

BEYOND LINEAR PRESUMPTIONS

A Working Paper

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**Organizational Learning:
Adaptive Management for Salmon Conservation**

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by

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Preface: This is a working conference. We have expected outcomes which are intended to more "successfully achieve public policy of restoring salmon habitat and populations in the Pacific Northwest." I strongly support this effort. However, experience has taught me that our efforts often fail to address background presumptions. Consequently, it has been difficult for us to produce results that are little more than a fresh coat of paint on the established structures of thought and practice. With this experience in mind, I prepared this working paper that challenges some common presumptions. I hope that it might help in our deliberations as we strive to meet the expected outcomes.

BEYOND LINEAR PRESUMPTIONS

Introduction

A common assumption in management has been this:

Adverse outcomes arise because our understanding of how natural systems function is limited. Thus, we need to better understand the complex systems that support salmon abundance. Management practices adapt as we gain better understandings. This approach requires organizational systems to learn in ways that utilize the improved information.

This paper departs from these assumptions. It sees the salmon Crisis in a very different way. For this paper, the crucial issue for us is not a better understanding of salmon and the natural systems that support their abundance. The crucial issue is the way we understand ourselves and the cumulative consequences of our actions.

Wild salmon should be considered not as a product but as prophetic symbol. As symbol, they stand for something far more than themselves. As a prophetic symbol, they warn us that something is fundamentally wrong with our own behaviors and self-understanding. We have failed to understand ourselves and the consequences of this failure involve far more than the declining stocks of fish.

Linear Presumptions

Consider an imagination exercise that I've used with audiences in the U.S. Pacific Northwest. Spend several days devoted exclusively to (A) watching the television that our children actually watch, playing their video games, driving in traffic from mall to mall, and exposing yourself to commercials of all kinds. Then, after recovering from A, devote several

days to **(B)** quiet reflection near a river or lake in a forest away from the business of our commercial and industrial world. In **A**, we are producers and consumers rushing about in a world of products, schedules, productivity demands, and incessant messages to buy more. In **B**, we are reflective visitors, quiet guests, in a world not of our own making. Both worlds have much to offer.

Now ask yourself, does your value system lead you to say, "We need to devote effort, time, and resources to producing more of **A** and less of **B** for our children"? Do we wish a world for our children even more dominated by **A** at the sacrifice of **B**? Is such a world - **A** promoted, developed, and hyped and **B** reduced, fragmented, and eliminated - so important to us that it is worth the tremendous efforts of time, talent, and resources needed to bring it about? I've yet to have a single person answer "yes." I've never seen a bumper sticker, tee shirt, placard, parent, or politician that said "Pave the Earth," "Kill the Salmon," "Celebrate Traffic Congestion," or "More TV for Kids." And yet most people believe that this shift is actually occurring; **A** promoted, developed, and hyped and **B** reduced, fragmented, and eliminated. Furthermore, there does not appear to be much confidence that more research, as currently practiced, will alter this direction of change (**A** over **B**). Wild salmon are telling us that this transformation is indeed occurring. Because their life cycles span diverse ecosystems and wide regions, they are good indicators of the scale of such transformations.

How do we explain this result, outcomes arising from our behaviors that are contrary to our values (intentions, ideals, and faith traditions)? The simple and fundamentally wrong answer is "blame." The political left may blame those different than the political right, but they share the common presumption "somebody (else) is to blame." We all find it easy to blame somebody.

Some go so far as to blame everybody. But blame, regardless of its form, reflects a fundamental misperception. Stated simply, we presume that:

Bad outcomes in human affairs are little more than the sum of the bad decisions (choices, actions, behaviors) at individual levels.

In more general terms, the outcome as a whole equals the sum of the individual actions leading to the outcome. Or, in human affairs, the cumulative outcomes reflect the values that determine individual actions. Underlying such views is a linear presumption: wholes can be reduced to the parts or sums of their parts. If something goes wrong find the parts that failed. Some look for a few very bad parts, others look for less obvious deficiencies in many (or all) parts that add up to something really bad. In either case, linear presumptions are at work.

Linear presumptions make the world so much more manageable. We can each feel self-justified because "I'm doing my part; if everybody did their own parts well, the whole would turn out well." Linear presumptions are built into our language, common practices (departmentalization), education (specialization), and even the mathematics (linear) drilled into our students. Indeed, nonlinearity (chaos theory, as an example) strikes us as strange, bizarre, esoteric, and largely irrelevant to the practical tasks at hand.

But now think about the implications of linearity. Consider a joke. If the world were linear, we could break a joke down into its components, words. We could then measure the "humor content" of each word. Then, we could add up the humor contents of the individual words to see if the joke were funny. This is absurd! Moreover, the absurdity would not be removed by obtaining more precise measurements of the humor contents of the words, developing larger sample sizes, or employing more sophisticated statistical techniques to our data. The humor of a joke is found in its wholeness not in its parts.

In similar manner, the difference between great music and the kind of noise that I produce when I play a piano (or any other instrument) is not to be found in the properties of the individual notes that are played. The difference, which is obvious, is in the wholeness of the music. The evaluation of my music is not mere opinion; the music is terrible. I can play grand notes on a grand piano but I can't play music. Changing the instrument on which the notes are played would not alter this assessment! Playing faster wouldn't help; measuring my productivity of notes would be a precise, quantifiable, and absurd way to measure my success as a musician.

The salmon are telling us that the music we are playing through our actions and decisions is of such disharmony and discord that they cannot bear it. The jokes we are telling are so sick that the salmon are being driven to extinction. But, as with music and jokes, we can neither grasp nor correct the discord, disharmony, dishumor, and dishonor of the wholeness of our decisions by assessing the qualities of the parts. The salmon are telling us that our linear presumptions are destructive. As a prophetic symbol, they warn us that the consequences of our linear practices involve far more than the decline of fish stocks.

A Simple Model

Imagine human actions through a simple model that begins to depart from our linear presumptions. Our model involves a way of seeing the cumulative outcomes of many people involved in many different decisions at different times and under different conditions. As in the real world, each individual knows only a few of the others and the contexts (situations, conditions) of decisions are highly varied. It is a dynamic world in which the actions of people, hence their decisions, adapt to changing political climates, new information, shifting economic conditions, and changing participants. Imagine the whole decision process as a game involving

many people flipping coins. Each flip of a coin represents a decision. When the coin comes up heads, the decision involves the technological development of some natural resource. "Heads up" outcomes designate decisions like pave a parking lot, build a dam, construct a highway, mine a deposit, or harvest a stand of timber. When the coin comes up tails, the decision involves the protection of some natural system from technological development. For example, "tails up" outcomes designate decisions to protect an old growth forest or prevent development along a stretch of river. Assume that each decision involves an equal value placed upon technological development and protecting the natural world including wild salmon. Thus, wild salmon and old growth forests are valued equally with shopping malls, commercial television, and video games. We imagine such a balance by assuming an unbiased flipping of the coins; "heads" and "tails" are equally probable outcomes of each flip. Each individual decision is balanced, reflecting the balanced values of the people involved.

Rather than focusing upon individual coin tosses at particular times, consider the context of all coin tossing over a long span of time, the entire game. Let us describe this context in some simple way that reflects the general context of decision making. The character of wholeness (the music, not the notes; the jokes, not the words) emerges over time from the countless decisions within this context. For our imaginary world of tossing coins, a context honest to our world can be expressed as a general way to play the coin flipping game. Stated simply, coins that come up heads stay heads. That is, when a flipped coin lands on heads (resource is developed), it is no longer flipped. When a coin comes up tails (resource is preserved), it can be flipped again at some later time. Now, imagine the cumulative outcome of many continuing coin tosses with this context. A tendency emerges from the whole that cannot be seen by examining individual coin tosses. This tendency is the growing presence of all coins in the "heads up" position. Through

many unbiased coin tosses, we approach a world where all coins are "heads up." That is, we approach a world of pervasive technological development (outcome **A**) where wild salmon have no place (outcome **B**).

Linear thinking implies that if these individual decisions are informed by assessments for each outcome, then the cumulative outcome of all decisions will reflect the values of the society, as expressed by each of its decision makers. Our imagination exercise suggests something very different, an **irreversibility principle** which can be stated;

The cumulative outcome of many decisions within a dynamic system will be dominated by the most irreversible tendencies within human actions regardless of the values individuals hold.

Within the context of human activity, each decision (flip of the coin) by itself may balance development and protection, yet the cumulative outcome of many decisions over time favors the more irreversible outcomes, i.e., development. In other words, the quality (value, worthiness) of the whole (cumulative outcome) is not equal to the qualities of the parts (individual decisions leading to the cumulative outcome) but instead reflects the tendency of the whole to sustain (not reverse) some actions rather than others.

All models are simplifications. A model has worth, however, when it allows us to see some matters of importance better than the alternative models. The world is indeed more complex than this flipping coin model. But, the relevant question to ask is this, does this model lead us to understand matters of importance - the irreversibility principle - that our more common models overlook? I believe it does!

The irreversibility principle is particularly relevant for adaptive management. If management is indeed adaptive - if actions change as new information becomes available, economic shifts occur, and political priorities shift - then the cumulative outcomes will be

shaped toward the least reversible kinds of outcomes. On the whole, actions to develop natural resources have been less reversible than decisions to protect natural ecosystems. If adaptive management does not address the irreversibility principle, then the cumulative outcomes of our actions will likely fit this principle. The cumulative imbalance, **A** expanded, hypcd, and intensified and **B** rducccd, compromised, and eliminated, will continue.

Toward a Nonlinear Understanding of “Public”

The decline of wild salmon is not the result of a few really bad decisions. On the contrary, it is an emergent outcome of countless actions, each of which probably seemed reasonable to those carrying out each action. If there had been more information available on salmon and their ecosystems, I doubt that the cmcrgent outcome would have changed much. The fundamental problem lies not in the quantity of information but thc in the linear presumptions bchind the information itself, the practices through which actions are taken, and the very language we use to discuss such matters.

Stated simply, under linear presumptions, wholes can be reduced to sums of parts. The character of a whole reflects the character of its parts. Thus, it makes little Sense to say that whole outcomes can be bad (contrary to intentions, ideals, values, and even common sense) whcn the individual actions within the whole were individually seen as reasonable, responsible, and proper by thoseinvolved. In a linear world the quality of the whole can be inferred from the quality of the parts. And, in a linear world, I could be a great musician; all I need to do is play great notes. But, the world is nonlinear and, alas, I am not a great musician. The generalIcsson: the quality of wholes cannot be reduced to the qualities of parts. Thislesson is obvious with respect to my lack of musical ability but not so obvious with respect to societal outcomes. but the

latter are far more important. Wild salmon, as prophetic symbol, are warning us that this lesson should be taken seriously.

So what ought we do? First, let us “nonlinearize” our language. I will select one word: public. Consider two definitions:

1. Public: of or pertaining to the whole of a people
2. Public: of or pertaining to the sum of the people

Under linear presumptions these two definitions are the same. Thus, the notion “public good” is reduced to “the sum of individual goods.” It makes little or no sense to sacrifice individual (private) goods for public goods.

In a nonlinear world, however, definition 1 is as different from 2 as music is different from the sum of notes. It’s not that private goods (or notes) are unimportant. They are! Nonlinearity forces us to recognize that from individual goods, all desirable within the contexts that they are chosen, public good can be lost. Public good cannot be reduced to the sum of goods and services consumed by individuals.

The flipping coin model provides a simple illustration. An imbalanced world for our children (**A** overwhelming **B**) emerges a history of balanced decisions (valuing **A** and **B** equally). Protecting a balance becomes a public concern, a concern not reducible to the fair (balanced) flipping of individual coins. The irreversibility principle tells us how a public good can be lost.

Public health is a public good requiring public agencies. The control of contagious disease, as an example, does not occur through the efforts of individuals to take care of themselves. Notions of “public agency,” “public responsibility,” “public service,” “public discourse,” and “public education” have similar nonlinear implications that become trivialized

under linear presumptions. So what can we do? One matter of importance is to emphasize the nonlinear meanings of “public” that are clearly different from common linear trivializations. The word “public” must include emergent outcomes (wholes) not reducible to the intentions behind individual actions (parts). Without such a transformation of meaning, I fail to see how public agencies could fulfill public responsibilities, regardless of how much research is done on matters such as salmon and their ecosystems. Similarly, I fail to see how adaptive management could provide the public service needed. Without challenging linear presumptions that pervade academia, I fail to see how my own institution can provide the public education and public service that our age sorely needs.

Unfortunately, however, in America today, linear presumptions in human affairs have become a dominant ideology. Stated simply, linear reasoning goes like this:

In any free exchange between individuals, the exchange will not occur if both parties do not benefit from the exchange. Thus, a free exchange is good or it wouldn't occur. If each free exchange is good, then the sum of all free exchanges will be good. The greater the sum of individual goods (occurring through free exchanges) the better we are as a whole.

From this linear perspective, public good (apart from the sum of private goods) makes little sense. Public agencies are viewed with hostility as government bureaucracies that restrict free exchange and thus reduce the sum of goods (presumed to be the whole). Under such a linear ideology, what is demanded is maximizing the amount of exchangeable consumer products (“goods and services”). Unfortunately, universities have largely bought into such linear presumptions

Under this linear ideology, the production of video games - play them, they're violent - are goods, consumer products. But the elimination of smallpox (a disease that killed more people in the last century than all wars) or the protection of national parks hardly ever come up

because they don't fit linear presumptions. These are public accomplishments brought about by public agencies- Cumulative environmental loss, global climate, or the risks of emergent diseases arising from increasing human population and expanding global travel are problems that tend to be overlooked, dismissed, or trivialized because they don't fit a linear understanding where the good of the whole is reduced to the sum of consumer products available to individuals. They are public concerns demanding public responses.

Organizational Systems

How might nonlinearity influence our perception of organizational learning? The term "organizational learning" is misleading. It tends to promote a confusion of parts and wholes. In ecology we know that whole ecosystems cannot be reduced to organisms. We know that music cannot be reduced to notes. In human affairs, however, we often reduce organizational systems to the properties of their parts, individual persons. As humans, we understand from experience what learning is. Too easily we transfer this understanding, to organizational systems. When we think of organizational "learning" we think we know what we are talking about because, as a person, we know what learning is. But, organizations are not persons. To think of them as persons is a fundamental mistake, a confusion of parts (notes) with wholes (music).

As individuals, we see learning as a good thing; it helps us to get along in our world. Organizational systems also "learn" to get along in the world. But, should we presume this to be a good thing? Consider an example. The tobacco industry includes vast organizational systems that have "learned" to thrive and grow. With respect to common measures of organizational success, Philip Morris has been one of the most successful. But, the consequences of this "success" have contributed to the death of millions of people.

My own research on Organizational systems, including the tobacco industry, sees them as emergent systems with behaviors not reducible to the behaviors of individuals. They are complex, adaptive, and nonlinear (CANL) systems able to adaptively self-organize in self-serving ways. Among their emergent behaviors are common tendencies to selectively distort information. Systemic distortion is a general phenomenon that only requires that individuals do what seems proper and reasonable within the context of the system. Deliberate fraud and deceit are not required. Systemic distortion is an emergent outcome not reducible to parts. To merely blame individuals is a common mistake that arises from linear presumptions applied to nonlinear phenomena. We make a serious mistake (a linear presumption) when we treat organizations as individuals or reduce their distorting tendencies to the malevolence or incompetence of individuals.

When we speak of adaptive management and organizational learning we must come to a better understanding of adaptive change within complex human systems that are fundamentally nonlinear. These are CANL (complex, adaptive, and nonlinear) systems. To speak of them as if they were individuals invites linear misperceptions that allow emergent outcomes to continue even as we blame each other.

I realize that such notions may seem far removed from the practical demands of our work. But, this too involves linear misperceptions. Given linear habits, we presume that if everybody did their parts well, the whole would be done well. Applying a common metaphor, "a chain is only as strong as its weakest link." If each link is strong (each part done well), the chain will be strong (the whole will be done well). Following this metaphor, we reason: "If I do my job well, and everybody else does the same, then the whole will be done well." So, rather than

talking about the whole (which doesn't fit our chain metaphor), we focus upon the practical demands of our own part (our link).

Change this linear metaphor into a nonlinear metaphor (say, music). Then, this reasoning makes no sense. "If I play my note well and every one else does the same, music will be done well." This is absurd! The whole itself must be addressed. But how?

Think of our current predicament in the following steps.

1. We were interested in protecting the "natural world," ecosystems, but
2. We didn't study the complex organizational system through which human actions are taken but instead
3. We studied natural ecosystems but then
4. We reduced ecology to biology allowing ecological problems to be reduced to a problem of insufficient fish production and then
5. We reduced biology to genetics and then
6. the courts were able to find that, on the basis of genetics we have not made a case that there are significant differences between wild and hatchery salmon, so then
7. We continue to solve "the problem" (4 above) by hatcheries and other technological means and
8. Within the contexts of the organizational systems that brought this about, each of us feels that "my own actions are reasonable, responsible, and proper."

What should we do? Move back to step 2! We need to understand the organizational systems that shape our modern world, not by reducing them to the intentions of individuals but seeing them as CANL systems with emergent outcomes not reducible to parts. I don't expect these organizational systems to fund such studies. Nevertheless, we have a number of veterans, whose experiences and stories of frustration have a lot to tell us. Our challenge is to construct models that are honest to their experiences. (I have examples.) Such studies should seek to

explain organizational outcomes that are both harmful and emergent (not reducible to parts), We need to develop alternatives to the linear understandings (e.g., blame).

In the shorter term, I suggest that we think of organizational systems much like we think of ecosystems. Both are self-organizing and adapting. Neither can be understood by reducing them to parts. How might we then see organizational "learning"? Ecologists tell us that the character of ecosystems reflects their history of disturbances, the "disturbance regime." In adapting to experienced disruptions over time, whole patterns of relationships are transformed. A system reflects the history of disruptions from which it emerged. Change the disturbance regime and you change the course of adaptive change.

From this perspective, efforts to promote more credible organizational systems involve promoting more credible disturbance regimes. Independent checks, professional responsibilities, and the actions of an alert and knowledgeable citizenry all contribute to such credible disturbance regimes. By enhancing the credibility and effectiveness of such means, we create conditions where harmful outcomes emerging from human systems tend to promote disturbances. Adaptive change would then tend to shift these systems toward less harmful arrangements. Such a model of organizational learning provides an alternative to common linear models that we too often take for granted. We can begin this by insisting that public agencies actually pursue public responsibilities. We should support them when they do and challenge them when they do not. Further, we should promote and enhance a citizenry that meets such public responsibilities. Finally, I sincerely hope that such challenges are directed at universities, my own included.

Conclusion

In whatever efforts we make to promote better management, we need to recognize and address linear misperceptions that are embedded in established habits of thought and practice. If we do not, we are likely to do little more than put a new coat of paint on an old structure of thought and practices. Then, the inherent misperceptions and deficiencies are likely to continue.

How might we move in a more meaningful direction? This working paper claims that we need to take the notion of "public" seriously, challenging linear trivializations. There are public goods that cannot be reduced to the sum of private (individual) goods (commodities, consumer products, etc.). There are public responsibilities and we need to make clear the consequences that arise when such responsibilities are not met. The irreversibility principle can provide some guidance in this regard and we should employ it when developing the expected outcomes of this conference. We need to promote more credible disturbance regimes for organizational systems by challenging them when they do not meet public responsibilities (properly understood). Finally, we need to be both thoughtful and bold.