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The Simplicity of Complexity

THE HIGH AND LOW OF POLITICS

Two errors are typical when it comes to politics. The first error is that politics is a dirty business, having some similarity to the making of sausage, the contents of which are both mysterious and perhaps unpleasant. The second error about politics is that only other people do it, usually people in high places. Neither of these beliefs is true in any thoughtful sense. People standing alone in the shower are political every inch of the way. They have goals, beliefs, values, hopes, passions, and associated strategies that define their political selves in association, benevolent or malign, with other people similarly defined. The result is human existence, and it is political every minute, every hour, every day, everywhere. And from the bottom up, not the top down.

Many professional political scientists choose to ignore the ubiquitous nature of politics, thinking it excessively broadens their task. Democracy is easier to handle; one just needs to lay out a few principles about regular elections and the rule of law and the job is apparently done. But everywhere today citizens of long-standing and stable democratic countries are growing grouchier and grouchier about their governments. Even professional political scientists are in the process of deciding democracies are actually oligarchies, a term the ancients invented to cover a small group of men governing a large group of other people for corrupt and selfish purposes.[1]

Democracy for these reasons begins to seem more like a way station along the long road of political life and experience rather than being a complete solution, and the idea of *self government* takes on new meaning. Perhaps, since every human being is deeply political, they might rise

to the challenge of actually governing themselves. Self government is of course ambiguous in its meaning; or perhaps better it can be said to have two meanings that frequently are used interchangeably, without defining just which meaning is intended. One meaning is that an individual might be able to govern himself or herself personally, acting as sovereign over the many dimensions that make up the existential person. The second meaning of self government involves the possibility that such self-governing individuals might be able, as a group, to govern themselves as a group. The two meanings are intertwined.

Self government of a group from within the group as a whole will vary in the skills it requires, depending on the size of the group in question, but it does require special skills, because while we are all political, we are not all equally in charge of our strategic wits. Even with one's dearest friends, negotiation sometimes becomes necessary. And when it becomes a matter of dealing with one's elected officials, some shrewdness may be appropriate if the outcomes are to be widely satisfactory to those at the base of the official hierarchy.

TURNING A PAGE IN DEMOCRACY

Self government, in other words, is not a synonym for democracy. Anthony Downs once provided the minimalist definition of democracy: all sane, adult, law-abiding members are allowed to cast one vote each in elections held periodically with at least two contesting parties; the party that gets the most votes wins and never tries to restrict the rights of the losers, while the losers never try to change the results by force.[2] The definition is invigorating in its simplicity and clarity, but it is not the end of the matter. Perfectly fair elections tend to outrage a great many people because legitimately elected governments often launch policies with which at least 49 percent (and perhaps more) of their members disagree (often vehemently). Sometimes also democratic governments outrage their constituents and their neighbors; perfectly fair elections do not guarantee that the regime's decisions will be either wise or responsible.

Democracy remains a hallowed goal for people who do not have it, but for people who have lived under it for a substantial period of time it has had an unexpected result: it has taught its citizens that democracy may not be the end of history; there may be more options to learn about, more political landscapes to explore. The present work is designed to make itself useful in that exploration, using techniques made accessible by new computer approaches, and bringing under the rubric of the political a variety of social science research that is essential to the craft of self government.

The first step in this reeducation about the shape of the political is to understand that politics runs along a very wide spectrum, covering everything from savage antipathy to selfless devotion. The social scientist who argued this most convincingly, Thomas Schelling,[3] started from the now almost forgotten Cold War and still argued that there is no relation between actors that is so negative that there is not some sliver of agreement, and indeed no relation that is so positive that there is not some sliver of disagreement, between the actors. As an early game theorist, Schelling described his theory as one of "interdependent decision," where whatever acts we take will be helped, hurt, modified, glorified, or brought to naught by other people, many of whom we did not even notice when we worked out our plans.

Schelling would later develop this viewpoint into a model of human "self organization," based on people's tendencies to fit themselves to the circumstances around them, both physical and social, by following simple rules. What was artistic about this concept was the realization that in such self-organizing situations, people were both leaders and followers. They entered an environment and responded to its cues in choosing what action to take; once they had acted, they themselves became part of the environment and acted as stimuli to other people because those other people noticed what they had done and were influenced in turn. Schelling's classic example was housing: people chose to stay or move depending on their neighbors, and once anyone moved, that changed the lives of the neighbors, both those they left behind and those they joined; and the whole process would keep bubbling until and if everyone was content with their environment.[4]

MEETING AT A BRIDGE

This approach would become known as *complexity theory*, and would be pursued in highly technical ways by computer programmers who studied particular patterns of behavior and how they changed under different parametric conditions, seeking to discern the nature and possibility of cooperation between rational people, or the likelihood of changing identities in a mixed geography, or the outcome of hostility and war among combatants.[5] But Schelling's original approach came closer to being a general theory of politics than these narrower exercises would suggest, because he argued that this self-organizing process was in fact the creator of the societies we see around us.

How this self-organizing process works was illustrated in a map Schelling suggested as the basis of a little story about two army airmen

who had to bail out of their planes behind enemy lines, were separated from one another, and needed to get together for safety as they tried to rejoin their own forces. They had no communication devices, but each did have a map of the territory, and Schelling uses the situation to show how people "read" natural circumstances to choose their actions.

The map showed a river, a variety of roads crossing in various places, several farmhouses, a fairly large lake, and a bridge. In order to accomplish a meeting, each airman had to figure out where the other man would think he would go; so each looked for some "focal point" on the map. There were several buildings and several crossroads, so they gave no guidance; but there was only one bridge, and this served as a cue to each of the men that the other would expect him to go there if a meeting were to be achieved. The solution was not "fair," because one airman might be far away and have a long tramp to get there while the other was quite near the bridge, but there was no better alternative if a meeting was to be achieved.[6]

Bottom-up politics builds on this simple example. If all societies are organized in this willy-nilly way, with the specific situations of different members having substantial impact on the political outcome, then politics is present from the beginning of human association and politics never goes away because particular people are always at least somewhat discontented with the status quo and are silently or actively working to change it. What we cheerfully call democracy is a top-down label that tries to put a good face on this self-organizing process, but current sociopolitical movements in the United States and many other long-stable democracies indicate that democracy really does not tell much about what is being negotiated at the grassroots. Truths that are inviolate in the system's official definition may not be present in daily experience. Bottom-up politics is a guide to, and a possible strategy for, such ambiguities.

Politics, far from being a dirty business that is carried out by other people, especially in high places, can more helpfully be described as a high calling for people who seek to become self-governed. But it needs to be played well, and the social sciences can contribute to the play.

THE GAME OF LIFE AND POLITICS

Complexity theory makes it possible to look past the standard formulas that are used to evaluate governments of various kinds and move toward a better appreciation of democracy, not as a static label but as an amazing, living phenomenon in which many unexpected, unintended,

informal, intricate, and creative processes are involved. To make progress beyond democracy, what is needed is a new perspective on the full scope of political life, not just the campaigns and ballot boxes, but the whole complex reality that a democratic system represents.

Complexity theory has roots in mathematics, physics, and biology but is intuitively simple and directly applicable to the social and political worlds. What complexity theory does is rearrange reality so that familiar things are seen in a new light. Its basic metaphor is the lattice, a potentially infinite checkerboard containing players arranged all at the same level, distributed in different ways across the lattice cells. The individual players have very simple "personal" attributes and conduct themselves according to very simple general "rules." When these simple people and their simple operating rules are dumped into a computer, what emerges are results that can seem wildly complicated and yet can be explained with great accuracy, simplicity, and eloquence by looking down to the bottom at the basic actors and the rules, to see how these actors and these rules unexpectedly interacted to create the reality that people see.

One of the early examples of this intriguing mix of complexity and simplicity was John Conway's famous Game of Life, which took a mathematician's artistry to the central issue of human existence – life and death. On the basic lattice, each cell could be set to be either "live" or "dead" at the beginning, and history was created through miraculously varied patterns as the result of only two rules: (1) a live cell remained alive if it had two or three live neighboring cells; and (2) a dead cell came alive if it had exactly three neighbors, otherwise it stayed dead. The underlying point was that if a live cell had fewer than two neighbors, it died of loneliness, and if it had more than three neighbors, it died of overcrowding. A dead cell came to life only if the mix was exactly right.[7]

What was amusing about the Game of Life to human observers was that the whole lattice was potentially alive and that dead cells would spring to life unexpectedly if certain conditions favored it. The results were not unpredictable, except that human attentiveness is short and not accustomed to such close tracking of every detail. It was the computer that made it possible, for the first time, to think about the world from the bottom up, simply because the computer did the bookkeeping. Where old-time social observers faced complexity unaided, the idea of the *cellular automaton*, as in Conway's model, made it convenient to look for meaning and explanation in simplicity, working from the bottom up.

Rethinking the everyday world in this slightly peculiar way, from the bottom up, has several implications for questions of politics and self

government. Its major impact is perhaps to scatter abstract concepts to the four winds. The democratic state, representative government, war and peace, liberalism and socialism, all lose a certain amount of reality because from the viewpoint of a cellular automaton, they cannot be defined in terms of actual human behavior. These abstract concepts, and others like them, will continue to be used in colloquial ways by old-fashioned political commentators, but they do not add to the observer's appreciation of what is actually going on in the world, on a practical level.

One of the insufficiently appreciated maxims of politics in Washington is "don't listen to what we say, watch what we do." A cellular automaton could not have summarized things better. It is also interesting to notice that the lattice eliminates the hierarchical arrangements that are often thought essential to political life, so there is no longer a clear division between citizens and leaders. Such a division is what narrowly restricts the duties of citizens to voting, so getting rid of the distinction is a first step toward self government. Politics is played in every cell in the complexity grid, and the elected official stands elbow to elbow with the ordinary folk. It is a radical vision but quite nonpartisan. The "ordinary folk," both left and right, show a growing appreciation for its possibilities.

LOOKING FOR SUGAR

How far can complexity theory be taken in the social sciences? A full sense of the range of its capacities can be illustrated briefly by an ingenious model, developed by Joshua Epstein and Robert Axtell, which covers all the ground between barren subsistence to whole society formation in a neat logical package.[8] Where does one start in such a heroic intellectual inquiry? The first step is to invent plausible and perhaps incisive ways to describe humankind. Epstein and Axtell accomplish this with two variables: one is whether the agent is near or far sighted, and the other is the agent's metabolism. Eyesight is a useful distinction because it distinguishes agents according to how far they can look in the search for good things; people who see a bigger field are more able to locate the larger rewards and thus become richer.

The agent's level of metabolism is a less obvious factor in motivating human experience, but it is equally important; it is not equivalent to greed, to how much the agent *wants*, but to physical constraints, to how much the agent *needs* to stay in good condition. The first moving step in the model is to take a bundle of people so described and insert them into a field across

which they can move at will; the field is provided with sugar distributed about the landscape, and the only rule for the players is "go where the most sugar is and eat." This settles the economy – Adam Smith in a lattice.

Following the Sugarscape model a little further shows how to think about complex systems step by step, so that their analysis remains manageable rather than overwhelming. Agents seek sugar, so one must consider the sugar crop, which is, like the agents, a living object; its growback rates must be specified in the model to distinguish between rich and poor countries. The authors add another point one might have overlooked, that there is pollution at each site where the agents are gobbling up sugar; the choice of what site to choose is therefore modified to include not just the amount of sugar there but also the ratio of sugar to pollution. At each step the agent adds some sugar and loses some to metabolism; spare sugar can be stored, but if the agent runs out entirely, it is removed; others, happily, may live forever on the grid.[9]

Society begins to take shape on the Sugarscape as different agents achieve different levels of wealth, and inequality develops. Seasons are created by modifying the growback rate so that it slows in one area while increasing elsewhere; thus migration enters the model. Eventually Epstein and Axtell introduce a second commodity, spice, so trade can begin. Sex of a simple sort takes the model further in a demographic direction: an actor selects a neighbor at random; if the neighbor is of opposite sex, fertile, and there is a convenient empty cell for the newcomer, a new agent is created. Finally history, in "a very simple caricature," happens when actors settle on two different piles of resources, develop stable societies, then grow and seek to spread and run across their neighbors, whom they may assimilate or fight.[10]

THE PRACTICE OF COMPLEXITY

Complexity theory has a major weakness in that computer people are fascinated by the possibility of setting up algorithmic models that dance around in these interesting ways, but normal people often do not quite see how it all relates to their practical problems of living in the world, much less to governing themselves in that world. It is useful, therefore, to pause and outline some of the potential and actual contributions of bottom-up theories to making the world a clearer place to live in.

- Complexity theory clears the deck of many unexamined ideas that are commonly used but have no concrete meaning and confuse discussion,

such as the "public interest" or the "common good," or even apparently practical terms like "efficiency." Taking these words from the bottom up, one is forced to ask *whose* interest, *whose* good, and efficiency for *whose* purposes? It may be that there is one public, but it seems unlikely and cannot be blithely assumed without further investigation. Complexity theory, in other words, recognizes that human experience includes inescapable diversity.

- Complexity theory cuts through romantic myths about perfect forms of government. Once the observer has taken a close look at the people at the bottom of the political system, it becomes obvious that they are too diverse to be neatly unified by *any* form of government. Accepting this fact prepares people (1) to recognize that there may be flaws in their own governments, and (2) to admit that foreign governments may not be as flawed as outsiders would like to think.
- Complexity theory suggests that the politicians about whom everyone complains may be doing a better job than they are given credit for. Considering the contradictions inherent in government, the vagaries inherent in the electorate, and the appalling emergencies that turn up every day, politicians deserve some slack. It is true that they sometimes raise their own salaries while complaining about red ink, but it is also true they face hard policy choices in which none of the options is pleasant. Looking at the world from the politician's point of view might make people more charitable.
- In respect to understanding how institutions work, complexity theory emphasizes the frequently unrecognized point that formal laws, formal regulations, formal offices, and even constitutions are only a fragile superstructure erected like a scaffolding over a flooding river of *informal* political interaction. Whatever the official rules, the players are all inventing personal ways to implement or circumvent them. People matter, everywhere.
- As this implies, institutions cannot be considered sacred but are human creations, made by imperfect individuals trying to implement their own view of the world. That view may be pious or it may be nefarious; complexity theory encourages looking beneath the surface, recognizing the good, recognizing the imperfect, and speaking up for the downtrodden.
- Finally, complexity encourages everyone to notice that they have neighbors, that these neighbors' actions are important to them, and that very likely they do not understand even 1 percent of their neighbors' worldviews, attitudes, opinions, goals, hopes, fears, and dreams.

Complexity theory here does its Socratic duty, providing an intellectual reminder of our own ignorance of each other, and of the dangers inherent in that ignorance.

SOCIAL SCIENCE IN POLITICS

Complexity theory is an honestly new idea in the world, invented by a specific and known group of people from physics, mathematics, biology, and the computer sciences at a specific place and time, and tied to a specific technology, computers, and the algorithmic models they make possible.[11] As with all innovation, however, complexity theory is not entirely without roots in the past, and many of these early ideas are essential to the full appreciation of complexity theory's operation and implications. Fully to carry out the program suggested by complexity theory in the discussion of self government entails assistance from the social sciences, and there are available classic works from the disciplines of economics, sociology, game theory, history, and anthropology that provide a rich background. These works provide frameworks that assist in studying human behavior with a broader focus than computer models allow, and they will provide the background to the chapters in the present book.

The most comprehensive perspective is defined by the work in game theory by Thomas Schelling, *The Strategy of Conflict*, and the later complexity theory in his *Micromotives and Macrobehavior.* His approach to game theory is informally used here to cut through multidimensional human interaction in order to reveal the payoffs at issue any time people come together. Implicit in game theory is micro-sociology, here represented by Erving Goffman's *The Presentation of Self in Everyday Life,* which analyzes the theatrical dimension of behavior and is essential to separating the real and the apparent in political life; and Harold Garfinkel's *Ethnomethodology*, a treatise on human creativity under pressure.

If complexity theory is to prove itself useful in the study of self government, it must guide its students in the understanding of people unlike themselves, with whom they must deal, like it or not, in the process of living their political lives. The present series of essays works toward this goal by providing a sequential set of examples of how bottom-up analysis can make sense of the inexplicable by revisiting case studies of other countries and other regimes and applying relevant concepts from the complexity framework to clarify what is going on and how it can be understood in quasi-logical terms. The analysis works on foreign countries because

very few people can be objective about their own home turf, and in the beginning it is more attractive to look at people in other parts of the world. Their unexpected behavior, familiar to travelers, has the effect of creating perplexity, which is the mother of wisdom.

The case studies selected for inclusion have been chosen in some cases because they are inherently puzzling to Americans, in other cases for the depth of detail certain scholars have achieved. The terrain will include Mumbai, India's former city of Bombay, where the nationalist right engages in regular social warfare of great violence; to the country of Iran, which is often pictured as a place of "veils and terrorists" but is in fact a remarkably rich and stable society; to back-country China, where a Peace Corps worker describes the escape of his students into modern lives, leaving behind the misery of their parents; to Italy, where one man made a cultural revolution of vast scope without any outsiders really noticing; to Zimbabwe, where one man continues to make a revolution that everyone notices and the evaluations are sharply skewed; and finally to South Africa where individual and group self government joined in dramatic battle.

The concept that will unify these investigations at an overall level is the idea of *self organization*, which is central to complexity theory. As a general matter, self organization may or may not happen; it is an achievement rather than a guaranteed outcome. It is based on a simple series of steps, starting with *basic agents*, who are usually many in number and are distributed around the *basic lattice* in various patterns, and who act *in parallel* – that is, each actor acts simultaneously, going its own way without waiting for others. This basic setup is why the model is also called *agent-centered modeling*, a term actually more accurate than complexity theory because it gets at the underlying micro-simplicity rather than the macro-results produced.

The central dynamic is that every agent is constantly reacting to its neighbors; this eliminates any reference to an outside governor; and the reaction is in terms of *basic rules*, as just illustrated in the Game of Life and Sugarscape. "Rules" can be misleading here, because the agents are not doing what someone else has dictated but what they themselves think is important. The most vivid illustration between official rules would be a soccer game where the official rules deal in matters such as getting the ball into the goal box, and the unofficial rules suggest that if the referee is not looking, one should attack the opponent's shins.

In agent-based models there are, in effect, no referees, so everyone follows their own behavior preferences, and *sometimes* different