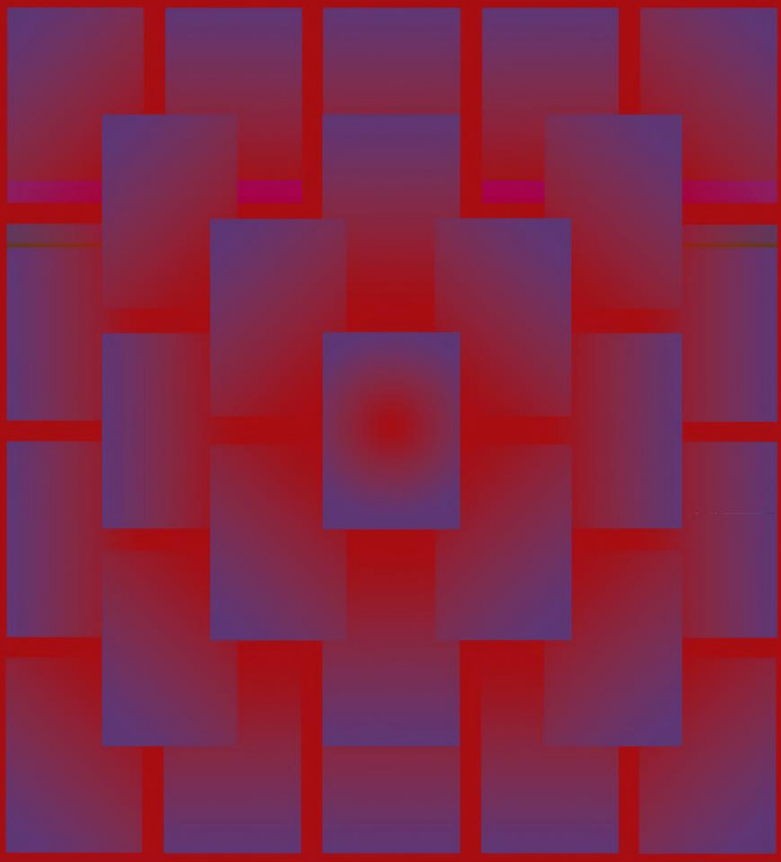
General Systems Theory Beginning with Wholes



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General Systems Theory Beginning with Wholes

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Preface

I became enthralled by general systems theory early in my graduate career. It has grounded all my subsequent work and teaching. I wrote *General Systems Theory Beginning with Wholes* because I wanted to share the excitement and potential of systems ideas with a large audience. So much of what has been written about it before has been in the physical sciences or inaccessible prose in the behavioral sciences.

The importance of a general systems theory approach is not so much in its formal ideas as in the shift to a new way of seeing things. When I teach about systems theory I concentrate on encouraging students to make that shift by giving them multiple examples that tie into their own personal experiences or current events. Typically students make a leap into a systems mode of seeing and thinking when they realize that what seems complex and foreign at first is in fact intuitive to their lives. My favorite compliment as a teacher came one day when I overheard a student talking about my course. He said, "I'm not going to be able to live a normal life after taking this course." I like that.

Writing this book proved to be a difficult task. With other writing I have been describing something concrete and outside myself, but the uniqueness of a systems approach as a way of seeing meant the process was more like describing how to walk or breathe. I persevered, driven by the desire to make systems theory knowable, or perhaps more importantly "feel-able," to a wide audience in the hope that more people will use it.

This book is important to anyone working in the helping professions—counseling, nursing, therapy, social work—who has greeted systems theory at some point but may not have grasped it fully owing to the abstract nature of conventional systems writing. Academics who want to know about general systems theory in environmental studies, psychology, sociology, family therapy, social work, economics, history, nursing, social policy, marketing, or women's studies will find this book both comprehensive for their own libraries and use-

ful in teaching. Students will find that this book reads like a good lecture, one which imparts ideas thoroughly and easily.

This book covers 31 general systems theory concepts that are directly relevant to the behavioral sciences: context, nonsummativity, system, unit, causality, cybernetics, action and inaction, co-emergence, agency, change, feedback, equifinality and multifinality, content, content and context, meaning, parallogic, realities, communication, report and command, you cannot not communicate, double bind, emotion, suprarationality, definitional deficit and definitional equality, science, multiverse, subjectivity, tools, data, decoding, and general constructs. Each concept is defined, explained, and illustrated on the personal, organizational, and social policy level. The derivations and significance are given to link each concept to its theoretical place and practical usage.

Long-time systems devotees will find themselves being updated by learning new "state of the art" systems concepts like action and inaction are equally causal, the impossibility of blame, multifinality, parallogic, realities, definitional deficit and definitional equality, content and context—light through a prism, multiverse, suprarationality, emotion, decoding and general constructs. They will also greet old favorites like system, nonsummativity, double bind, and feedback and cybernetics, explained in accessible language with extensions into organizations and social policy. The annotated bibliography provides a comprehensive list of significant systems ideas from Aristotle to sources in 1994.

The uninitiated will find a comfortable and informative path on which to begin to see and feel as a systems theorist and realize its particular relevance to issues like nuclear disarmament, AIDS, environmental degradation, anorexia, spouse abuse, senile dementia, and military action. Anyone who wants to appreciate seeing wholes as a means of innovating in their work will get not just the expanded view but all the references and examples they need to justify their new ideas.

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I owe my intellectual heritage to Norman W. Bell who taught me how to think without ever telling me what to think. That process is woven throughout this book.

Completion of this project was aided by support through my appointments as Visiting Scholar, Institute for Research on Women, Rutgers University, and Visiting Fellow, Department of Sociology, Princeton University.

Chapter 1

Introduction

Aristotle came up with the idea that the whole is greater than the sum of its parts. Alice discovered in Wonderland that meaning is relative to context. Anne of Green Gables shows us how emotion is the center of human experience. These three imaginings ground a "wholes" approach.

My purpose in writing this book is to give readers a feeling for the possibilities found in seeing the world in terms of wholes, or relational patterns. This means setting aside preconceived notions about how to begin inquiry that may restrict the range of phenomena brought into our scholarly viewing lenses. Though I will elaborate and give greater detail to this stance, its essence is as simple as allowing for the idea that there are things that emerge in groups of two or more parts that are not witnessed in those parts alone.

See that there is more to a child and parent together than when they are alone in separate rooms. Witness the process when a child falls and scrapes a knee, goes right on playing until the parent appears, and then begins crying. When a committee meets to decide on a course of action, such as which play to present for the summer festival, why is it that while all the individuals have excellent suggestions, the ultimate decision is in favor of something that no one likes? Has rent control, which was intended to increase the quality and availability of rental housing in Toronto, led to the reverse? Over time, a black market for securing housing in the form of "key money" co-emerged, along with grossly fluctuating markets for condominiums and escalating use of food banks. As capital shifted to expensive rental accommodation, people had to pay more for housing, and therefore had less to spend on food.

All of these examples point out that when we begin to see in terms of wholes rather than parts, patterns appear that a classic model of simple linear cause and effect cannot capture. They point out that such patterns, which we will learn later in this text can be described as "multifinal," can be found on any of the so-called levels that more conventional approaches cling to for analysis. There are patterned similarities between an intimate relationship that escalates into

violence, a committee that decides to deny parole, and the escalation of the arms race leading ultimately to the Gulf War.

The idea of nonsummativity is not new. It can be traced back to Aristotle and the ancient Greek saying, "Never step in the same river twice for as it stays the same it is constantly changing." What is new is the potential of a wholes approach for transforming debate on current global problems through rethinking the epistemologies that ground conventional analysis. In this shift new visions appear for intervention. This arises by adding recent advances in wholes thinking about human groups to the basic tenets of a general systems theory approach developed largely in the physical sciences.

In addition to levels or sizes of groups of two or more parts, the content of the patterns analyzed is not restricted by a wholes approach. The Malpeque oysters of Prince Edward Island were once threatened by extinction due to widespread cancer but somehow overcame it. Computer viruses have been found and have become a common part of language in recent years. Gang swarming of shopping malls is getting increased attention. All of these events can be analyzed via the concept of "feedback." The ideas generated through a wholes or general systems theory approach can be used to consider any form of substantive issue where there are two or more interrelated parts. Because of this it is possible to think of the approach as "pan-disciplinary" in that it can be used across conventionally defined disciplines such as biology, computer science, engineering, sociology, economics, family therapy, medicine, or psychology.

In addition to transcending disciplinary boundaries, a wholes or systems approach cuts across conventionally defined theories. This is possible because a wholes approach is not set up like theories which begin with assumptions and derive their stances from these assumptions. In the conventional mode of making theories, because the applications and derivations hang directly from their assumptions, theories could not be compared or challenged across these assumptions. For example, the assumptions of human benevolence in Marx's writings, versus human greed and insatiability in Emile Durkheim's writings, make legitimate challenge of one by the other impossible in that one could not go beyond questioning the basic assumption about human nature each presents.

A wholes approach proposes to transcend this type of conventional debate by offering a way of seeing without the prescription of assumptions. Instead the point of departure that the whole is greater than the sum of its parts is offered. Wholes of whatever content or membership become the focus of analysis, leaving the individual to read on assumptions of choice while still using the language provided by a systems approach. As such it presents a new means of talking about a host of events and issues that moves beyond the discrete and linear and toward the whole and emergent.

This sets the stage for new modes of research, intervention, and policy that are informed by consideration of the long-term effects of actions that have traditionally been seen only as linear cause and effect sequences. Seeing within a wholes approach provides a frame for thinking through, as a co-emergent process, actions like raising interest rates, free trade, Sunday shopping, health care user fees, or eliminating rental gardens in High Park. The importance of this mode of thinking is perhaps no more vividly illustrated than in thinking about the environment, where it can be argued that you cannot separate the destruction of the rain forests from the extreme poverty of the populations living in or near the forests, or the grossly skewed consumption patterns of certain industrialized nations.

So I begin here to define, explain, illustrate, and give the significance of a series of basic concepts that come out of a wholes or general systems theory approach. Ideas like "action and inaction are equally causal," and "you can't gauge the ultimate effects of action based on knowledge of input alone" surface as means of framing various current concerns like the feminization of poverty and U.S. militarism in the Persian Gulf.

Though my degree is in sociology and my substantive work has been on issues involved in health and gender, I shall be drawing on examples and illustrations from a wide variety of topics and disciplines. At each turn I shall move through three forms of issues: intimate relations, organizations, and social policy.

PATTERNS IN THEORY

To begin I shall situate a general systems theory approach in the range of types of available theories. This necessitates an inventory of classic approaches and recent advances. The thread I draw through this inventory is looking at how different approaches have brought to light various insights that are uniquely theirs. Since the focus of this book is systems theory, I provide a mere pencil sketch of these theories and leave it to readers to explore some of the excellent available texts that explicate these theories in extensive detail within the social historical contexts of the theorists' lives. At the same time I point out how each of these theories can be advanced by an epistemological shift to a wholes approach via digging out the basic epistemological roots that ultimately handicap conventional theories' applicability and may be invisible because they run so deep.

Social Theory

Conflict theory. Conflict theory has its roots in the work of Karl Marx. The underpinning ideas are assumptions of human benevolence and economic deter-

minism. Taken together these assumptions weave a picture of social life as one where people are pitted against one another in the struggle to get resources. The separation between haves and have-nots, owners and workers, the bourgeoisie and proletariat in the quest for material goods sets these groups in perpetual opposition, or conflict. Marx picked up on Hegel's notion of dialectic, opposing forces, to describe this process and pointed out how this conflict can only be resolved if its basis, capital, was eliminated and ownerships became communal (Wallace & Wolf, 1991). In this manner it would be possible for human beings to act out of respect for others and the community rather than out of self-interest and competition.

The focus of conflict theory is on social structures, or what has been called the macro level. Central notions involve the idea of collective consciousness and means of raising consciousness through making the conclusions of historical comparative analysis known. The works of Marx are debated today in the original. Additionally there has been a vast proliferation of scholarship in the Marxist tradition. Current focus on political economy, structural analysis, and elements of feminist theories attest to the vast influence and permeation of this theory.

Consensus theory. Consensus theory has its roots in a variety of sources, notably Auguste Comte, Emile Durkheim, and Herbert Spencer. Core to this approach is the assumption that human beings are intrinsically greedy and insatiable (Wallace & Wolf, 1991). Social structures that arise do so in a natural progression toward the advance of society and in the necessary containment and direction of insatiable human desires. In this vein society is viewed like a machine or organism where each part contributes in different ways to the maintenance and improvement of the whole. Which person plays which part is sorted out based on natural competition with those most capable taking on the most difficult tasks and being rewarded differentially based on the difficulty of the task and the process of attaining the role. The structure of society is based on consensus that there is basic agreement about what is important. Where conflict does occur it is a minor deviation that does not challenge the wisdom of the whole, or it is a temporary setback in the overall path of progress. Where social problems like alcoholism, crime, or pollution occur, they are predictable slippages in a societal machine that is generally functioning well and in the interest of the common good.

Central notions are (1) nonsummativity—the idea that the whole is greater than the sum of its parts; (2) evolution—the advancement of society through competition; and (3) function—everything serves a function to the system, its existence being evidence of its necessity. The goal of analysis is to seek out

universal principles of social functioning so as to fine-tune the social machine and develop the most smoothly running form with the lowest degree of slippage possible. A policy like increasing drunk driving penalties is designed to use fear of punishment to reduce this behavior.

Symbolic interactionism. Symbolic interactionism begins with the idea that human beings are creative or reflexive in their behavior and through this in the ways they mediate their experience. The ability to have symbols, meanings about aspects of life experience, which are shared by the group is the precursor to the existence of language. These symbol sets and their negotiation in varying contexts throughout life in changing circumstances become the focus of analysis. Such symbolic interaction begins the study of what has been called the "micro level," the everyday life of face-to-face interaction in human groups.

A central notion is self—the ability to reflect on one's behavior in concert with others and form an inner dialogue about appropriate and desired behavior that determines which actions are undertaken. The thrust of inquiry is to delve into subjective meanings developed in human groups often by becoming part of the group or observing at close quarters.

The macro/micro debate. *Level.* Taken together conflict, consensus, and symbolic interaction form the macro/micro debate, the gap between the immediate everyday and subjective and the abstract, societal, and objective. The existence of this gap has drawn a great deal of current attention and was the defining issue for the American Sociological Association's annual meeting in San Francisco in 1989. It is the basis of two schools of thought in terms of which level of analysis is more important, the macro or the micro, the societal or the interpersonal.

Implicit in the debate about level is an underlying notion of causality in the sense that argument over which is more important, the macro or the micro, seems to rest on determining which has greater causal influence. As I shall argue later in greater detail, this can be phrased as a more fundamental problem with conventional reliance on linear causality. Mechanistic models of cause and effect that necessitate separating out variables and apportioning cause are bound to set in motion a debate about which is more causal. Attempts to reconcile or link the macro and micro have fallen back on this underlying epistemology by trying to assign cause, and with it, blame. My feeling is that this has served to widen rather than narrow the gap, particularly since statistical analyses are more often the method of choice for macro-level strategies. This sets up a situation where the means of resolve is skewed from the start toward one position.

Methods. Implicit in this debate is which mode of inquiry is most appropriate, the objective or the subjective. Use of a notion of the macro level necessi-

tates an accompanying notion of society as an abstract. We cannot *see* Canadian society or American social structures. Their existence must be inferred because they exist outside of our immediate experience. Looking for this abstraction outside of humans' experiences means being objective, trying to stay outside of the phenomena. Marx's approach to this was to acknowledge that there is historical specificity to current knowledge, and then to escape this subjectivity by going back in time or across cultures using historical comparative analysis. Consensus theorists such as Durkheim dealt with the issue by staying at arm's length from the data they collected, examining suicide rates for example (Wallace & Wolf, 1991). The goal here is to drill out subjective bias, which may keep research from reaching accurate interpretation.

Contrarily, micro-level analysis takes the stance that what is of interest is that which is subjective and has meaning for the groups being studied. Symbolic interactionists do see their subjects, often spending a great deal of time in interaction with them. W. F. Whyte spent time with street gangs in Chicago (1943/1981), Erving Goffman with mental patients (1961), Joan Emerson with patients undergoing gynecological examinations (1970), and Barbara Hanson with nursing home residents (1985). The goal in each instance was to capture what the subjective experience in each setting was for the persons involved. These subjective experiences are then crafted into sensitizing constructs that try to communicate what it is like to be in any of these settings and why people behave the way they do.

In issues of methods around the macro/micro debate the question of aggregation versus context arises. Though this issue has not gotten the same attention as objectivity versus subjectivity, I feel it may be as, if not more, crucial to sorting out the nature of paradoxes between the macro and micro. It is perhaps less obvious because it revolves around the practicalities of research and therefore its theoretical relevance may have been missed.

In essence this issue involves the determination of what is the unit of analysis and how that unit is sought in the course of research design. In the case of macro-level analysis the unit of interest is the societal or general social property. In order to derive the social structure or property, data are derived from individuals and then aggregated into an estimation of the whole. This would be the case where individuals are surveyed by telephone prior to an election in order to get a feel for the general pattern in the population of voters as a whole. The general is discerned based on the average and this becomes the property.

Contrarily, attention to context means defining units such that it is the particular, rather than the universal, that is of interest. Because meaning is subjective, answers and issues are particular to the meaning group where they originate. To extend the case above, we might discover that while the largest proportion of

voters (48%) favor a right wing party, the *majority* of voters (52%) split among indifference or less prevalent alternative parties do not favor that party. Or, while the majority of voters in total support pro-life, the majority of women support pro-choice. Each example presents a different side to the issue of aggregation. First, because aggregation to the universal assumes that the most prevalent is the general, even if not the majority, it means that the most frequent will be taken as general will or consensus. This is of particular relevance if we consider that variance explained by aggregate models rarely exceeds 30 or 40% in the social sciences. This means that the general is deduced, based on assumption of the universal, even when models leave 60 or 70% unexplained.

Second, a majority of an entire population does not take into account the interests of particular groups. Thus, while a majority of members of parliament may vote in favor of a law restricting abortion, if they are primarily white, middle- and upper-class men, they may be voting from a perspective that is more detached from the subjective experience of the women who seek abortions.

In total the issue of retaining particular context versus searching for the general via aggregation highlights how we move from the theoretical to the practical and what it means in terms of interpreting results. Does the average represent the particular? Does perceived statistical predominance represent consensus, or a lowest common denominator, or the views of the most powerful?

Theories of Individual Behavior

Behaviorism. One of the most highly debated theories of this century has been behaviorism. The essential assumption here is the equivalence of humans with other species. The artifacts of humanness are just that, artifacts, with no inherent meaning, deity, morality, dignity, or principle. Humans behave in accordance with how they are trained by a series of rewards and punishments. Deviant or conforming behavior is explained in terms of the modes of rewards and punishments in the environment. B. F. Skinner, who popularized this stance, went on to envision a form of utopian society, *Walden Two* (1948), where the environment is perfected through carefully engineered control. This control would eliminate alleged human traits like envy, embarrassment, greed, and so on, which are at the heart of deviance and competition. In this ideal world there would be no crime or disappointment.

The methods of inquiry involve a strict adherence to logical positivism with strong reliance on the idea of nomotheism, the idea that you can derive universal properties based on the observation of individuals and then aggregating these data into average properties. In behaviorism this is extended to mean that not only can you generalize from the individual to the general, you can generalize

from the animal to the human. Vast literatures on the discovery of human intelligence have emerged in this tradition based on laboratory experiments on animals, primarily rodents and to a lesser extent birds and primates. I myself recall checking out a second-year psychology course. I was interested until I found out that for the major assignment I would be "assigned" a rat which I would "shape" (meaning train by reward and punishment) and observe. After the assignment the rat would be destroyed, given that it would then be useless for subsequent research, having been trained.

This anecdote illustrates, in addition to the assumption of human to animal equivalence, the importance of control, or isolation of all possible factors such that a direct relationship between a single cause and observed effect can be inferred. Because of this my rat, had I continued with the course, was useless because once trained, it was not possible to infer a direct causal relationship since it would not be clear whether or not it was my previous training or the next trainer's that was causing subsequent behavior. This stance is directed at maintaining strict objectivity and eliminating all elements of subjectivity, therefore context, from research.

Psychoanalysis. Arguably one of the most pervasive, influential theories of the 20th century, psychoanalysis, like Marxist theory, continues to be debated in its original form, in addition to spawning a profusion of elaborations, extensions, and counter-theories. It begins with the assumption of human subconsciousness. Sigmund Freud posited a tripartite model of human nature: id, ego, and superego. Humans are driven by subconscious desires for life and death (id) that are managed by the emerging ego, which listens to the guilt-evoking superego. The thwarting of desire and accompanying destruction of self-esteem in the course of growing up caused by having sexual, eating, and death impulses judged sick or inappropriate leads to repression of these desires. This repression appears in problems in functioning such as impotence, alcoholism, frigidity, and so on. The task of psychoanalysis is to dig into the unconscious and release pent up frustration and self-disgust by hypnotizing or looking at the dreams of the patient, or analysand.

The principal alliance in method is to a positivist approach stressing the objectivity of the analyst. However, the search for meaning and interpretation in the individual would seem to allow for a model of a creative subjective human.

THEORY OF PATTERNS

A brief review of these major approaches shows an array of assumptions about the nature of humans and what the central features of behavior are. Here is

where the potential of a wholes approach shines through, in transforming the conventional assumption-based debates by providing a new language or meta-theory for confronting issues that allows for, but does not necessitate, assumptions. In so doing it provides a pan-disciplinary and a-assumptive theoretical approach that captures new modes of thinking about the world that are not tied to the specifics of cultural, disciplinary, ideological, or political debates. Instead the focus becomes patterned redundancies when observing systems, those sequences of events that repeat and in so doing are amenable to description.

Each conventional theory reviewed is pinned to an assumption (or assumptions), something which is taken as true. Specific derivatives like Marx's dialectic or Freud's id flow from an initial stance on what is believed to be true, such as human benevolence or subconscious. This is the conventional mode for theory. Begin with an assumption, derive and test ideas that follow. Because of this, this type of theory is tied to its assumptions. Any challenge or advance of this type of theory is ultimately bounded by the assumptions in question. Thus, critique cannot go beyond this. You either accept the assumption or do not.

Acceptance of the assumptions may be tied to any number of motivations: religious, political, emotional, or ideological. However, because acceptance is belief-based there is no chance of resolve. There is an impasse because the ideas form a paradox—ideas true individually that cannot be true together. The Marxist assumption of intrinsic human benevolence is irreconcilable with Durkheim's assumption of intrinsic human greed. By way of analogy the pro-life/pro-choice debate shows up the same principle. Inherent in the sides' names are the bases of the debate. One side sees abortion as a question of murder, the other as a question of control over one's body. In both the case of the theorists and that of the abortion debaters, there is no hope for resolve because their positions are grounded in totally irreconcilable assumptions about what is the true nature of the issue. Thus, the process of argument leading to advance, reminiscent of Hegel's notion of dialectic, is precluded. Instead there remains a kind of "my mom's better that your mom" pattern with resolve coming only in terms of which side is more numerous or has the power to enforce its will.

This is where a wholes or general systems theory approach promises to transcend the classic debates, by freeing theoretical debate from assumptive paradox. Instead of beginning with an assumption, it begins instead with a point of departure, nonsummativity, which states that the whole is greater than the sum of its parts. This idea invites analysis of varying kinds to begin wherever it seems relevant, wherever there is some phenomena that exhibits properties when two or more parts are put together that are not present in those parts alone. Though systems approaches have been used to a variety of ends with a variety of assumptions, I take the stance here that this single point of departure is the

sole requisite of a wholes approach. Any of the elements that I, or others, add to it are options.

This difference in basic structure sets up general systems theory as an approach rather than a theory in the conventional form. In essence a systems or wholes approach is targeted at a new way of seeing the world for purposes of understanding it. In this manner it challenges and transcends more conventional approaches by providing an alternative to a mechanistic way of viewing the world that underpins all of the theories I reviewed. Each of the theories is trapped by debates about determinacy framed as a question of level, by a model of linear causality, or by a mechanistic approach to units. By suggesting alternatives in contexts, cybernetic causality, and relational units, a systems approach is able to reform conventional theories while leaving their inherent assumptions intact. This provides a means of advance within the confines of each theory, while at the same time allowing for a language that is shared across theories. A Marxist approach can benefit from use of the language of equifinality to describe the inevitability of conflict. Parallels can be found in the high rates of recidivism in spousal violence, which may be examined by a behaviorist.

In sum, a wholes approach provides a means of reframing the classical debates about assumptions to which conventional theories are tied. This lies in an epistemological shift to seeing a world of relational wholes, rather than discrete individual pieces. The power of this shift in seeing is witnessed when we stop to consider how the history of the 20th century has pointed increasingly in the direction of issues that are relational to the extent of being global in nature. Perhaps the most significant event in this direction was the development and deployment of the first atomic bomb.

The earliest thinkers of the systems approach, Wiener and Rosenbluth, began articulating the concept of cybernetics in the A-bomb's aftermath and reflect a self-conscious science informed by the new revelation that science does not operate in a vacuum. A thought can ultimately lead to mass destruction. Einstein's equation $E = mc^2$ led in multifinal fashion to the destruction of Hiroshima and Nagasaki. Recognition of the role of science and the need for a socially conscious science is reflected in N. Wiener's book *Cybernetics* (1948).

This development in the physical sciences was echoed in the close link between general systems theory and the rise of peace and conflict studies, exemplified by the work of Rapoport (1974). In the escalation of the arms race, the Vietnam War, and more recently the Gulf War, the appropriateness of a wholes approach came to prominence. The zero sum game as a metaphor for global armed conflict became a question of central attention. Here Rapoport points out vividly how the need for a wholes conception of inquiry is demonstrated by the move toward wars. ". . . [T]he First World War was the chemists' war: high

explosives and poison gas were the gifts of chemistry. The Second World War owes its achievements to the physicists, who gave us radar and the atomic bomb. The Third World War is seen by those who are planning it as a mathematician's war, the war of computers and guided missiles" (Rapoport, 1989, p. 160). This mode of war planning is shown in the 1983 movie *War Games*, where probabilities for success by one side and the costs in casualties are constantly assessed by a computer.

What a wholes approach points out in this instance is that there is no such thing as a discrete war, in the sense of direct cause and effect, win and lose. Seeing the issue in terms of winners and losers leads to a false notion that the effects of war are containable, predictable, finite. In order to make this point clear and advocate a safe deterrent to war, peace and conflict theorists developed the concept of nuclear winter. Through calculation they demonstrated that any thermonuclear war, in addition to immediate damage in terms of loss of life and destruction, would send the world into a quasi-glacier age. The fires created by bombing would produce such a mass of smoke and related contaminants that the atmosphere would no longer allow sunlight to pass, setting the planet into a perpetual winter. This multifinal outcome, nuclear winter, presented a possible deterrent to nuclear war by stockpiling highly combustible materials next to prime targets for bombing, such as military installations (Rapoport, 1989). The relevance of a wholes approach here is to point out how looking beyond initial causes and effects toward ongoing patterns of feedback suggests a new means of seeing the debate.

The importance of a systems approach can be seen in the attempts to frame the Gulf War as "containable" based on using conventional weapons, a simple case of removing a threat by blasting it away. The war was undertaken without thinking through how this supposedly discrete action would magnify in the global system. Has it ultimately strengthened Saddam Hussein's position? What will be the ultimate effects of hundreds of thousands of civilians being killed during the war, referred to as "collateral damage," borrowing the metaphor of medicine? I wrote the first draft of this text in the spring of 1992. The importance of looking at long-term events became clear to me when the U.S. military forces were again dispatched to the Persian Gulf in August 1992, co-emergent with the 1992 presidential campaign. In 1994, George Bush was ousted, while Saddam Hussein remained in power.

There are three elements of a systems approach that promise to transcend the kind of linear, mechanistic, short-term epistemology that led to embarking on the Gulf War: cybernetics, relational units, and process.

In terms of linearity, the systems alternative to causality is to look away from simple finite causal sequences and look instead to the cybernetic, self-

steering nature of systems of two or more parts. In this manner it is possible to frame the Gulf War as a result of an ongoing feedback process that maintains the war industry in the U.S. When the Cold War began to thaw the industry that fueled it remained, meaning that a new enemy threat would co-emerge in order to maintain the seesaw pattern of escalation, advance, and immediate obsolescence of weaponry. It is possible to see past the dichotomy of level in that assigning cause or determinacy to any one part, level or otherwise, becomes moot. It is the co-emergent concert production that becomes relevant rather than attempts to assign cause, and with it blame, either wholly or partially.

Seeing the relational as opposed to the mechanistic means seeing *defense* itself as a relational term. There is no defense without two or more parts; it is a pattern that co-emerges between parts and is not seen in either part alone. Threats, perceived or otherwise, can only exist with two or more parties playing in concert to create and maintain the notion.

Long-term thinking is a metaphor for shifting from seeing phenomena as ending to seeing them as ongoing processes. This is a subtle distinction in that we may believe that we are thinking in process terms but in practice we are thinking in finite pieces of a process by virtue of the way we divide up phenomena to study them. By overlaying a linear cause and effect model on a process, we imply that effects are finite without considering their interactive continuity. Consider the initial effects of something like the proposed fixed link between New Brunswick and Prince Edward Island (PEI). The short-term benefit was phrased as job creation. However, in the long run the effects of the fixed link cannot be predicted based just on the initial effect. What, for example, will happen to the agricultural base of the PEI economy if middle- and upper-class people begin buying up farmland for luxury homes and commute to Halifax?

Another example of problems in thinking in terms of single linear cause and effect versus interactional ongoing process is the case of ballet training. Insisting on skeletal proportions for female dancers may set off a lifelong pattern of anorexia and bulimia, drug use, or chronic injury. Or, insisting on training techniques that change bone structure before it is fully formed may force age limitations on the career of a dancer. These dynamics are chronicled in Gelsey Kirkland's autobiography *Dancing on My Grave* (1986).

In each instance a wholes approach means seeing not just the initial effects but how these effects are reacted to, how the process amplifies and mutates from the original. Within a wholes approach the concepts of feedback, equifinality and multifinality can be used to talk about these patterns in systems.

A wholes or general systems theory approach surfaces as a language for describing patterns in phenomena of interest, using nonsummativity (the whole is greater than the sum of its parts) as a point of departure. It is in essence a

theory of patterns that allows for articulating a series of concepts that work on a new form of epistemological stance, seeing the world in terms of wholes.

ORGANIZATION

This book is in two nonsummative parts leading to a co-emergent wholes approach. Part One sets up some basics of a general systems theory approach, which are derived from a host of disciplines in the physical and social sciences, and are relevant to any system of two or more interrelated parts. Part Two adds a number of ideas that other authors and I have developed in order to analyze human systems, and that may have relevance for other kinds of systems.

For simplicity I have divided the book into a number of subsections. Each presents one idea, shown initially under the heading, then developed in detail. In these sections, I define, explain, and illustrate on the levels of intimacy, organization, and social policy, give derivations and extensions, and conclude with the significance. In this manner there will be repetitive patterns for readers to follow as we greet an array of ideas.

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