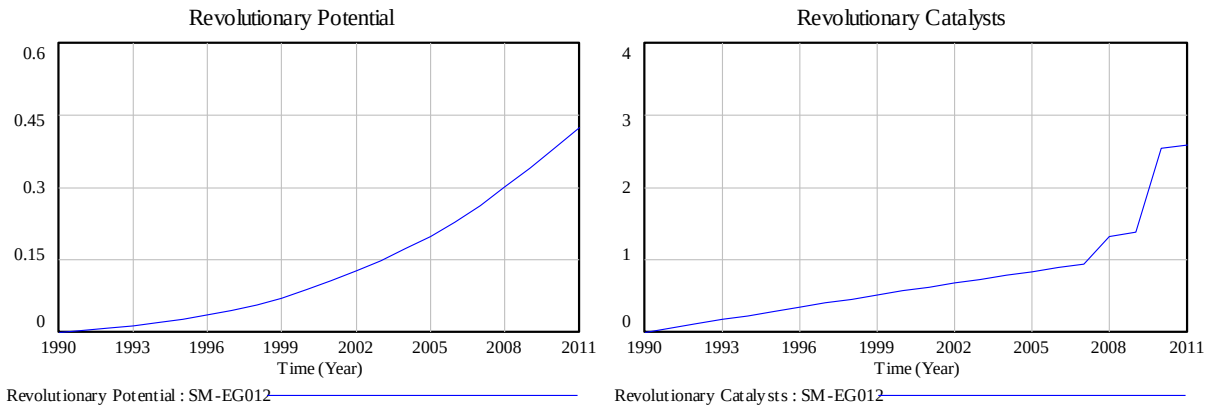


Figure 7. Simulated behavior for key variables.

As seen in diagrams the perception of economical status had been developing since the launch of economical reform programs in 2000 but the magnitude still seemed negligible and also highly vulnerable to international crises. In addition change in SPR Trend shows a dominant descending pattern accelerated especially after the emergence of communication technologies like internet which provide the opportunity to compare oneself with other nations; however the pattern was alleviated by the lunch of the political reform programs in 2005.

Private and Public Sentiments are quantified over the close interval [0, 1]. Zero means supporting present condition and one represents pure objection of status quo. As you see, in the years leading to the insurgence movements, the private sentiment has culminated to highest amount ,while the public sentiment remain still low, mainly because of regimes suppression structure covered under the law of emergency state. The gap fueled the potential needed for such movements.

Revolutionary Catalyst mainly reflects the development of common knowledge as a result of technological evolution, and opposition strength in number. The influence leaped in 2009 by the emergence and dissemination of virtual social networks in Egypt giving the ability to organize events and spreading the news; Also environmental effects, which a great portion of that is the backfire of repression structure, like persisting Israel-Gaza issues, 2008 workers strike and 2010 immolation of the fruit seller in Tunisia.

Discussion

As illustrated, system dynamics models are purpose orientated and are structured to design, study and implement policies regarding the real world problem. This model provides a quantitative analysis of the policies that were implemented by failed governments and their ramifications; also we designed several scenarios for probable policies which weren't executed.

Alexis de Tocqueville once observed that "the most dangerous moment for a bad government is when it begins to reform itself", yet many observers and political scientist, inside and outside of Egypt, have viewed political reform steps made in 2004 and 2005 as a momentum toward protest movements' emergence.

But had Egypt entered an era of irreversible social insurgence or the movements were the effect of an unwise policy of political opening from the ruling elites, considering their purpose? Could the model help us to find the answer to this question?
To find the answer we removed the attributions of 2004 political reforms from *Social Freedom status* and *Suppression Mode*; after the simulation was completed, the behavior emerged as followed:

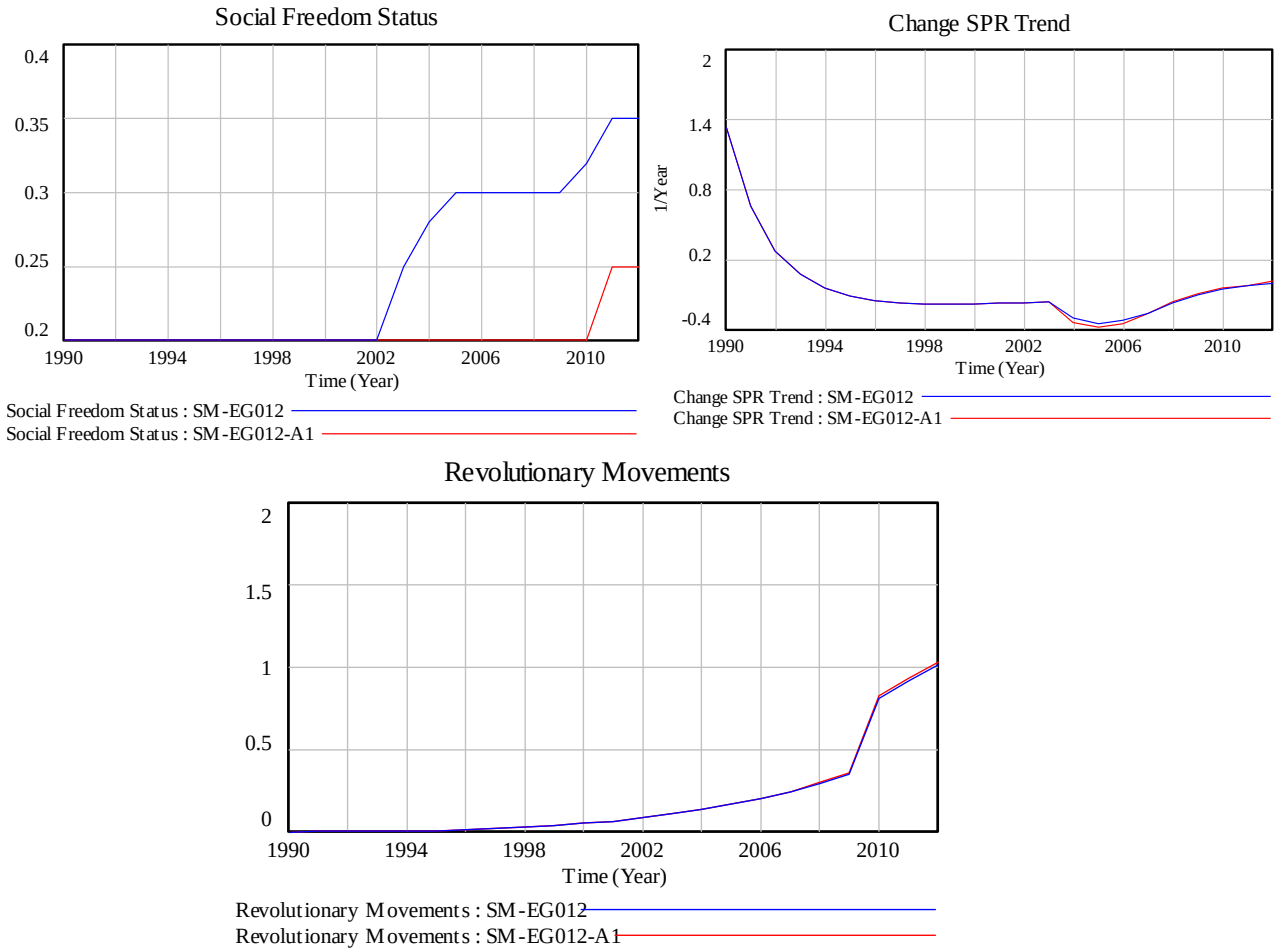


Figure 8. Model simulated behavior with reform attributes removed (red line), indicated reform as an inevitable choice.

The simulation indicates that, with political reform attributes removed, the system will respond with a higher rate of relative insurgence movements, as depicted the dashed line of removed attributes, lies above the solid normal one; so it seems that these reforms, with whatever their intention was, resulted in alleviation of impeding insurgence movements not their emergence. And the link between them could be merely correlation, not cause and effect.
Hence, another ambiguity rises here, if the political opening is not the apt strategy then what is? What is the structure driving this behavior and how it could be manipulated? The fact is that political opening without rigorous authenticated political parties to balance social forces proved to be useless. Because it has nothing to do with culminated tensions of the past; a better policy could prepare the context for emergence of organizations serving as stabilizer for society, filling the gap between public and private sentiment and so soothing revolutionary potential.

Thus far, many analysis have focused on the role of internet and virtual social networks in insurgence movements, from London riots to Cairo protests. Previously asserted, internet and social networks with their decentralized character and high interactional nature give birth to new set of capabilities to form common knowledge which at the first stage spurs the ability to reach large numbers of people, and organizing them. These new two-way and even multi-way forms of communications are in sharp contrast to radio and television. (Diamond 2010) this highly empowers *Revolutionary Catalysts*.

As represented in figure 9, the extraction of virtual social networks influence from the model, leads to a severe collapse of insurgence movement which mostly stems from decreased amount of Catalysts; albeit, the contribution of common knowledge to Sentiment Sector, though small, should not be neglected.
This could be well seen at what happened in Malaysia, a place where once was called, “east Asian miracle” in development because of low inequality and high output following development. It was regarded more because of its low political mobilization, but what happened in July 2011 proved how much internet catalyzing effect is dominant in emerging insurgent movement, that altered Malaysian low political mobilization paradigm. (Acemoglu and Robinson 2002)

A point which deserves mentioning is that, the internet and virtual social networks don’t have any intrinsic virtue or tendency. They could serve both bad and good causes. They could help to organize protests against dictators in authoritarian regimes or riots by gangs in peaceful cities. They only operate as an amplifier for propensity toward insurgence lying within the society without any heed to what it is about.

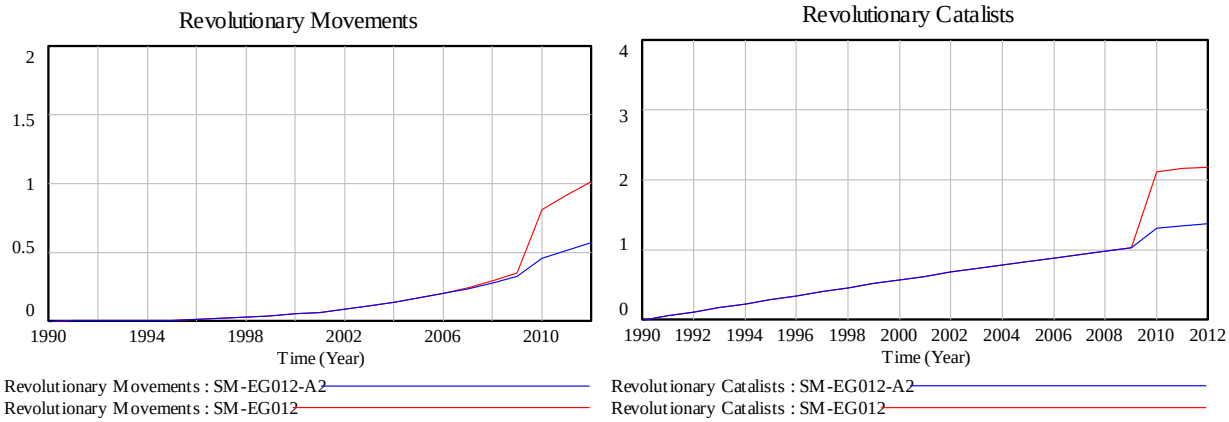


Figure 9. Relative effect of Internet and virtual social networks on movements. Blue line represents the scenario.

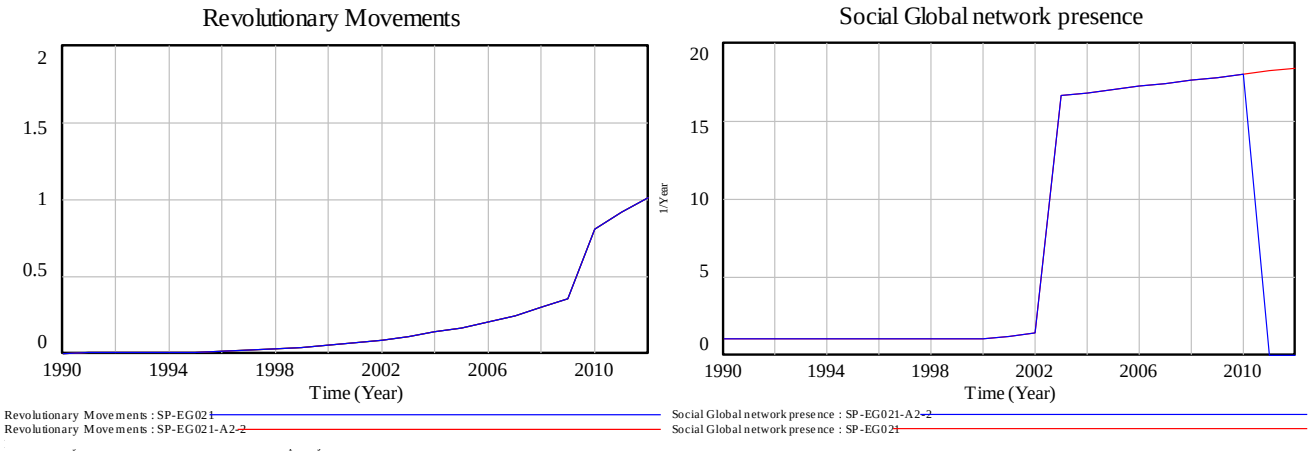


Figure 10. Revolutionary Movements under the scenario of interim Internet black out.

As we clarified, how fundamental is the role of internet and virtual social networks in formation of insurgent movements what ruling elites could have done to thwart it? The answer to this question, in short term is simply "nothing"!

With the premise that the ruling government had the ability to shut down the whole internet, as they did in Egypt, still there exist two impediments, first as the government, financial and business units need internet communication, this black out could not last so much, and second because of consequences of this policy, the blackout usually comes when it's too late; thus regarding system's high inertia evoked from cumulative nature of the variables, as the simulated behavior shows there won't be any significant change and usually the pertinent reduction of common knowledge is compensated with homophily of citizens during the protests leading to an unchanged catalyst rate .

The next scenario studies the impression of environmental shocks. Environmental shocks are to great extent (condoning exogenous ones like war, sanction and so on) endogenous to the society and in fact root from the cognitive section of the model, *Sentiment Status*; in fact it's the high gap between private and public sentiment, formed by mental models that makes a man immolate himself .

But the question lies here, why assassination of Khaled Saeed couldn't mobilize Egypt to the same degree as self-immolation of Mohammad Bouazizi blew Egypt and Tunisia up? To clarify the statement, we want to investigate what would have happened if the self-immolation of Bouazizi and its subsequent incidents in Tunisia, which considered as igniter of the movements, occurred with the same intensity and public attention sometime before, per say in 2008 strike of the worker.

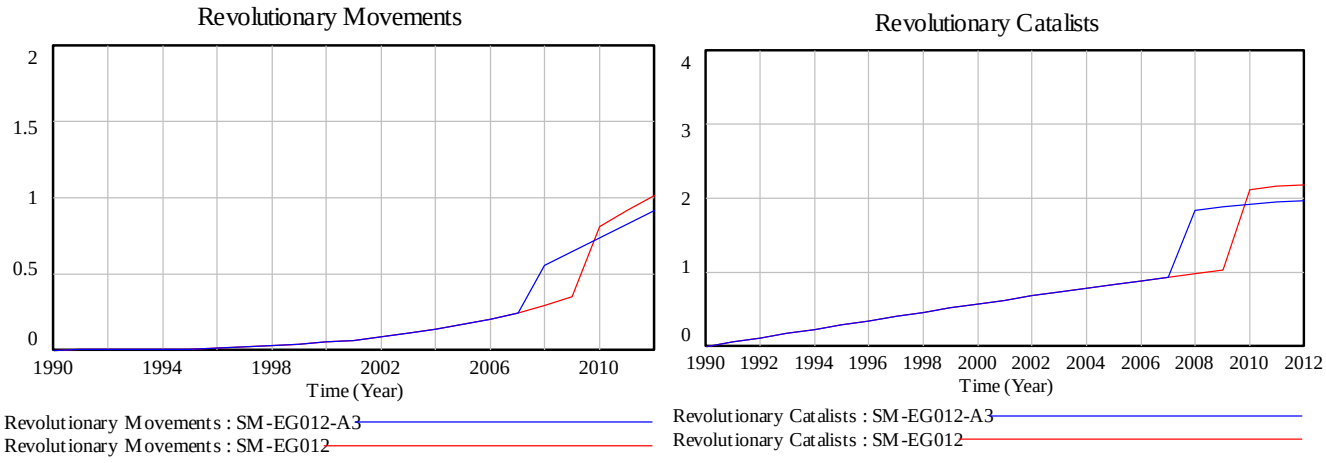


Figure 11. Revolutionary Movements under the scenario of altered environmental conditions.

Clearly the diagrams state, this time the shock couldn't generate rigorous movement, as it did in 2010, and easier for the government to control them. The reason is that opposition needs time to form their networks, organize them and develop trust among members to bring them to streets when needed; for Egypt, movements like "Alkifaya" and assassination of Khaled Saeed served as a stimulator to spur the formation of these networks, which proved their viability during the protests.

The forth scenario we are going to apply, is the one that obviously seems very appealing to ruling governments, suppression. How will the system respond to different stages of suppression and how will it work? For this, we first take the premise that the suppression structure's resources either financial or administrative are sufficient and the regime will retain its

internal cohesion, independent of existing stage of suppression. Though we know that these are very tough assumption, considering that every regime has suppressive capacity.

The model was simulated by three different suppression tendencies in increasing order, as seen in the diagrams (Figure 12) this policy could only buy some time for the regime by shifting the pressure from fundamental solution to short term ones; this policy aims to diminish catalysts of the revolution by e.g. harassment of networkers, leaders or suppressing street protests but has neglected the main cause, the potential of movements. Hence as it tries harder to harness the revolutionary Catalyst, the increasing revolutionary potential caused by suppression generates the same level of movements in longer time horizon.

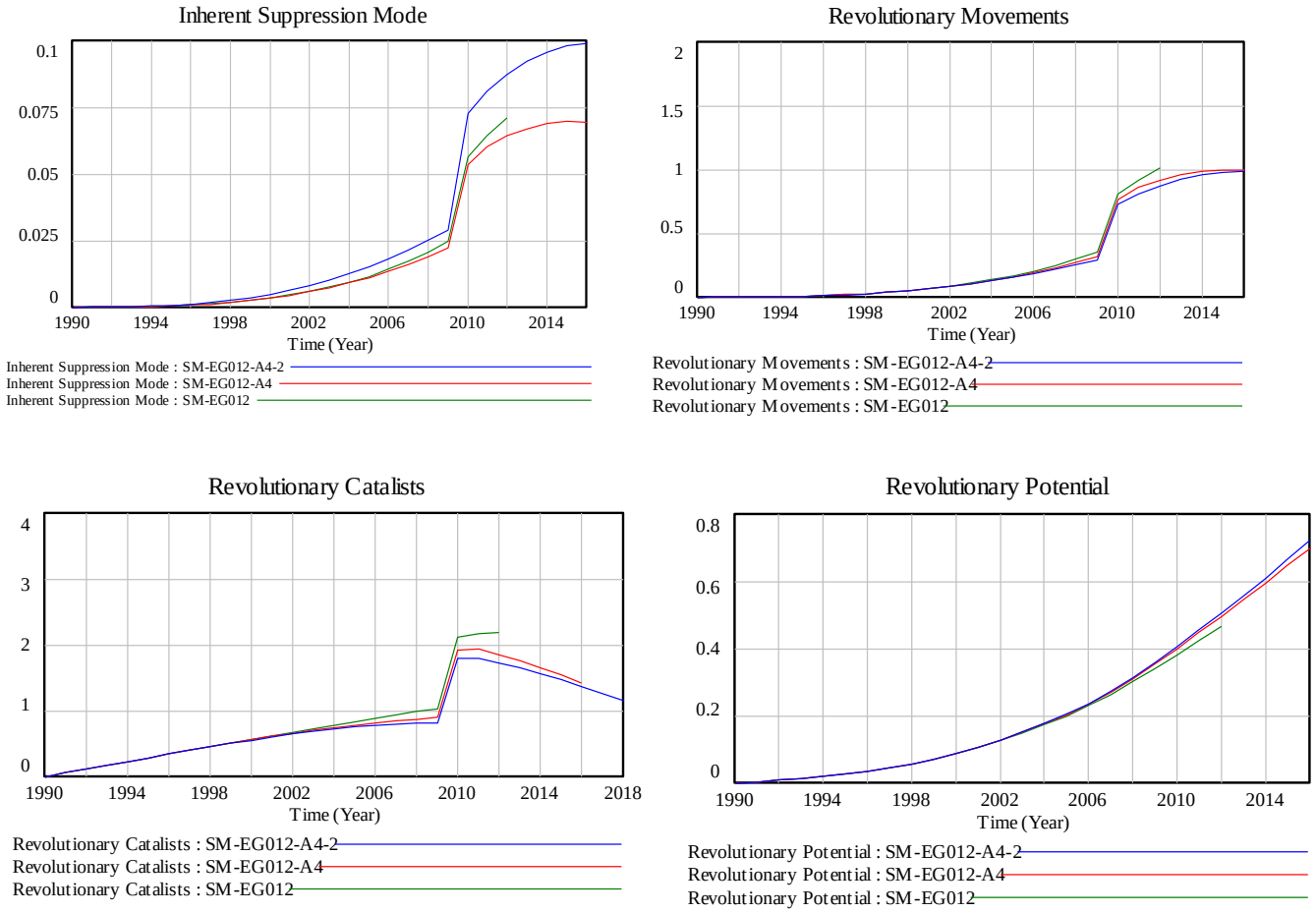


Figure 12 - Suppression level and its attributes, under three different scenarios.

Stage two coercive capacity.

Stage three coercive capacity.

Stage four coercive capacity.

A surprising output was the decrease in suppression level as the suppression tendency was increased (the red line); this was because of correlation between the suppressive act and emergence of revolutionary movements, as suppression level increased the decrease in insurgent movements in short term, leads to a decreased suppressive act.

But what causes the system to lean toward these short term solution instead of fundamental ones? The structure depicted in cause and effect diagram of figure 13 indicates how the ruling system forms inertia to perform policies which would directly influence the origins of problem i.e. the gap between potential and private sentiment by providing the society with free organization for citizens to speak themselves.

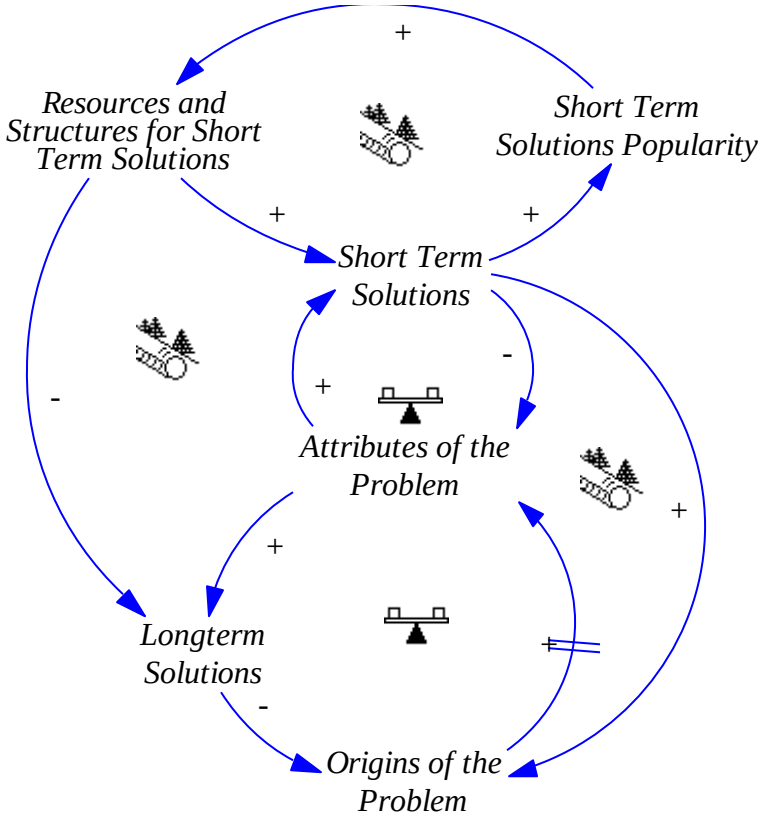


Figure 13. Shifting from fundamental solutions to short term ones.

As Short term solutions prove more useful and prompt in diminishing attributes of the problem, they gain more popularity than strategies directed to the origins of the problem which are usually more subtle and slow. So the resources are acquired by short term solutions, in our case repression, and will form constitutions pursuing these solutions, which spontaneously generates inertia and resistance toward fundamental solution and unfortunately in our case, even reinforcing the origins of the problem.

Conclusion

Insurgent and revolutionary movements are indeed systematic, endogenous and dynamic procedures; and political science can't achieve a holistic and in-depth understanding except by utilizing methodologies especially designed in essence to facilitate this level of complexity.

In this article we devised a hypothesis explaining the situation experienced in Arabian countries especially Egypt, then the hypothesis was formulated and simulated using computer simulations and the results were analyzed in order to determine leverage points for strategy design.

Developing an insightful model is difficult enough; using models to help change the organizations and constitutions and implement new policies is even harder. The greatest potential for improvement comes when the modeling process changes deeply-held mental models. In this way, the authors retain a hopeful outlook that results of this article could be helpful in altering the mental models of the ruling elites.

References

Acemoglu, Daron, and James A Robinson. "The Political Economy of the Kuznets Curve." *Review of Development Economics*, 2002: 183-203.

Bashiriye, Hossein. *Counter-Revolution and Revolt in Iran* (2009).

Deibert, R, and R Rohozinski. "Liberation vs. Control: The Future of Cyberspace." *Journal of Democracy*, 2010: 43-57.

Diamond, Larry. "Liberation Technology." *Journal of Democracy*, 2010: 69-83.

Elster, Jon. *Explaining Technical Change: A Case Study in the Philosophy of Science.* Cambridge University Press, 1985.

Forrester, Jay W. "Lessons from system dynamics modeling." *System Dynamics Review*, 1987: 136-149.

Forrester, Jay W. "Policies, decisions and information sources for modeling." *European Journal of Operational Research*, 1992: 42-63.

Forrester, Jay W. "System dynamics, systems thinking, and soft OR." *System Dynamics Review*, 1994: 245–256.

Forrester, Jay W, and Peter M Senge. "Tests for Building Confidence in System Dynamics Models." *TIMS studies in management*, 1980: 209-228.

Gray, J. N. "Notes On Database Operating Systems." *Operating Systems*, 1978: 393-481.

Hitchens , Christopher. *The Shame Factor. Slate Online Magazine.* January 21, 2011. http://www.slate.com/id/2283168/ (accessed April 8, 2011).

Korotayev, Andrey, and Julia V Zinkina. "Egyptian Revolution: A Demographic Structural Analysis." *Middle East Studies*, 2011: 57-95.

Kuran, Tim. "Sparks and Prairie Fires: A Theory of Unanticipated Political Revolution." *Public Choice*, 1989: 41-74.

Marshal, Monty G, and Keith Jaggers. *Political Regime Characteristics and Transitions, 1800-2002.* Polity IV Project, Societal-Systems Research Inc. and Colorado State University, 2008.

Mashyekhi, Ali N, and Soheil Ghili. "System Dynamics Problem Definition as an Evolutionary Process Using Ambiguity Concept." *International System Dynamics Conference.* seoul, 2010.

Masoud, Tarek. "The Road to (and from) Liberation Square." *Journal of Democracy*, 2011: 20-34.

Richmond, Barry. "Systems thinking: Critical thinking skills for the 1990s and beyond." *System Dynamics Review*, 1993: 113–133.

Rodrik, Dani. "The Poverty of Dictatorship." *Social Europe Journal*, 2011.

Sandberg, Mikael. "Soft Power, World System Dynamics, and Democratization: A Bass Model of Democracy Diffusion 1800-2000." *Journal of Artificial Societies and Social Simulation,* 2010.

Skinner, Burrhus Frederic. *Beyond Freedom and Dignity.* New York: Bantam Books, 1971.

Sterman, John D. *Business Dynamics: Systems Thinking and Modeling for a Complex World.* McGraw-Hill/Irwin, 2000.

Zakaria, Farid. *How Democracy Can Work in Middle East.* February 3, 2011. http://www.time.com/time/magazine/article/0,9171,2046038,00.html. (accessed May 5, 2011).