PRINCIPAL DISCOVERIES IN MY 32-YEAR RESEARCH PROGRAM ON THE STUDY OF COMPLEXITY

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ABSTRACT

The results of my prolonged research program on complexity are summarized and related to the primary purpose of the Panetics Society: the reduction of suffering on a large scale. These results are believed to be very relevant to the Panetics Society and, of much significance, to virtually every organization that is involved in society at large.

My research program to study complexity began 32 years ago, and has continued to this day. Every effort has been made to follow scientific ideals in conducting this program. Specifically, the effort has ranged from the study of foundations to the development of numerous empirical results under a variety of conditions that would surely have revealed weaknesses in the theoretical results. The empirical study, in itself, has taken place over a period of 20 years and has involved people on the major continents and organizations ranging in size from a few hundred people to several hundred thousand people. Under these circumstances, I believe that the principal results of this program can be reported with a substantial degree of confidence; and that these results are relevant to almost every organization that is engaged in working with social issues.

THE FOUR KEY THEORETICAL COMPONENTS OF THE STUDY

In a prolonged study of complexity, four key theoretical components have come to light. They are:

- Second-Order Thought (i.e., thought about thought itself, as opposed to thought about any other subject)
- Human Behavior (individual, small group, and larger organization; with special emphasis on behavioral pathologies that must be overcome in order to make progress in working with complexity)
- The Manifest Inadequacy of Everyday Language (its inadequacy to support reliable communication about the problematic situations that involve complexity, and the consequent linguistic ambiguities available to the powerful)
- The Necessity for Scrupulous Adherence to the Ideals of Science (without which credibility of research results necessarily is severely damaged)

Each of these components will be discussed in what follows.

THE SIX KEY EMPIRICAL COMPONENTS OF THE STUDY

The empirical evidence stemming from the study can be organized into six components, which are:

- Requirements for Process Designs (complexity does not yield to poorly-conceived processes or to processes that are effective in ordinary situations)
- Effectiveness of Processes (tests of processes for resolving complexity in a wide variety of problematic situations-sufficiently wide and varied, so that generalities can be drawn that are not locale- or topic- specific)
- Requirements of Infrastructures (tests of infrastructures for supporting processes aimed at resolution of complexity)
- Requirements and Types of Process Leadership (identification of the requirements and types of process leadership in (a) enabling and (b) carrying out processes aimed at resolution of complexity)

- Identification of Disabling ("Killer") Assumptions (determining those assumptions which, held by persons immersed in complexity, tend to or may disable their learning capacities and prevent them from acting to help resolve complexity)
- The Unawareness of and Disinterest in Key Prior Discoveries of Thought Leaders (making it very difficult to recruit institutional learners that can and will institutionalize the changes dictated by my research findings, even when such changes are demonstrably necessary to make institutional practices compatible with stated institutional goals)

These components will also be discussed in what follows. But one must be aware that the core discoveries of this research program are best described by linking the theoretical and empirical components. Several correspondents have complained that I should simplify my findings to make them more accessible. Simplicity is a wonderful goal, but it is not quite clear to me why one would make it an imperative in a study of complexity, or how 32 years of research can be compressed into one page to meet the needs of people who are not willing to read.

Regrettably, it is beliefs that run counter to my discoveries that are the biggest obstacles to acceptance of these discoveries. So I have to be able somehow to disarm those beliefs in order to gain acceptance from a sizeable body (and the most powerful) of potential beneficiaries of this work. This imperative is further weakened by the powerful collection of physicists who have appropriated the word "complexity" to their own ends, and who have brought along in their collective wake a collection of management and policy faculties who seemingly have taken no lessons from the past history of abysmal attempts to make social science look like physics.

The physicists appear to derive most of their leadership from the relatively well-heeled Santa Fe Institute, and from academics who cooperate with them. The work of scholars such as those whom I call Thought Leaders is never mentioned by that collection of people whose primary assumption seems to be that no one thought about complexity until their organization began its work. I suppose "arrogance" is not too pejorative to apply to scholars whose principal skill seems to be working with mathematical equations; and whose principal deficiency seems to be to make huge leaps in claiming that social components behave like the solutions

of those equations, without providing adequate empirical evidence to support that assumption.

SECOND-ORDER THOUGHT[1]

I have given the name "second-order thought" to thought about thought itself, as opposed to thought about, e.g., economics, politics, physics, religion, or any other subject aside from the human practice of thinking. Similarly, I would call all such other forms of thought (except for synonyms of "thought") by the name "First-Order Thought". The following findings accrue from the study of second-order thought:

★ The Thought Leaders in Second-Order Thought. The first finding in this area is that there have been Thought Leaders at work in this area since around 350 B. C., and that the string of important Thought Leaders has brought us to the point in time where the second finding is warranted.

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[1] Aside from my own work, here are key references that show the developments relevant to second-order thought:

1) Bochenski, I. M. (1970) **A History of Formal Logic**, New York: Chelsea.
2) Cooke, H. P. (Trans. 1938) **Aristotle: The Categories, On Interpretation**, London: Heinemann.
3) Houser, N. and C. Kloesel (Eds.) (1992), **The Essential Peirce: Selected Philosophical Writings**, Vol. 1 (1867-1893), Bloomington and Indianapolis, IN: Indiana University Press.
4) Harary, F. R., V. Norman and D. Cartwright (1965), **Structural Models: An Introduction to the Theory of Directed Graphs**, New York: Wiley.
5) Peirce Edition Project (Eds.) (1998), **The Essential Peirce: Selected Philosophical Writings**, Vol. 2 (1867-1893), Bloomington and Indianapolis, IN: Indiana University Press.
6) Russell, B. (1919, 1993), **Introduction to Mathematical Philosophy**, New York: Dover (originally published by G. Allen & Unwin, Ltd., (London) and Macmillan (New York)
7) Tredennick, H. (Trans., 1938), **Aristotle: Prior Analytics**, London: Heinemann.

★ The second finding is that the aggregate consequences of the work of the Thought Leaders, coupled with the empirical results on behavioral pathologies, show that all persons who practice First-Order Thought should recognize their findings and put those findings to work in both the educational system and the world of action in all problematic domains involving complexity.

HUMAN BEHAVIOR[2]

A field of First-Order Thought that is vital to the resolution of complexity is the field called "Human Behavior". I shall use the term "human sciences", which has been adopted by several scholars in light of the fact that areas such as psychology, sociology, and anthropology all relate to humans; and that the people in this area seem to be uncertain as to what to call the aggregate (e.g., behavioral

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[2] Aside from my own work, here are key references that show developments related to behavioral pathologies which negatively affect resolution of complexity:
1) Allison, G. C. (1971), Essence of Decision, Boston: Little, Brown.
2) Argyris, C. (1982), Reasoning, Learning, and Action, San Francisco: Jossey-Bass.
3) Bales, R. F. (1951), Interaction Process Analysis, Cambridge, MA: Addison-Wesley.
4) Downs, A. (1966, 1994), Inside Bureaucracy, Prospect Heights, IL: Waveland.
5) Janis, I. L. (1982), Groupthink-Psychological Studies of Policy Decisions and Fiascos, Boston: Mifflin.
6) Lasswell, H. D. (1971), A Pre-View of the Policy Sciences, New York: American Elsevier.
7) March, J. G. and H. A., Simon (1958), Organizations, New York: Wiley.
8) Miller, G. A. (1956), "The Magical Number Seven, Plus or Minus Two: Some Limitations on Our Capacity for Processing Information", Psych. Rev., 63(2), 81-97.
9) Simon, H. A. (1974), "How Big is a Chunk?", Science 183, 482-488.
10) Tuckman, B. W. (1965), "Developmental Sequences in Small Groups", Psych. Bull., 63(6), 384-399.
11) Vickers, G. (1981), Responsibility-Its Sources and Its Limits, Seaside, CA: Intersystems.
12) Vickers, G. (1983), Human Systems are Different, London: Harper and Row.

sciences or social sciences). In this field, several Thought Leaders stand out because they have identified behavioral pathologies that limit the efficacy of efforts to resolve complexity.

To appreciate this, it helps to realize that individual pathologies would automatically invade groups where they would support group pathologies, and that group pathologies would invade the larger organizations where they would be available to support organization pathologies. In other words, there is a kind of hierarchy of pathologies at work, with every member of the hierarchy available to counter efforts to resolve complexity.

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