

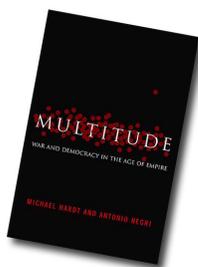


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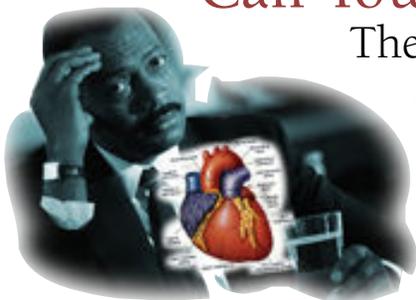
Complexity in the Multitudes



A new book explores the new form of social resistance to empire. And it's all about networks. Find out more about the complexity-consistent messages of this challenging book.

[Click here or turn to Page 2.](#)

Can You Die from a Broken Heart?



The poets were right all along. There is a strong connection between the health of the human heart and emotional health. Compelling new research suggests the linkages may be deeper than was previously thought.

[Click here or turn to Page 6.](#)

Plexus is on the Verge!

The 2005 Plexus Summit is almost here! Don't miss this opportunity to explore many applications of complexity science... and to learn from a multi-disciplinary panel of the world's leading complexity scholars and practitioners.

[Click here or turn to Page 18.](#)

plus

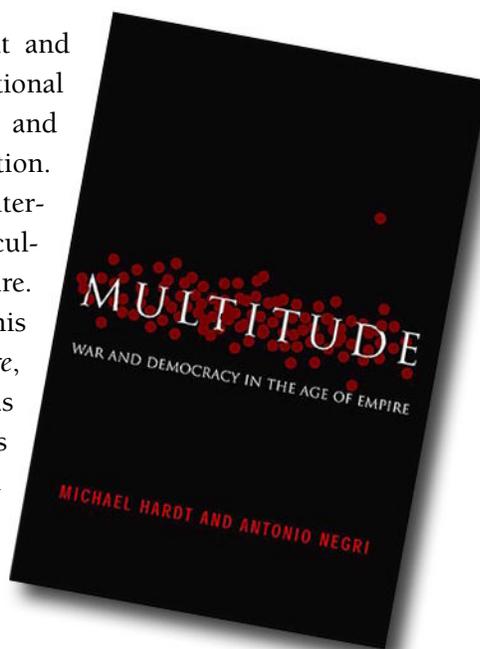
Meet our New Members • Plexus Fractals • PlexusCalls
Positive Deviance Conference

The Political Potential of Complexity

In the new book, *Multitude*, authors Michael Hardt and Antonio Negri examine the roles of networks in societies and the political structures that govern them.

In their previous book *Empire*, Michael Hardt and Antonio Negri attempted to reconcile traditional concepts of imperialism, based on nation-states and fixed borders, with today's new era of globalization. Imperialism no longer exists, they assert. The international nature of economics, politics, war, and culture has replaced it with what they call empire. While the power structures that result from this postmodern state of affairs are the focus of *Empire*, the new forms of resistance to empire are the focus of *Multitude*. While the book never addresses "complexity science" specifically, it does contain many complexity science concepts.

Regardless of whether you agree with the authors' position, *Multitude* should be read by anyone interested in the potential political possibilities that complexity science offers. At the heart of *Multitude* is the idea of the network. Hardt and Negri assert that the network is the new paradigm for our age in the same way that Foucault's panopticon (a type of prison that obscured the whereabouts of the guards, forcing the prisoners to internalize their own fear and monitor themselves) was for modernity. "It is no coincidence, (Foucault) argues, that the prison resembles the barracks, which resembles the hospital, and so forth. They all share a common form that Foucault links to the disciplinary paradigm." The network has now manifested itself in every aspect of life in much the same way, from the sciences to international relations, a development that requires new analysis and offers new possibilities.



In order to explain the concept of the “multitude,” Hardt and Negri first explore the metaphors used to describe “the people” in modern political theory. Traditionally, the people who make up society have been conceived of as the “masses” or the “body politic” who, either serve (in the case of monarchies), or elect (in the case of democracies) their leaders. These labels create a physiological analogy where the people are the body and the leaders are the head, controlling the body’s movements. The “will of the people” could only be represented by a small group of leaders, or else there would simply be a chaotic mix of different voices. However, scientific knowledge has moved beyond the mechanical understanding of the body and into the networked configuration of synapses in the brain. This discovery, along with the study of other types of decentralized networks, offers a new analogy and way of thinking about how society itself can be structured:

“It is not that networks were not around before or that the structure of the brain has changed. It is that network has become a common form that tends to define our ways of understanding the world and acting in it. Most important from our perspective, networks are the form of organization of the cooperative and communicative relationships dictated by the immaterial paradigm of production. The tendency of this common form to emerge and exert its hegemony is what defines the period.”

In the past, geopolitical theory has emphasized the fixed borders of nation states and has been the main tool for analyzing international politics. Although nation-states continue to exist, the fixed borders of the past seem increasingly meaningless in the face of globalization. Hardt and Negri propose a new way of analyzing international relations by viewing countries as hubs and nodes. Instead of the United States being the single super power in the world, it is rather a hub in the global network. While more powerful than the other nodes, it still depends on these other nodes for survival.

Applications: Iraq, Terrorism and Beyond

For example, even though the US decided to invade Iraq alone, it is now seeking support from other nations for its occupation. This condition blurs the distinction made in political ideology between unilateral and multilateral action. Viewing each country as a node in a larger web undermines the older notions of how a country asserts its power over others as well. In the past the Middle East was at the mercy of its more immediate neighbors to the east and west. However, now a nation on a different continent has begun to assert its

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influence by linking itself with strategic nodes in the Middle East (Israel, Afghanistan, and Iraq). By doing so the US has created “long range” links for itself that allow it to bypass older geographical barriers.

Hardt and Negri focus on Iraq in order to describe how the network plays itself out on a more local level. One of the examples they offer is how terrorists have utilized the network structure. Instead of the top-down structure traditionally used by armies with a clear chain of command, terrorists have organized themselves into independent “cells” that act like nodes in a decentralized network. By doing so they create no clear target that can bring the entire organization down (i.e. even if Osama Bin Laden were caught Al-Qaeda would still continue to function) and the cells are far more adaptable. Node-like cells also make it difficult to ascertain terrorists’ numbers and whereabouts, giving a smaller force more advantage over a larger one.* There have been similar operations in the past, such as the Vietcong guerrillas, but until recently none have had the technology that allows for constant communication or “feedback.” The authors suggest that the invading armies will have to adopt the network structure of their enemy in order to fight them, but that this is not enough on its own. One of the more subtle effects of a decentralized network is that it creates a “gray zone,” blurring the line between civilian and terrorist. Therefore military strategists have stressed the need for “full spectrum dominance,” which aims to win the people over on the cultural, social, economic, and political levels. They hope to infiltrate the society so completely that something as dispersed as a terrorist network will not be able to survive.

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The Power of Biopower

The need for full spectrum dominance points to an even more essential issue in *Multitude*, which Hardt and Negri call “biopower.” This term refers to the need for empire to not only control people through the traditional use of force, but also to control them on every level of life. Biopower, they argue, is also the key to understanding where the seeds of resistance to empire lie. Empire must constantly shape and create its subjects in order to maintain power, and it accomplishes this through the use of networks. However, by relying on networks the very people empire wishes to control are learning about and becoming connected through the technology they use in their every day lives. An “open source” society promotes and relies upon constant communi-

*For further information you can read the RAND Corporation’s book about Netwar on-line at: <http://www.rand.org/publications/MR/MR1382>.

cation of its subjects, which has been one of the major obstacles to organizing against empire in the past. The authors make it clear they understand a large portion of the world does not possess this technology or have cyber economies yet, but they explain how the dominant technology of any era tends to trickle down into the areas that do not possess it yet. One example is the effect modern industrialization had on farmers who had to change the way they produced food, or leave their farms all together and work in factories. The same process is repeating itself now with the genetic modification of plant seeds. This is technology that most farmers do not have access to or control over, yet it directly affects their livelihood.

The concept of the “multitude,” Hardt and Negri explain, is different from older concepts such as “the masses” or a “mob,” because these metaphors distill the people involved down to a thoughtless unity. Communication and feedback through networks allows for individuality and collective action (two ideas usually seen at odds with one another) simultaneously:

“The crowd or the mob or the rabble can have social effects - often horribly destructive effects - but cannot act of their own accord. That is why they are so susceptible to external manipulation. The multitude, designates an active social subject, which acts on the basis of what the singularities share in common. The multitude is an internally different, multiple social subject whose constitution and action is based not on identity or unity (or, much less, indifference) but on what it has in common.”

The authors find evidence of this in the anti-globalization protests that have taken place all over the world, each with a similar message but taking place in distinct countries and cultures. The Zapatista movement in Chiapas is also cited as an example of people in one country aiding the revolutionary movement of people in another, whom they have never physically met. These examples offer a glimpse of what true bottom-up democracy could look like. Abstracted political representation and lack of direct communication between the people have allowed for the top-down structure to prevail until now. Non-hierarchical networks render these representatives unnecessary and offer a way for the multitude to govern itself. As Hardt and Negri say, “democracy requires a radical innovation and a new science.” Though they do not identify one explicitly, complexity science seems to hold this potential.

Terrorists have organized themselves into independent “cells” that act like nodes in a decentralized network. By doing so they create no clear target that can bring the entire organization down, and the cells are far more adaptable.

By: Carver Tate, Plexus Member. Mr. Tate is a graduate of the Gallatin School at New York University with a BA in Globalization and Media Studies

Matters of the Heart

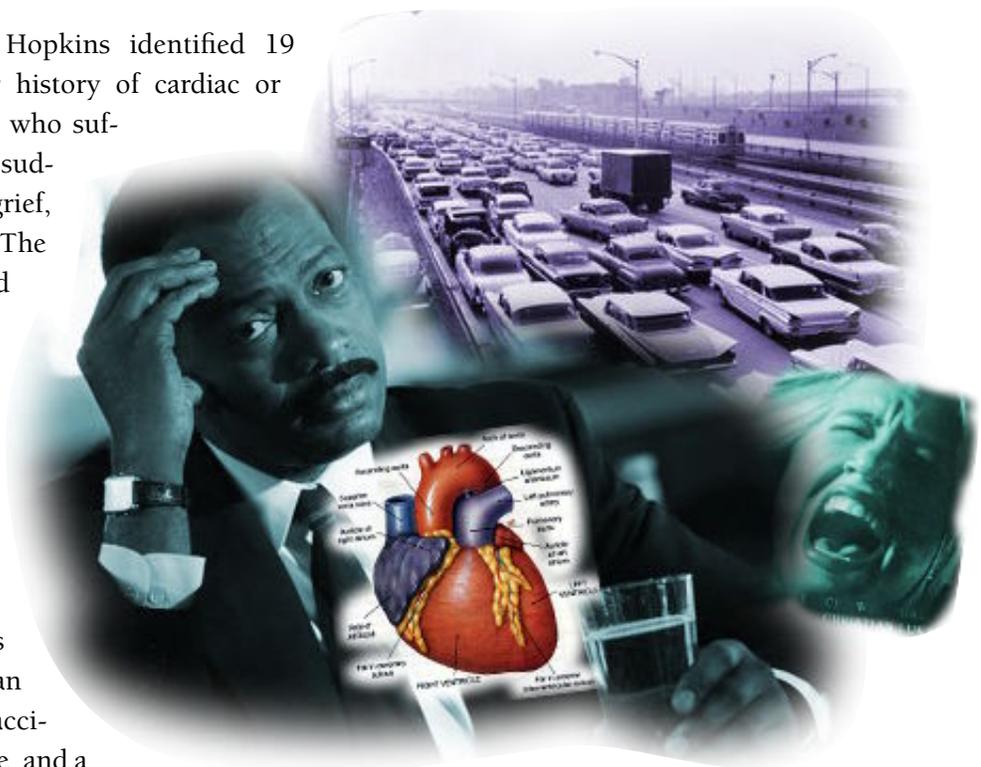
Modern science is producing new evidence that connects the health of the human heart to the emotional connections that people make with their environments.

“The heart has its own memory, like the mind.”
Henry Wadsworth Longfellow

Medical scientists are discovering proof of what poets have always known—that we can die from broken hearts.

The implications are profound: stress can cause very specific illnesses, and bodily systems are inextricably entwined, interdependent and interconnected with environment.

Doctors at Johns Hopkins identified 19 patients with no prior history of cardiac or coronary artery disease who suffered heart failure after sudden emotional stress—grief, fear, anger or shock. The patients, 18 women and one man, had a median age of 63, but one was 27 and one was 32. They showed up in coronary care units in Baltimore suffering chest pains and serious heart malfunctions after such shocks as death of a loved one, an armed robbery, a car accident, a biopsy procedure, and a



surprise party. Some would have died without treatment, but all recovered. Dr. Ilan S. Wittstein, a cardiologist at Johns Hopkins University School of Medicine, was the lead author of an article about the patients in the February 2005 issue of the *New England Journal of Medicine*.

Dr. Pat Rush, a physician and Plexus Science advisor who left academic medicine five years ago to begin an innovative clinical practice using complexity science, thinks the phenomenon found in the Johns Hopkins patients is not uncommon and will be diagnosed more often as new views of illness and health emerge. “I think there are all kinds of things that go on all the time that we don’t see because our way of seeing is to focus one part of the body,” she observes. “People at Johns Hopkins must have figured this syndrome didn’t fit the conventional model, and then done some theoretical mapping that identified what stress could be doing.”

Dr. Wittstein has explained in news reports that all the patients, who were treated between 1999 and 2003, had unusually high levels of stress related brain chemicals and hormones such as adrenalin, which may have temporarily “stunned” the heart muscle, decreasing its ability to pump blood. Researchers call the condition stress cardiomyopathy. It differs from a heart attack, which occurs when a blood clot in a coronary artery cuts off circulation to the heart muscle. Emotional stress can induce a heart attack in someone who already has coronary disease, but in the cases studied it produced heart failure in people who had no blood clots, diseased arteries or patches of dead heart muscle.

Dr. Rush recalls that when she began her practice, she suspected that obtaining richer, more comprehensive information about a patient’s symptoms and life circumstances could yield profound insights into a patient’s condition. “My thought was that if I could step back and listen to the narrative of the patients, and take into account all the different things that were going on with them, I could find clues to the underlying dynamics of their symptoms,” she says. “I began to see things I had never seen before. I thought how did the most interesting people on the planet walk into my office? Then I realized it’s not just my patients. It’s what’s going on every day and we don’t yet fully know how to see it.”

If a patient arrives with vertigo, chest pain, or a backache, for instance, she doesn’t view it as an isolated symptom. She thinks of the patient’s described dysfunction as part of a dynamic complex system and she looks at possible perturbations and interactions.

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-Dr. Pat Rush

A Loss of Variability

“I think this study opens up a window into much that we don’t know, and much that is yet to be discovered,” Dr. Rush says of Dr. Wittstein’s work.

Dr. Robert Lindberg, a member of the teaching faculty of Columbia University School of Medicine and a Plexus Science advisor, is another physician who has woven complexity principles into his private practice. He explains how the heart can be shocked into malfunction when overwhelming emotion triggers an outpouring of “flight or fight” biochemicals, among them derivatives of adrenaline and cortisone. Dr. Lindberg says the stress response is a consequence, or confluence, of interactions among the neurologic, immune and emotional systems, the three systems he calls the major “inter-connectors” of the human organism.

“Normally these systems are constantly switching on and off or modulating up or down as a consequence of the many feedback mechanisms present within the complex human system, but also due to the inherently oscillatory nature of all living entities,” he says. “Living systems are homodynamic, which means they maintain stability through constant change.”

In healthy people, he says, variability is measurable in all biologic parameters, including heart rate, respiration and hormonal systems. With the onset of disease and aging processes, normal variability is lost.

“Another way of saying this is that there is a degradation of the complex interactions that are responsible for resilient health,” he says. “As I see it—not what was speculated by the authors of the study—overwhelming stress, or prolonged stress over time results in a loss of variability of the neurologic, immunologic and emotional systems. There is a disruption of the healthy complex interactions that hold us together and it is reflected by the loss of the myriad nuanced modulations central to optimal health.”

Sustained exposure to the flight or fight chemicals causes death or derangement of heart cells, and that causes heart failure. It’s not the chemicals themselves, Dr. Lindberg emphasizes, it’s the prolonged exposure, which is akin to having the stress response stuck in the “on” position. That means variation is halted, which is very destructive because it initiates a cascading effect on many other biochemical interactions.

For example, Dr. Lindberg says, authors of the Johns Hopkins study point out that sustained exposure to adrenaline causes excess calcium to flood into the heart cells. The heart muscle cells normally contract and relax as calcium

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oscillates in and out of the cell. When calcium floods the cells, oscillation ceases and individual cells freeze or become “stuck” in contracted position. The heart can’t pump, and the result is heart failure, shock, and potential death. In other words, he says, lost variability in the fight or flight chemicals leads to lost variability in calcium flux, which leads to the loss of normal variability or function in the heart muscle.

The Plexus Clinical Practice Learning Network has for sometime been exploring human physiology as “an outcome of innumerable oscillators coupled together, self organizing into a robust resilient system, oscillating at all scales.”

Literature is filled with ancient wisdom on fluctuating entwinements of heart and fate. Shakespeare’s King Lear cried out that his heart was “crack’d” and Othello vowed he would “wear my heart on my sleeve for daws to peck at.” Dona Maria Marquesa de Montemayer, the wounded old woman in Thornton Wilder’s *Bridge of San Luis Rey*, asked whether the “constant pain in her heart had an organic seat.” Ugly, awkward and mistreated by her mother, husband and daughter, she imagined a surgeon cutting into her chest and exclaiming to his students, “This woman has suffered, and her suffering has left its mark upon the structure of her heart.” Ecclesiastes warned, “The heaviness of the heart breaketh strength.” And Proverbs reminds us “A merry heart doeth good like a medicine, but a broken spirit drieth the bones.”

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From Earthquakes and Anger to Cardiac Arrest

Modern science is paying increasing heed to how the heart responds to the unpredictable vicissitudes of life.

Dr. Lindberg notes that an article by J. Huang, et al., in the January 15 2001 issue of the American Journal of Cardiology, *Sudden Changes in Heart Rate Variability During the 1999 Taiwan Earthquake*, reports data from 12 individuals who happened to be wearing heart monitors during the quake. Heart rate variability plummeted the instant the quake began in all patients except for three who were taking beta-blockers.

An April 5 story in *Nature* reported evidence that strong emotions disrupt the electrical rhythms of the heart. According to the story, Matthew Stopper of the Yale University School of Medicine and his colleagues asked 24 patients who had implanted defibrillator devices to keep detailed diaries of their emotions. All the patients had defibrillators that were designed to detect conditions that could trigger cardiac arrest, and to deliver an electric shock to restore healthy rhythm. Fifty-six shocks were recorded during the study. Researchers found that in 100 per cent of the cases where the patients recorded an elevated level of anger, the arrhythmias that triggered the shocks were the most dangerous type heart patients can have. Those arrhythmias are initiated by a series of rapid, premature heart contractions. In contrast, only 68 percent of arrhythmias not preceded by anger had that type of contraction.

One puzzle in the Johns Hopkins study was that women seemed far more predisposed than men to emotionally induced malfunctioning of previously healthy hearts. Several doctors have said they are uncertain about what would make women more vulnerable.

“Of course all humans experience stress and it can take its toll slowly over time and in many different ways,” Dr. Lindberg observes. “This syndrome is just a more dramatic and immediate presentation of severe stress that singles out the heart.” Stress can also manifest itself through palpitations, headaches, sleep disruption, and gastrointestinal symptoms, he says, and a vast assortment of ancient and modern afflictions that are represented by disruptions of rhythmic biological activity.

A journal article reports data from 12 individuals who happened to be wearing heart monitors during the 1999 Taiwan earthquake. Heart rate variability plummeted the instant the quake began.

By: Prucia Buscell, Plexus Institute

New Members

Plexus Institute continues to draw the participation of a community of passionate learners. Here are the latest to join our journey.

Sherri Solomon-Jozwiak

St Vincent Catholic Charities is utilizing complexity theories for organizational development and change. We've been on a five year journey in partnership with all stakeholders and Michigan State University. Our goal is to create capacity and capable communities within ourselves, at the organizational level and within systems of care in our community for the ultimate purpose of impacting quality of life — spiritually, emotionally and physically.



I believe this journey begins with a thriving workforce. I'm most interested in the applications of complexity as described to organizational development and change. I'm a new convert to positive deviance. My introduction to Plexus was a complexity experience. Attending a focus group, not shy about sharing my views on organization, a fellow participant and MSU Professor told me that the Plexus Institute would be a good fit for me. I explored the website, listened in on calls, journeyed to Austin and ACENET and became a Plexus convert! I was tired of solo self discovery through literature and thoroughly enjoy the enthusiasm of others who believe!

P.S: Thanks to Professor Larry Liebovitch you'll note I'm paper folding.
sjozwiak@ccs-syh.org

Ruth R. Armstrong

Ido consulting on governance issues, researching the area of accountability to create a framework that includes minimum specs for accountable organizations, facilitating strategic planning processes. I also teach at York University's Schulich School of Business in Toronto. The course is in the MBA program – Civil Society: Nonprofit Organizations.

What interests me most about complexity is the emphasis on patterns, relationships and resonance with an organic view of organizations. I found Plexus Institute by attending a workshop in Toronto last fall sponsored by Plexus and organized by Board Member Liz Rykert.



I am president of Vision Management Services, Toronto, which offers customized services to management, boards and community groups to achieve organizational and community health.

rutharmstrong@vision-management.ca
www.vision-management.ca

Susan Bakewell-Sachs

I am Dean of the School of Nursing at The College of New Jersey. I also practice one day per week as a Pediatric Nurse Practitioner at The Children's Hospital of Philadelphia. My clinical area of focus is children born prematurely. My research area is on timing of discharge from the hospital and infant functional status.



I am most interested in complexity as it applies to nursing education, practice, and research, health care delivery, and work environments.

I found the Plexus Institute through my colleague Claire Lindberg. My interest was piqued by the Clinical Nurse Leader national pilot project. I became a member because of the opportunity to be part of a rich network of nurses and others interested in learning more about complexity and applying it to nursing education and practice.

sbakewel@tcnj.edu.

Jane Mahoney

While the photo places me in one of my favorite spots, my garden, doing one of my favorite things, playing (in this case with bubbles), my other life situates me as an assistant professor at the University of Texas Health Science Center at Houston, School of Nursing where I teach psychiatric and mental health nursing to undergraduate and graduate students. I also teach nursing theory and qualitative research. In addition, I am involved in a number of research projects all focused on the experiences of living with chronic illness.



Complexity science appeals to me because of the nonlinear approaches available to help explain complex human behavior. I am especially interested in the use of narrative to explain human interactions in health care. I found out about Plexus from a colleague, and I joined because I saw the opportunity to be a member of a community of scholars who were committed to developing complexity and supporting each other along the way. I have appreciated the non-competitive nature of the nursing learning network as the group strives to develop knowledge in new ways in order to address complex health care problems.

jane.s.mahoney@uth.tmc.edu

David Introcaso

An increasing number of our AHRQ (Agency for Healthcare Research and Quality) evaluations are using social network analysis to understand relationships between and among AHRQ and its various constituencies and AHRQ funded researchers and their networks. If innovation (or improvement), through developing shared meaning, in health service delivery—and that’s what we’re after—is a social process that emerges in real time (i.e., via, as described by Ralph Stacey’s, gesture-response communication) then understanding what’s going on—or not going on—in relationships is critical both from descriptive/evaluative perspective as well as from a prescriptive/planning perspective.



I became increasingly interested in complexity after spending time as a Kellogg Foundation fellow in the early to mid 1990s studying Edgar Schein, Peter Senge and Chris Argyris, among others, in trying to understand issues ranging from anti-hunger and food security to liberation theology-led movements in Central and South America. (I also had a former college roommate teaching grade school in Santa Fe. His roommate worked at the Santa Fe Institute - talk about degrees of separation!) More recently, I re-read Thomas Kuhn’s *Structure of Scientific Revolutions*, because the paradigm we use to forward health services delivery research seemed, to me at least, increasingly inadequate. “Normal science” of reductionism, linearity, etc. seemed inconsistent with the realities of entangled evidence production and adoption. (As Kuhn said, citing Bacon, truth emerges more readily from error than from confusion.)

I became aware of the Plexus Institute’s DC fractal group in mid-2003. This quickly led to AHRQ hosting in December of that year a complexity meeting that included Everett Rogers and Ralph Stacey. We hosted a follow-up meeting in 2004 and hope to do so again in December of ‘05.

Dr. Introcaso is evaluation officer for AHRQ in Rockville, MD.

DIntroca@ahrq.gov

Fractal News

Complexity is about community and connection. That's why the Fractals were created. Find a Fractal near you – or help to start a new one – and take your learning to the next step!

Washington Fractal

 June 8—Chris Laszlo, partner and co-founder of Sustainable Value Partners, Inc., will help those at the DC fractal meeting explore how complexity thinking can contribute to building sustainability into existing strategic and operating processes. In his book, *The Sustainable Company: How to Create Lasting Value through Social and Environmental Performance*, Chris asserts that “planetary ethics”, the integration of economic, environmental, social and high ethical objectives into long-term business strategy, is the key to corporate survival. For ten years, Chris was an executive at Lafarge SA, a world leader in building materials. He served as head of strategy, general manager of a manufacturing subsidiary, and vice president of business development. Before that he spent five years at Deloitte & Touche, where he consulted to such global industry leaders as Dupont, Toshiba, Avon Products, and Renault. Educated at Swarthmore, Columbia, and the University of Paris, Chris earned a doctorate in economics and management science. He currently teaches a course on sustainable value at the European Business School INSEAD, in he advanced management seminar and CEDEP Executive Education programs.

The DC Plexus Fractal holds monthly meetings on the second Wednesday of every month from 6:30 to 9 pm. Bring a snack and join us for networking at 6:30 pm. The program starts at 7 pm. Meetings are held at Van Ness East, 2939 Van Ness Street, NW, DC, 20008

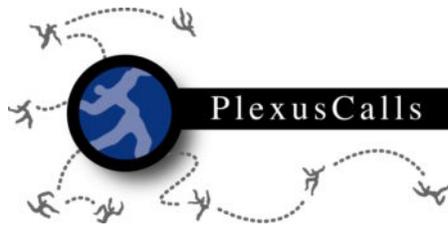
For details, go to www.plexusdc.org or contact Lisa Kimball at lisa@group-jazz.com.

Ontario Fractal

 Join us for a session on Leadership, at Liz Rykert's office at Meta Strategies -
401 Richmond St. West, Studio 206; June 16th, 3-5 pm

Further sessions will resume in the fall.

For questions and further details, contact Liz Rykert, Merta Strategies, and Vice
Chair Plexus Institute, Liz@metastrategies.com, or phone, 416-340-6382.



PlexusCalls Spring-Summer 2005

Bringing People Together in Conversation

If you would like to listen to these provocative conversations:

- Dial (641) 594-7500
- Enter the access code 85392, followed by “#”

PlexusCalls are scheduled for Fridays from 1 PM to 2 PM Eastern Time. Please check www.PlexusInstitute.org for further details, additions or changes to the schedule.

June, 24, 2005

Uncertainty and Surprise:

Questions on Working with the Unexpected

Guests Dr. Reuben McDaniel, Dr. Dean J. Driebe and Dr. J.A. Scott Kelso, will discuss highlights of recent research on unpredictability and surprise. Dr. McDaniel and Dr. Driebe edited a new volume in the *Springer Complexity Program Series Understanding Complex Systems*. The book, released in May, *Uncertainty and Surprise in Complex Systems: Questions on Working with the Unexpected*, is a collection of papers first presented at a conference on *Uncertainty and Surprise*, sponsored by Plexus Institute and the Ilya Prigogine Center in 2003 at the McCombs School of Business at the University of Texas at Austin. Dr. Kelso's presentation, *The Complementary Nature of Coordination Dynamics: Toward a Science of the In-Between*, is included. Dr. McDaniel one of

the first scholars to examine the impact of complexity inspired leadership in health care operations. He is a well known organizational theorist and holds the Charles and Elizabeth Prothro Regents Chair in Health Care Management at the University of Texas at Austin, where he is professor of management science and information systems. Dr. Driebe, a physicist and former senior researcher at the Prigogine Center for Statistical Mechanics and Complex Systems at the University of Texas at Austin, is now an independent scholar based in Fort Lauderdale, Florida. Dr. Kelso, a founder of the Center for Complex Systems and Brain Sciences at Florida Atlantic University, Boca Raton, FL, is a professor and widely published author whose works include the ground-breaking *Dynamic Patterns: The Self-Organization of Brain and Behavior*, MIT Press, 1995.

July 15, 2005

Life, Death and Health Insurance

Guests will be Rushika Fernandopulle and Susan Starr Sered, co-authors of *Uninsured in America: Life and Death in the Land of Opportunity*. Dr. Fernandopulle was the first executive director of the Harvard Interfaculty Program for Health Systems Improvement and is a founder of Renaissance Health, a primary care practice in Boston designed to use innovative techniques to enable patients to maximize their own well-being. He is also a clinician at Massachusetts General Hospital, a member of the Harvard Medical School Faculty, and a member of Plexus Institute. Susan Starr Sered is research director of the Religion, Health and Healing Initiative at Harvard's Center for the Study of World Religions. She is a medical anthropologist and the author of several books and articles. More than 45 million Americans lack health insurance. Drs. Fernandopulle and Sered began research to find out exactly what that means to individuals, families, communities and society at large. Their research uncovers the often unacknowledged cost of untreated injury and illness. The stories of the uninsured men and women they interviewed present a disturbing picture of the way ill health cascades through other areas of life. The authors also present a compelling argument that the insurance consequences of one divorce, one pink slip or one serious illness could push most ordinary Americans into a permanent caste of those fated to become and remain sick.

On the Verge: Changing Lives, Organizations & Minds

Complexity science in a changing world

September 12-13, 2005 at the Delray Marriott, Delray
Beach, Florida

A verge is the brink of progress, or the start of transition to something different. It's the point just before something starts to happen. In nature, it is a place where different ecosystems intersect, a place where abundant diversity and interaction yields energetic evolutionary potential. Join a session where many scholarly disciplines converge, and discover what complexity science principles suggest for our changing lives.

Complexity science and its applications have never been more important. Biologists and earth scientists tell us that in the last few decades, humans have changed the world's ecosystems more profoundly and rapidly than in any other period of human history. Technological advances have revolutionized virtually every field of human endeavor. Innovations in communications that only recently seemed like science fiction have destabilized and transformed individual lives and global markets. Interactions among social, economic, political and scientific forces have never produced faster or more unpredictable results. At a time when seismic social and scientific changes overwhelm our institutions and outpace our education, the principles of complexity science offer invaluable insights and a path to understanding and actions that matter.

The 2005 Plexus Annual Summit, offered in collaboration with the Center for Complex Systems and Brain Sciences at Florida Atlantic University, will bring together internationally known experts from the natural and social sciences to share ideas, reflect on current knowledge of complex systems, and explore the pressing human goals most likely to benefit from the combined efforts of thinkers and scholars from diverse disciplines. When physicists, biologists and neuroscientists exchange knowledge with psychologists, economists and organizational scholars, surprising ideas are the only predictable expectation.

As **Larry Liebovitch**, professor at the FAU's Center for Complex Systems explains, new tools, concepts and methods have emerged over the last 20 years that enable people to work with complexity in fields ranging from molecular biology to organizational management. Professor Liebovitz points out initiatives such as the National Institutes of Health Roadmap and the National Science Foundation Crosscutting Programs emphasize the transdisciplinary, multilevel approaches that are crucial to the future of science, technology and society.

Pre-conference Session: Why Oceans Matter Sunday, September 11, will explore .

The evolutionary tale of the Earth and its oceans is layers of adventure, soap opera, and disaster saga, all in motion together. Oceans cover more than 70 percent of the globe, yet less than five percent of that expanse has been explored. Within those complex bodies of water are tantalizing mysteries and secrets that may help explain the beginnings of life and the future of all living things. **Dr. Ellen Prager**, the first woman to serve as chief scientist of the National Oceanic and Atmospheric Administration, now serves as chair of Deep Ocean Exploration Research and Explorer-in-Residence at the National Geographic Society. *Time* named Dr. Prager a “Hero of the Planet” and she will lead an evening of exploration and discovery that will illustrate why oceans matter to us as scientists, students and citizens of the earth.

A feature that follows on Monday will be *An Evening of Experience and Interaction: Sim-Bio-Sys: Life as Business Partner*. Strategies for sustainability abound in the living world. An understanding of evolutionary progress and ecological processes form the basis of a new but time-tested approach to product and organizational design. In simulating biological systems, we explore how the “facts of life” provide energy and inspiration for revolutionary changes in industry an organization.

Gary Merrill is a principal in the human systems development firm Emergent Systems, which specializes in the development and facilitation of experiential eco-literacy leadership programs. **Dr. Michelle Merrill**, who has studied orangutans in the Sumatran rain forests, has taught evolutionary biology, anthropology and sustainability to student and professional audiences.

Other sessions over the two days will explore how context changes everything we know and do, and what different kinds of models can—and cannot—tell us about ourselves and our changing world. Scholars and practitioners will guide explorations of how change happens, in organizations, in the economy, and in human leadership. More than a dozen extraordinary thinkers will share their latest ideas and experiences from the cutting edge of research and practice. This is an opportunity to sharpen our perceptions on how change happens, what brings it about, and what slows it down. And perhaps most vital, through interdisciplinary discussion and the chance to view our own experi-

ences in a new light, we gain more penetrating awareness of how change itself—the subtle changes we barely notice and tidal waves that overwhelm us—influences our lives and minds.

Faculty:

Alice Ware Davidson, Ph.D., R.N.

Assistant Professor at the University of Colorado School of Nursing, Faculty Associate in the Colorado Center for Chaos and Complexity

Alice Ware Davidson holds a Ph.D. (1988) from the University of Colorado and a MS in Nursing from Case Western Reserve University. She has also served on the faculty at Wright State University and as administrator, educator, and clinician in healthcare organizations. As a Collaborative Researcher, a joint position between CU and local hospitals, she conducted numerous studies showing the importance of the multi-sensory environment in human well-being. These understandings were applied in designing award winning community centers, cancer care units and neonatal and adult intensive care units.

Dr. Davidson was a Research Fellow at Harvard Medical School, and scholar at Boston University, the New England Complex Systems Institute, the Santa Fe Institute, and the Pari Institute in Italy. Using computer modeling, circadian rhythm, physiologic, and qualitative research methods, she pioneered deeper and more dynamic ways to view the potential for therapeutic uses of the environment. She found that complexity science provided a new lens to explore the experience of pregnancy, case management of chronically-ill older adults, sensory interference in healthcare environments and the art of nursing. Her work has appeared in publications that include the pioneering journal *Complexity and Chaos in Nursing*.

Scott Kelso, PhD

Glenwood and Martha Creech Chair in Science, Florida Atlantic University

Dr. Kelso, an internationally respected scholar, founded one of the world's first institutes devoted to complexity science, the Center for Complex Systems and Brain Sciences, at Florida Atlantic. His current research interests include the problem of coordination in living things, connecting levels of brain and behavior through theory and experiment, principles and mechanisms of coordination dynamics in sensori-motor integration, learning, perception, language, and development using brain imaging techniques and behavioral measures. In 1995, Dr. Kelso wrote *Dynamic Patterns: The Self-organization of Brain and Behavior*, in which he shows how the human brain is fundamentally a pattern forming dynamical system, poised on the brink of instability. He also showed that self-organization underlies the cooperative action of neurons that produces human behavior in all its forms. Dr. Kelso was recently elected a Fellow in the American Association for the Advancement of Science, and he is editor of the new series from Springer, *Understanding Complex Systems*. Dr. Kelso serves on the Science Advisory Board of Plexus Institute.

Thomas Petzinger, Jr.

Chairman and CEO, Launchcyte

Tom Petzinger has acquainted millions of people with complexity science concepts through his highly regarded weekly “Front Lines” column at *The Wall Street Journal* and his bestselling book *The New Pioneers: The Men and Women Who Are Transforming the Workplace and Marketplace*, an exploration of the new economy. He also serves as a director of Reaction Biology Corporation, and Immunetrics Inc. Prior to co-founding LaunchCyte, he spent 22 years at *The Wall Street Journal*, where, as deputy Washington bureau chief, he managed operations for the largest Journal bureau in the world. He also served as Washington economics editor, millennium editor, and weekly “Front Lines” columnist, a capacity in which he conducted hundreds of case studies of entrepreneurial success. Tom has written three best-selling business books, including *The New Pioneers*. He serves as a founding trustee of the Plexus Institute, a director of the Pennsylvania Biotechnology Association, and a visiting fellow of the Cap Gemini Ernst & Young Center for Business Innovation. Petzinger holds a B.S. in journalism from Northwestern University, where he was a Richter Undergraduate International Scholar.

Leon Glass, PhD

Isadore Rosenfeld Chair in Cardiology and Professor, Department of Physiology, McGill University

Dr. Glass is an internationally recognized scholar and among the first to understand health and disease from a dynamical and complex systems perspective. His work has been instrumental in moving nonlinear dynamics from the fringes of science in the 1960's to the center of science in the 21st century. He is a Fellow of the Royal Society of Canada and the American Physical Society. He serves on a number of editorial boards, including *International Journal of Bifurcation and Chaos* and *Chaos: An Interdisciplinary Journal of Nonlinear Science*. Dr. Glass has received numerous awards for his scholarly contributions. He is the author or co-author of a number of books including *Understanding Nonlinear Dynamics, From Clocks to Chaos: The Rhythms of Life*, and *Nonlinear Dynamics in Physiology and Medicine*. He has written well over a hundred articles, book chapters, reviews and short essays. Dr. Glass is a leader at the Centre for Nonlinear Dynamics in Physiology and Medicine, an inter-university and inter-disciplinary group of 12 individuals with expertise in various areas of science and engineering, mathematics, computer science, and medicine.

Reuben R. McDaniel, Jr., EdD

Charles and Elizabeth Prothro Regents Chair in Health Care Management, Professor of Management Science and Information Systems, The University of

Texas at Austin

Reuben McDaniel has done more than any scholar to develop and bring complexity science concepts, practices and research methods into healthcare in the United States. Through a lifetime of writing, teaching, research, and leadership of a complexity and healthcare research network, this widely respected organizational theorist has demonstrated convincingly that complexity science based management practices improve the care of patients and the performance of healthcare organizations, from primary care practices to hospitals. In 2004, Reuben was awarded one of the highest honors bestowed by The University of Texas at Austin, the Civitas Award, given to a faculty member who has shown exemplary campus citizenship throughout a career of service at the university.

Melanie Mitchell, PhD

Professor of Computer Science at Portland State University, External Faculty Member, Santa Fe Institute

Melanie Mitchell received a Ph.D. in Computer Science from the University of Michigan in 1990. Her dissertation work with Douglas Hofstadter was on cognitive modeling of high-level perception and analogy-making. She has held faculty or research positions at the University of Michigan, the Santa Fe Institute (as Director of the Institute's Adaptive Computation Program), the Los Alamos National Laboratory, and the OGI School of Science and Engineering at the Oregon Health & Science University. She is currently Professor of Computer Science at Portland State University and an external faculty member of the Santa Fe Institute.

Dr. Mitchell has been the recipient of a University of Michigan Regents' Fellowship, a Junior Fellowship in the Michigan Society of Fellows, and a 21st Century Research Award Grant from the J. S. McDonnell Foundation. In 1997 she was selected to give the Ulam Memorial Lectures in Complex Systems at the Santa Fe Institute.

Dr. Mitchell is the author of *Analogy-Making as Perception* (MIT Press, 1993) and *An Introduction to Genetic Algorithms* (MIT Press, 1996). She is the co-editor of *Adaptive Individuals in Evolving Populations: Models and Algorithms* (Addison Wesley, 1996) and *Perspectives on Adaptation in Natural and Artificial Systems* (Oxford University Press, 2005). She is also the author of over 60 research papers in the fields of machine intelligence, cognitive science, and complex systems.

Eliot R. Smith, PhD

Professor of Psychology and Cognitive Science at Indiana University, Bloomington.

Dr. Smith's publications pioneered the application of connectionist models to phenomena within the field of social psychology, such as the learning and application of stereotypes and the flexible construction of the self-concept. He

is currently exploring the use of multi-agent models as a theory-building tool to explore dynamic, interactive effects of individual decision processes and the social environments that pervasively influence individuals. Dr. Smith is also interested in the situated/embodied cognition perspective, particularly emphasizing the role of the social and interpersonal environment as a key context for behavior. His notable theoretical and empirical contributions to other areas of social psychology include investigations of the role of emotion in prejudice and intergroup conflict, and of the nonconscious effects of past experiences on social judgments and decisions. A Fellow of the American Psychological Association and the American Psychological Society, Dr. Smith has been the recipient of numerous grants and other awards, and he was recently named the winner of the 2004 Thomas M. Ostrom Award for contributions to social cognition. He is currently editor of *Personality and Social Psychology Review*.

Olaf Sporns, PhD

Associate Professor, Department of Psychology, Programs in Neural Science and Cognitive Science, Biocomplexity Institute, Indiana University

Olaf Sporns was born in Kiel, Germany, in 1963. After studying biochemistry at the University of Tübingen in Germany, he entered the Graduate Program at New York's Rockefeller University. In 1990, he received a Ph.D. in neuroscience and became a Senior Fellow in Theoretical Neurobiology at The Neurosciences Institute in New York and San Diego. Since 2000, he has held a faculty position at the Department of Psychology at Indiana University in Bloomington. He is currently an Associate Professor of Psychology, as well as a core member of the Programs in Cognitive Science and Neuroscience, and directs the Computational Cognitive Neuroscience Laboratory (www.indiana.edu/~cortex/CCNL.html). Dr. Sporns' main research field is theoretical and computational neuroscience. A main research focus is the design of neuronal models that can be interfaced with autonomous robots and can be used to study neurobiological and cognitive functions such as perceptual categorization, sensori-motor development, and the development of neuronal receptive field properties. Another focus is the design of anatomically and physiologically detailed models of neuronal networks to investigate the large-scale dynamics of neuronal populations. This work includes the development of statistical measures for characterizing complexity in neuronal networks as well as methods for analyzing the topological structure of neuronal connectivity patterns. Dr. Sporns is a member of the AAAS, the Society for Neuroscience, the International Society for Adaptive Behavior, the Cognitive Neuroscience Society and Sigma Xi. He is an associate editor or member of the editorial board of the journals *BioSystems*, *Adaptive Behavior*, the *International Journal of Humanoid Robotics*, the *Journal of Integrative Neuroscience*, and *Neuroinformatics*.

From the Inside Out: Uncovering Solutions to Intractable Problems through Positive Deviance

Sponsored by Plexus Institute and the Positive Deviance Initiative at Tufts University Friedman School of Nutrition Science and Policy. Held at Tufts University, Boston, Massachusetts

*The tyranny of averages always conceals
sparkling exceptions to the rule.*

–Jerry Sternin & Richard Tanner Pascale
in the Harvard Business Review article
Your Company's Secret Change Agent.

June 28-29, 2005.

This session will begin with a pre-conference June 27, an Introduction to Complexity Science: Implications for Organizations, Communities and Leadership. This one-day session will provide new insights into social change triggered by advances in complexity science, and offer an understanding of the theoretical foundations of Positive Deviance. The workshop will give attendees an opportunity to understand some basic complexity concepts and identify ways they can be used in organizational and community work and in daily life.

The conference will begin with stories from the field that illustrate how Positive Deviance works. Those attending will learn how PD has been used to reduce the risk of HIV/AIDS and produce sustainable improvements in some equally daunting social challenges: childhood malnutrition in Vietnam and other countries, the 4,000 year-old practice of female genital mutilation in Egypt, and child and maternal health in Pakistan. It has also worked in initia-

tives in the US where behavior change is needed to improve educational performance, corporate operations, and quality issues in health care.

Faculty will include:

- **Jerry Sternin**, director of the Positive Deviance Initiative, which he founded in 2001 after working for more than a decade to pioneer and refine applications of PD in diverse settings all over the world. He was country director for Save the Children (US) in Bangladesh, Philippines, Vietnam, Egypt and Myanmar. He is a former Peace Corps Volunteer and country director for Rwanda, Mauritania, Nepal, and the Philippines, and has served as an Assistant Dean and Student Advisor at the Harvard Business School.
- **Monique Sternin**, technical director of the Positive Deviance Initiative, co-teaches a course on PD for practitioners at Tufts. She has worked on PD initiatives in countries all over the world, working to reduce malnutrition, advocate condom usage for commercial sex workers in Myanmar to help reduce the transmission of HIV/AIDS and other diseases, and improve infant and maternal health. She has also collaborated on the first hospital-based applications of PD in the US.
- **Arvind Singhal**, Professor and Presidential Research Scholar at the School of Communication Studies at Ohio University. Dr. Singhal is one of the



As part of their practice of Positive Deviance, the Sternins assemble women to share important ideas about infant care at the Healthy Baby Fair.

world's leading authorities on social change and communications, particular on campaigns that address challenging issues in the developing world. He is author and co-author of scores of articles and books, including *Organizing for Social Change*, *Combating AIDS: Communication Strategies in Action*, *Entertainment Education: A Communication Strategy for Social Change*, and *India's Communication Revolution: From Bullock Carts to Cyber Marts*.

- **Henri Lipmanowicz**, is a founder of Plexus Institute and Chair of the Board of Trustees. His work with Plexus followed a distinguished career at Merck, where he was President of the Merck Intercontinental and Japan Division, and a member of the Management Committee. During this tenure he helped conceive and give birth to the “Enhancing Care Initiative”, a program of the Harvard AIDS Institute and the Harvard School of Public Health aimed at improving HIV and AIDS care in resource-scarce settings.
- **Curt Lindberg**, Plexus Institute President, helped found Plexus Institute and has served as its President since its incorporation. He has played an important role in introducing complexity science into management practice and health care. Among his many publications is the highly regarded book *Edgware: Insights From Complexity Science for Health Care Leaders*, which he coauthored with Brenda Zimmerman and Paul Plsek.

[Click here to register](#) now to learn how Positive Deviance can help you and your organization discover the most creative natural solutions to the most difficult challenges.