The Law of Requisite Variety

Why Flexibility is Important for Success in a Changing World

by

Robert B. Dilts

NLP University Press

P.O. Box 1112
Ben Lomond, CA 95005
Phone: (408) 336-3457
Fax: (408) 336-5854
e-mail: teresanlp@aol.com
web site: http://www.nlpu.com

Contents

The Law of Requisite Variety

Introduction

The *Law of Requisite Variety* is a fundamental tenet of systems theory, having to do with the necessity for variation and flexibility within a system. This law relates to mechanical, biological and social systems, and has profound and far reaching implications for how we manage our organizations, our clients, our families, our health and our lives.

According to systems theory, our bodies, our societies, and our universe form an ecology of complex systems and subsystems all of which interact with and mutually influence each other. It is not possible to completely isolate any part of the system from the rest of the system. Thus, all of the interactions that take place within a human being and between human beings and their environment follow certain basic principles and rules of systems. Biological and social systems, for instance, are based on certain 'self-organizing' principles and naturally seek optimal states of balance or homeostasis.

The Law of Requisite Variety states that in order to successfully adapt, achieve or survive, a member of such a system requires a minimum amount of flexibility. That amount of flexibility has to be proportional to the variety that member must contend with in the rest of the system.

A classic example of the repercussions of this principle is illustrated in the success of our Cro-Magnon ancestors over the Neanderthals. Approximately 30,000 to 60,000 years ago, both Neanderthal and Cro-Magnon peoples populated the earth. The Neanderthals were in many ways anatomically similar to the Cro-Magnon, with the exception that the Neanderthals, who predated the Cro-Magnons by tens of thousands of years, were generally physically stronger and

had a slightly larger brain size (the Neanderthals' brain size was nearly 10% greater than our own). The main difference between the two groups, however, was in the degree of 'requisite variety' they exhibited. Throughout the Neanderthal sites excavated in Europe, Asia and northern Africa, the types of tools and encampments constructed by the Neanderthal peoples are roughly the same. Their tools consisted primarily of hand held stone tools and wooden thrusting spears, and they had no obvious art objects.

Cro-Magnon sites, on the other hand, are characterized by the degree of diversity and uniqueness evident in their tools, jewelry and other artifacts. In addition to many variations of stone tools, the Cro-Magnons made tools of bones and antlers, including 'compound' tools such as bows and arrows, and nets made from rope. The Cro-Magnons were constantly making innovations and adaptations in relation to their environment and their previous creations. The Neanderthals were unable, or perhaps unwilling, to produce innovations or adaptations in their way of doing things. They show no variation with respect to either time or location. The eventual extinction of the Neanderthals and the rise of the Cro-Magnons into modern humans can be directly related to their relative degree of 'requisite variety'. The Neanderthals were unable to adapt, either to environmental changes, or to their Cro-Magnon coinhabitors.

The history of environmental ecology and evolutionary biology is filled with similar examples. A certain degree of biodiversity is necessary for adaptation and survival. The Irish potato famine of the mid 19th century, for instance, was caused by an overspecialization on the potato as a staple food. Because the potato was easy to grow and thrived in Irish soil, farmers focused on it as the primary food source. The success of the potato brought about a corresponding explosion in the population. The 'late blight' that killed the potato in 1845 and 1846 lead to the starvation and exodus of countless people. Had the farmers not created such an agricultural 'monocul-

ture', and balanced their planting with other types of crops, they might have possibly produced enough 'requisite variety' to have avoided the widespread starvation brought about by the destruction of the potato crop.

In a way, then, the Law of Requisite Variety can be viewed as an extension of the old adage, "don't put all of your eggs in one basket." If something happens to that basket, you've lost all of your eggs. There are also deeper and more subtle implications of the Law of Requisite Variety, extending beyond biology into social interactions and everyday life. And, the fact remains that, even though we may all nod our heads in understanding of the lessons cited above, that there are still many companies, associations, political parties and families with no more 'requisite variety' than the Neanderthals.

Ashby's Law

The Law of Requisite Variety was initially stated by W. Ross Ashby in his book *Introduction to Cybernetics* (1956, 1971, pp. 206-207). In fact, the law is sometimes referred to as "Ashby's Law" in honor of its formulator. The field of cybernetics (Weiner, 1965) addresses the control or regulation of complex systems (mechanical, biological and social). In fact, the word "cybernetics" comes from a Greek term meaning "steersmanship."

Ashby's law essentially asserts that *"variety is required to regulate variety."* To explain this principle, Ashby gives an example of two individuals, A and B, playing a game. Let's say Mr. Neanderthal (A) and Ms. Cro-Magnon (B) are playing cards. At the beginning of the game Mr. Neanderthal might be holding five cards (1,2,3,4 & 5), while Ms. Cro-Magnon has only one card ('a'). If Ms. Cro-Magnon's card can beat (+) only one of Mr. Neanderthal's cards and would lose to (-) or draw with (?) the remaining cards, Ms. Cro-Magnon's chances of a successful outcome are very limited. The table below shows

one set of possible outcomes of Ms. Cro-Magnon's response to Mr. Neanderthal's selection.

		B (Ms. Cro-Magnon)	
		a	
	1	–	
	2	?	
A	3	+	(Outcome)
(Mr. Neanderthal)	4	–	
	5	?	

Table 1:

B Has No 'Control' With Respect to the Outcome of the Interaction

Clearly, a positive outcome for Ms. Cro-Magnon is only possible if Mr. Neanderthal chooses to play card number 3. Since Ms. Cro-Magnon can only respond with card 'a', regardless of the choice Mr. Neanderthal makes, Ms. Cro-Magnon has no 'control' over the outcome of the game. The outcome is completely dependent on Mr. Neanderthal.

Now, let's say Ms. Cro-Magnon is dealt another card, giving her two cards, 'a' and 'b', producing the outcomes shown in the table below.

A \ B	a	b
1	–	+
2	?	–
3	+	?
4	–	?
5	?	+

Table 2:

By Adding Another 'Choice' B is Able to Direct the Outcome More of the Time

In this situation, a positive outcome is possible for Ms. Cro-Magnon for three out of five of Mr. Neanderthal's cards (1, 3 and 5); if Ms. Cro-Magnon makes the appropriate response. The variation in the outcomes can now be reduced by Ms. Cro-Magnon, in that she can insure either a '+' or '?' outcome, regardless of the card that Mr. Neanderthal plays.

We could extend Ms. Cro-Magnon's flexibility even further by dealing her a third card, 'c', producing the outcomes shown in the following table.

A \ B	a	b	c
1	–	+	?
2	?	–	+
3	+	?	–
4	–	?	+
5	?	+	–

Table 3:

B Has Enough Variety to Successfully Regulate the Outcome

In this scenario, a positive outcome is now possible for Ms. Cro-Magnon for any move selected by Mr. Neanderthal; depending of course on whether or not Ms. Cro-Magnon chooses the appropriate response. We can say that Mr. Neanderthal's variety has been "absorbed" by Ms. Cro-Magnon. If Ms. Cro-Magnon is dealt one or two more cards, her variety would clearly eclipse that of Mr. Neanderthal, and she would dominate the game.

Thus, one important implication of the law of requisite variety is that the member of a system that has the most flexibility also tends to be the catalytic member of that system - like the queen in the game of chess. The ramifications of this are obvious for individuals and organizations operating in a dynamic, free market economy. The individual or group with the most flexibility is able to manage a situation better than whose who are more limited or rigid.

We should also note, however, that in our metaphorical card game above, Ms. Cro-Magnon's increased variety is not a guarantee of success. When she only had one card, Ms. Cro-Magnon had at least a one-in-five chance of a positive outcome. With five cards, a negative outcome is also possible for any move made by Mr. Neanderthal, depending on how Ms. Cro-Magnon responds. Choice brings responsibility and the need for wisdom along with it. The Irish potato farmers were 'rational' to continually select the type of potato that yielded the largest crop, but they were not necessarily 'wise'.

A Common Misinterpretation of Ashby's Law

Ashby's example of two people playing a game has lead some to interpret the Law of Requisite Variety as essentially something like, "the person with the most flexibility wins;" or, "the element in the system that has the most variability controls the system." The implication is that the salesperson, therapist or leader with the most flexibility of approaches will be the one who closes the sale, creates the change or dominates the interaction. While this formulation may provide valuable guidance or inspiration in certain situations, it is also problematic from several perspectives.

First of all, this interpretation is not really 'systemic', in that it presupposes that the individual or 'element' being referred to is somehow isolated from the rest of the system. In order to judge that one has "won" or "controlled" something or somebody else, one has to perceive oneself as ultimately separated from it. According to systems theory, however, all elements of a system are interconnected and mutually influence one another. As Gregory Bateson pointed out, "...no part of an internally interactive system can have unilateral control over any other part." According to Bateson, the behavior of any individual or element in a system is determined "by the behavior of the other parts of the system, and indirectly by its own behavior at a previous time."

A second assumption of this interpretation is that the situations to which it refers involve competition or conflict. These type of situations are commonly referred to as "zero sum" interactions, in which one person wins and the other loses. It is important to keep in mind, however, that Ashby's 'game' need not be competitive. The Law of Requisite Variety applies to many different types of situations. In cases such as the Irish potato famine, everyone loses. Ashby's law would also be valid for a cooperative game, requiring appropriate responses from both A and B in order to produce a mutual 'win-win' as a positive outcome.

The interaction between A and B may not be a game at all. A and B could be a pilot and co-pilot, two mountain climbers, a child and a parent, etc. The interaction does not have to be restricted to only that between two individuals. It could be that of a commercial enterprise, in which the variety represented by A could be a group of different customers and B could represent the number of products or services available. For example, A could represent five different customers entering an ice cream store, and B could represent the number of flavors of ice cream available (i.e., a = vanilla, b = chocolate, c = strawberry). If the customers have different preferences for ice cream (+, -, ?) the implications of Ashby's law become obvious. If the store only has vanilla available (Table 1), only one customer will be satisfied and buy an ice cream cone. If vanilla and chocolate are available (Table 2) the store will be more successful. If all three flavors are available (Table 3), the customers and the proprietor of the store all win. The customers are able to get what they want and need and the store makes more sales.

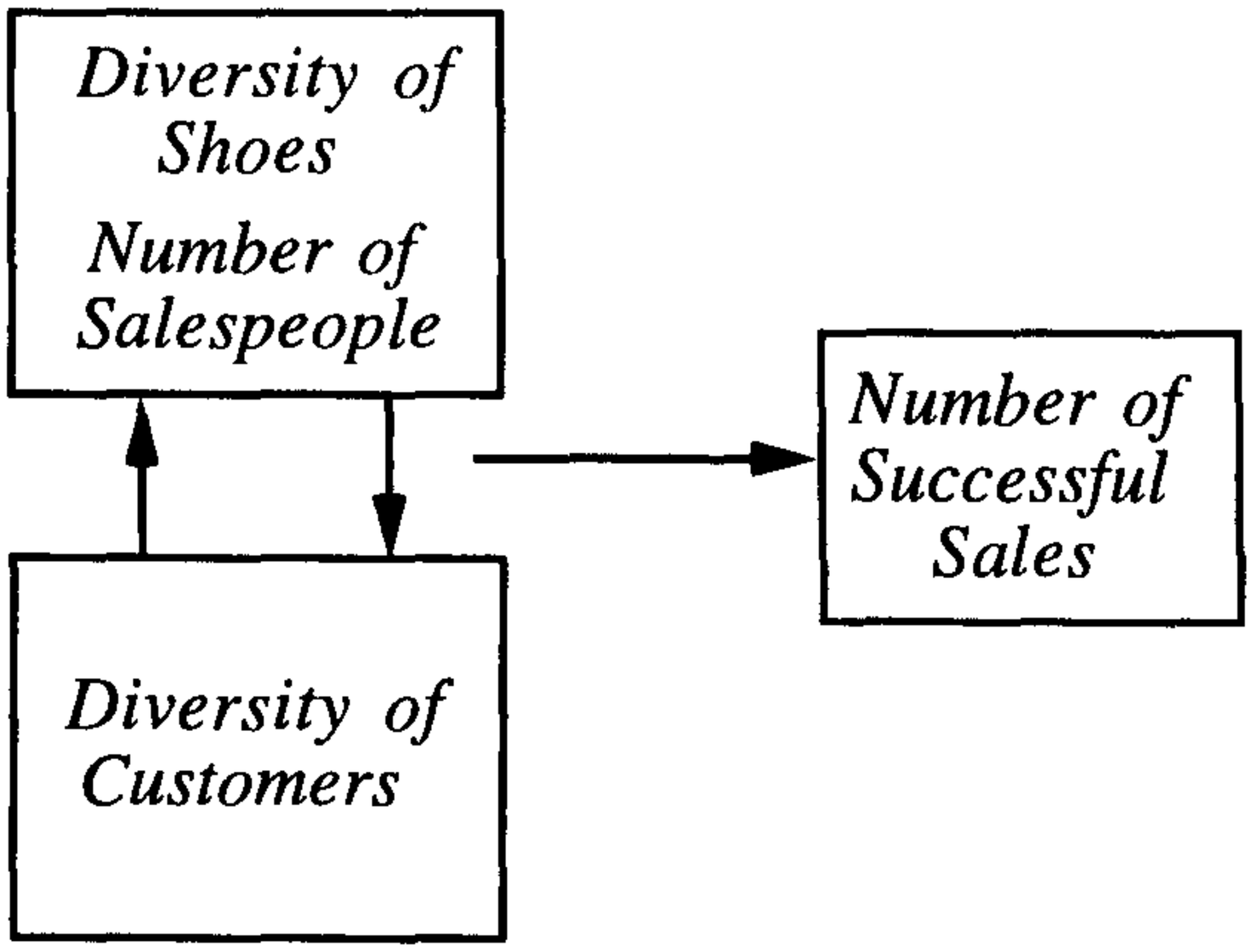
Managing Diversity

This latter interpretation has implications that extend far beyond competitive game playing. It provides us with a fundamental rule for managing diversity.

Change and diversity are a fact of life. From the perspective of systems theory, both Nature and Society tend towards diversity. We cannot avoid it. Rather, we must learn to more wisely address it if we are to survive into the next millennium. According to cybernetics, there are two basic ways to deal with diversity: (1) to try to reduce or "attenuate" it, and (2) to attempt to regulate or "absorb" it.

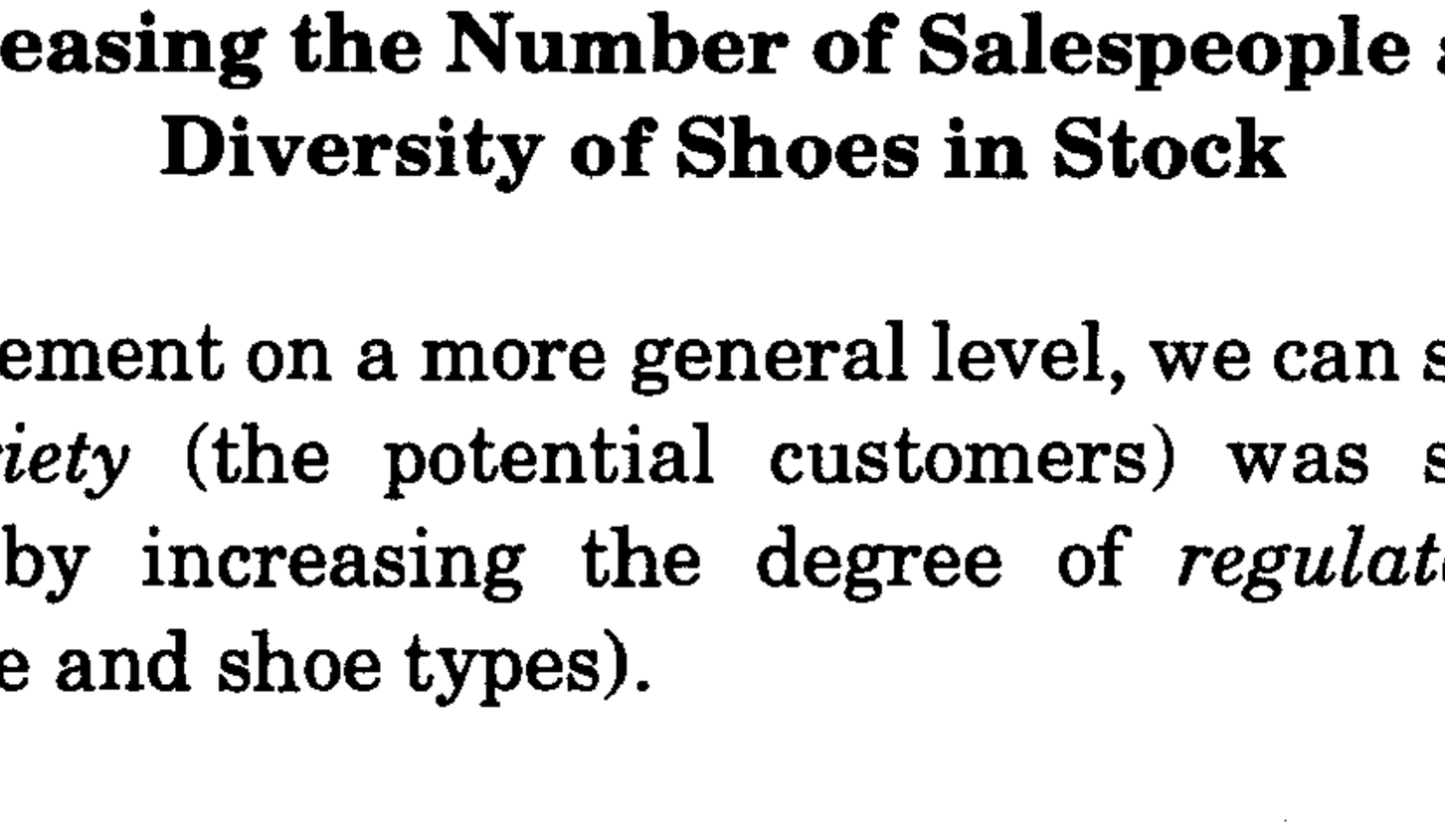
To illustrate the two approaches, consider a person opening a shoe store. If the store begins to become successful, it will naturally attract an increasing number and variety of customers, who will have different needs and preferences for shoes (i.e., sizes, colors, styles, etc.). Eventually the number and diversity of customers and their demands for different sizes and types of shoes will become more than a single person can handle, and the store's proprietor will need to make a choice.

If the owner were to attempt to "attenuate" the diversity, he or she would decide to specialize in only certain types of shoes (say, high fashion women's shoes). In order to "absorb" the diversity, on the other hand, the owner would need to hire more salespeople and stock a wider variety of shoes. In this way, in accordance with the Law of Requisite Variety, he or she will effectively "absorb" the diversity of customers and achieve a greater number of successful sales (similar to the way that Ms. Cro-Magnon's additional cards allowed her to to direct the outcome of the card game).



A Diversity of Customers is "Absorbed" and Regulated by Increasing the Number of Salespeople and the Diversity of Shoes in Stock

As a statement on a more general level, we can say that the *system variety* (the potential customers) was successfully 'absorbed' by increasing the degree of *regulatory variety* (salespeople and shoe types).



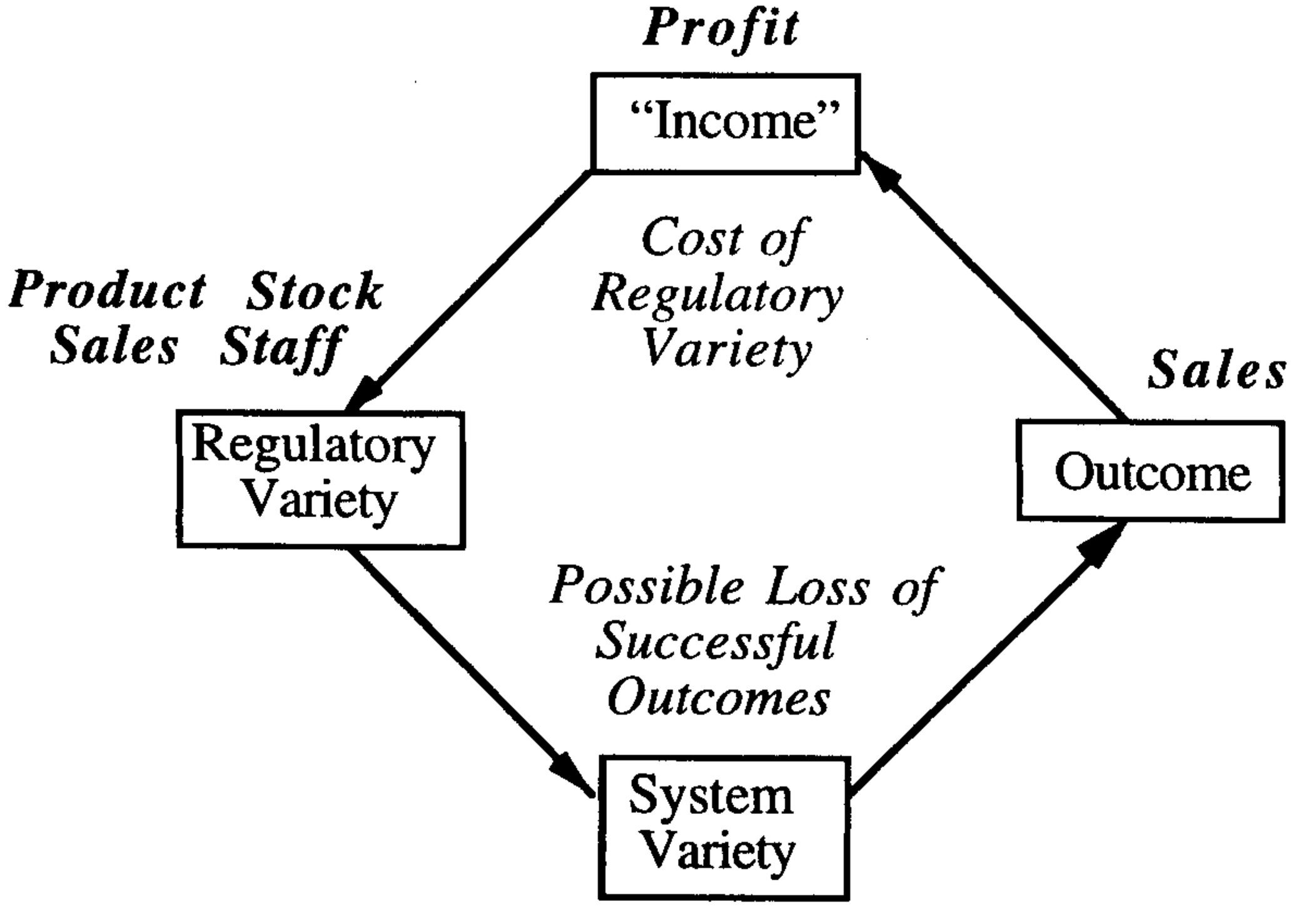
As System Variety Increases, Expanding Regulatory Variety Leads to a Greater Number of Successful Outcomes

Growth arises when an increase in regulatory variety stimulates more variety in the system. For example, when an increase in the variety of shoes or number of salespeople serves to attract even more new customers.

The 'Costs' of Requisite Variety

The decision of the shoe store owner as to whether he or she should attempt to specialize and "attenuate" the increased diversity of customers, or to expand and "absorb" the diversity of customers, often comes down to a matter of 'cost'. That is, the store owner needs to balance the desire to achieve 'outcomes' with the desire to receive 'income'. There are significant costs associated with hiring more salespeople and stocking a wider variety of shoes. In many ways, more diversity and variety means more time, more costs, and more hassles.

It is important to keep in mind, however, that profits or income can be reduced in two ways: (1) by the costs involved in hiring more people and increasing the variety of shoes in stock, and (2) through the loss of potential sales because customers cannot be satisfied. If the store owner is able to be innovative, he or she may find ways to reduce some of the costs of regulatory variety, or to distribute it differently. New technologies and operating methods, for instance, might be used to help to involve customers more in their own decisions and decrease the time needed by salespeople to handle them.



The Costs of Increasing Regulatory Variety Need to be Balanced with the Possible Loss of Successful Outcomes Created by an Increase in System Variety

Even if the owner were to decide to specialize, the diversity of customers is not actually "attenuated." It has simply been deflected somewhere else, and will either be absorbed by another store, or remain latent in the population. In the latter case, continued pressure will be placed on the owner to expand his or her business, or on others to open stores that will satisfy the latent needs and demands of potential customers.

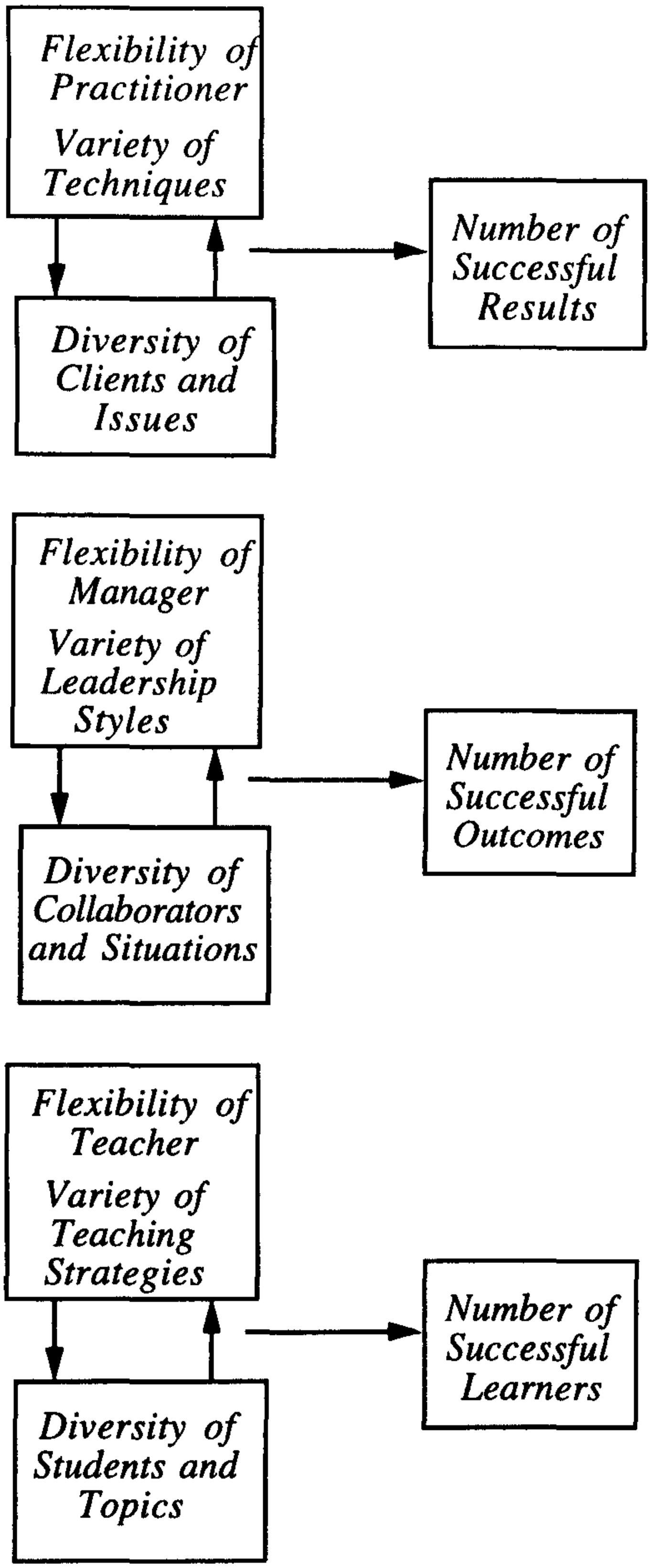
Naturally, it is possible to specialize successfully. Many stores find niche markets, in the same way that diverse species of animals adapt to an environmental niche. However, this is only possible if the requisite variety is available in the larger system.

Thus, we can see that the satisfaction of the Law of Requisite Variety is the defining condition of a successful enterprise or team, and is the limiting condition of 'downsizing'. An effective organization or team must have the 'requisite variety' to be able to perform all of the functions and handle the diversity of conditions which are necessary to achieve their desired outcomes. If a company 'downsizes' below the threshold of regulatory variety required to adequately perform its tasks within the dynamic system surrounding it, it is in serious danger of going the way of the Neanderthal.

According to systems theory, 'fitness for the future' is as important a criterion for survival and success as 'optimum use of resources' in the present. Many teams and organizations, however, seem to follow the strategy of the Irish potato farmers of the last century, primarily focusing on optimizing short term results. The degree of 'requisite variety' present in a particular system or approach should be a primary criterion for all process re-engineering, planning and strategy formulation.

Some Implications the Law of Requisite Variety

The general principle that *regulatory variety needs to keep pace with system variety in order to produce successful outcomes* may be applied to a host of different contexts. To reach successful outcomes, therapists, managers, coaches and teachers must have enough flexibility and varieties of techniques, styles and strategies to address the diversity of situations and needs presented by those with whom they are interacting.



Successful Outcomes are Dependent on the Ability to Address a Variety of Different Needs and Situations

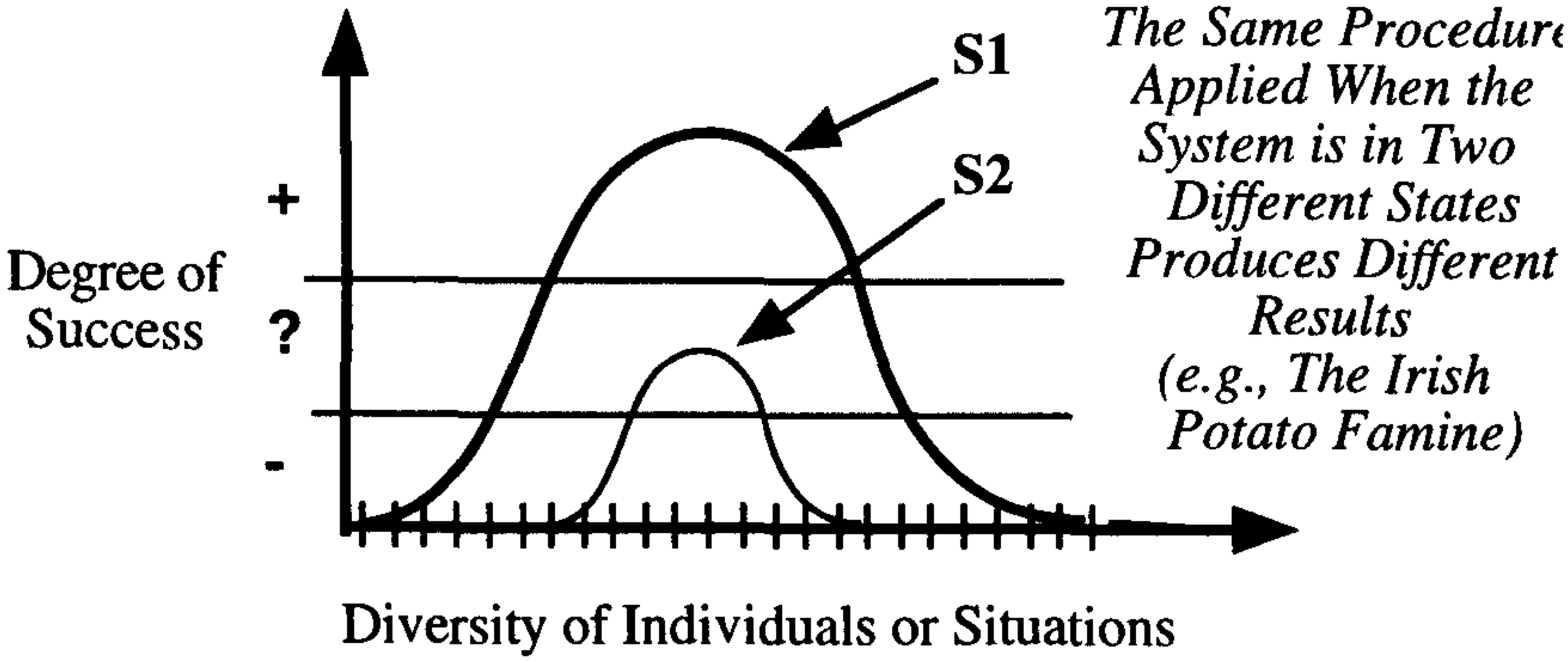
One of the implications of the Law of Requisite Variety is that, if you want to consistently get to a particular goal state, you have to increase the number of options available for reaching that goal in proportion to the degree of potential variability in the system. As the lesson of the Irish potato famine illustrates, it is important to explore variations in operations used to accomplish goals, rather than simply repeat the same one — even if it has produced successful results in the past.

It is often claimed that "if you always do what you've always done, you will always get what you've always got." But it is not necessarily true that you will even "get what you have always got." Doing the same thing does not always produce the same result if the surrounding system changes. Because the environments and contexts in which we operate change, the same procedure will not always produce the same result. If you want to consistently achieve your goal, you must vary the operations you are using to get to it. When you continually use the same procedure in a dynamic system, you will produce a varying result. In fact, as a system becomes more complex or dynamic, more flexibility is required.

As a simple example, let's say someone has a goal to move a chair across a room. When there's not much variation in the environment, he doesn't need much flexibility to accomplish that goal. He picks up the chair and carries it directly across the room. If he were in California, however, and there was an earthquake, he would have to have more potential variability to reach that goal because of changes being introduced in the environment. He might have to dodge a piece of plaster if the ceiling were falling. Flexibility is needed to adapt and survive.

It is obvious that if there is a traffic jam or road work blocking your typical route to work, you will not get there on time if you 'do what you've always done'. Instead you must find alternative routes. Taxi drivers in big cities often know a

variety of ways to get the airport or to a particular street in case there is some type of obstruction on the usual route.

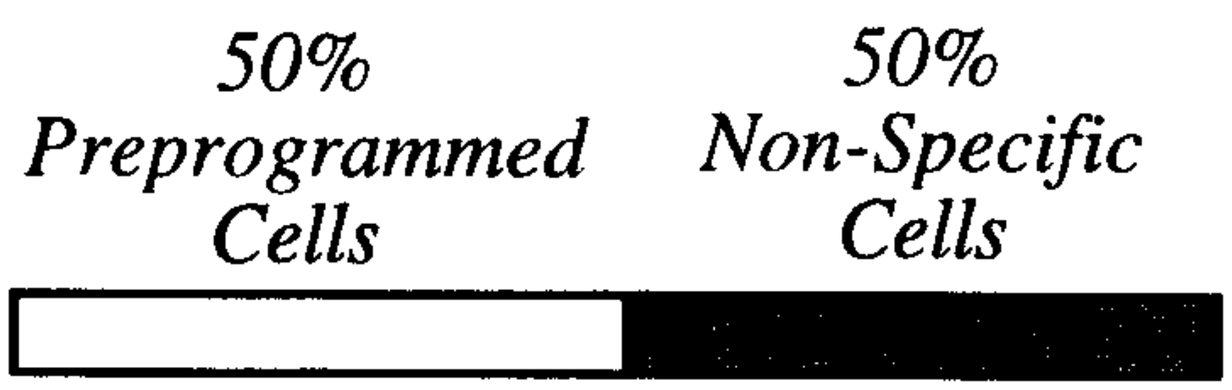


The same operation that produces successful results when the system is in one state (S1), may be ineffective when the system changes states (S2).

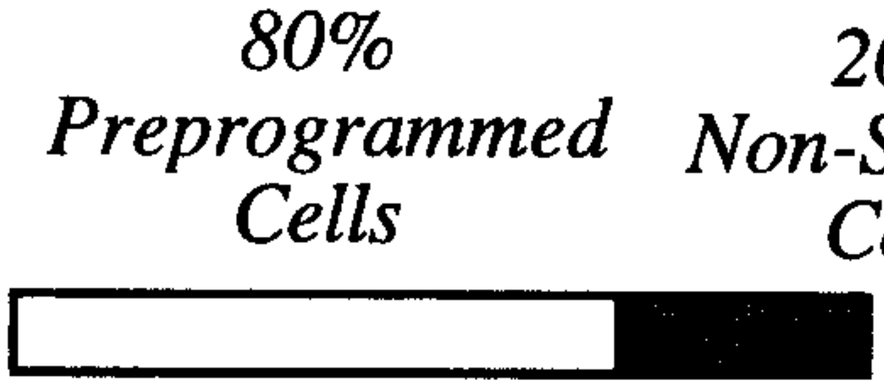
The necessity of requisite variety is probably nowhere more evident than in the basic biology of our bodies. The biological killers that plague us today are not dangerous because of their strength, but because of their 'requisite variety'; and our lack of requisite variety to regulate them. What makes cancer dangerous is its degree of variation and adaptability. Cancer cells are quickly changing cells that are able to adapt rapidly to different environments. Cancer becomes life threatening when our immune systems are unable to produce the regulatory variety necessary to identify and effectively 'absorb' proliferating cancer cells. The field of oncology has been stymied in its attempt to treat cancer because cancer cells have more requisite variety than the powerful chemical poisons and radiation treatments being used in the attempt to destroy them. At the beginning, these treatments are able to effectively kill many cancer cells

(along with many healthy cells as well, unfortunately). Variations of the cancer cells, however, are eventually produced that are resistant to that treatment; leading to a reoccurrence of the cancer symptoms. Stronger and more deadly chemicals are tried, until a point is reached in which the therapy becomes life threatening to the patient, and no more can be done to help medically.

The AIDS virus produces similar problems. Like cancer, the AIDS virus is extremely flexible and adaptable, making it difficult to treat with chemotherapy. The virus itself effects the immune system reducing its flexibility. It should be noted that the AIDS virus does not destroy a person's entire immune system. It only influences parts of it. People with AIDS still fend off many infections and diseases every day. What AIDS influences is the immune system's adaptability. Recent studies have shown that in a healthy person's body, roughly half of the immune system cells are 'preprogrammed' to respond to specific illnesses. The other half are not yet programmed to respond to anything in particular, leaving them available to adapt to new challenges. In the bodies of people who have AIDS, that ratio changes such that approximately 80% of the immune cells are preprogrammed and only 20% are non-specific and free to learn and adapt to new situations. The cells that are effected by the AIDS virus are the ones that give the immune system its 'requisite variety'. Metaphorically, AIDS creates a 'Neanderthal' immune system.



Normal Immune System



Immune System Effected By AIDs

The Immune Systems of AIDS Patients Have Lost Much of Their 'Requisite Variety'

An implication of the Law of Requisite Variety is that these illnesses would be most effectively treated by increasing the regulatory variety of the immune system. A healthy immune system is essentially an effective learning organization. In fact, people who have natural immunity to AIDS appear to already possess an immune system that has the requisite variety to address the virus. Thus, the issue is not so much the 'strength' of the immune system, but rather its degree of flexibility to respond. Medical treatments might be more effective if they focused on how to stimulate the requisite variety of the immune system, rather than producing stronger external means to destroy cancer cells. It is important to remember that the Neanderthals were physically more powerful than the Cro-Magnons, but did not have access to the same degree of requisite variety.

Because of our lack of understanding of the Law of Requisite Variety we often try to simply attack the problem, rather than encourage the natural predators.

In summary, according to the Law of Requisite Variety we need to constantly explore variations in the operations and the processes that we use to get results. Even processes that have been effective in the past might not continue to be effective if the environment or the system around it changes. From this perspective, one of the primary traps or limits to growth is past success. It's easy to believe that "nothing succeeds like success" and that because something was successful before, it will continue to be successful. But if there are changes in the system around it, those things which used to work will no longer continue to be effective; as the Irish of the last century discovered with potatoes.

Therefore, if someone is committed to accomplishing a certain goal, he or she needs to have a number of possible choices to reach it. The number of different ways a person needs to achieve a particular goal depends on the amount of change that is possible within the system in which he or she is attempting to reach that goal.

Aligning Flexibility and Consistency

In reflecting on what we have explored so far about the Law of Requisite Variety, it may seem that we are heading towards a conflict or paradox. Systems require stability and homeostasis to survive, and consistency is an important property of all successful individuals, organizations and organisms. How can we be both flexible and consistent at the same time? One way to begin to resolve this seeming paradox is to recognize that not every interaction in a system occurs on the same level. The answer has to do with *where* we require the flexibility in a system.

A key issue in any effective performance, for instance, is how to balance willingness to change with values such as

'consistency' and 'congruence' in behavior. If one is consistent with respect to his or her goal, one will have to have flexibility in *how* he or she reaches the goal. The issue has to do with at which levels are we flexible. In one sense, where you need to be flexible is determined by where you are committed to be inflexible. For instance, one general 'rule of thumb' proposed by the Law of Requisite Variety is to "hold your goal constant, and continue to vary your behavior until the outcome is achieved." If somebody is determined to be competent at, say, leading or motivating people, and that is the outcome they're holding constant, then where they need flexibility is in being able to adapt to different motivations of people and different environments.

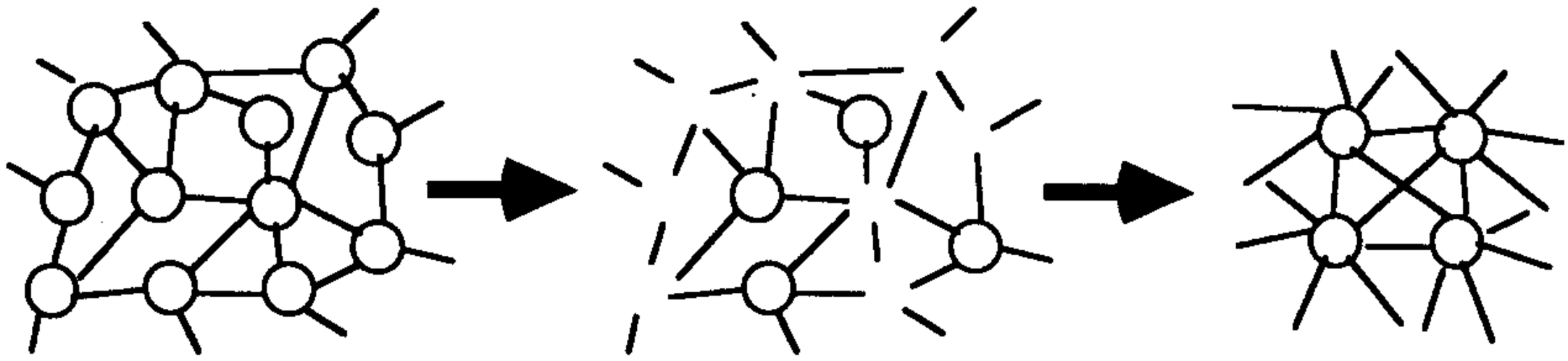
As an analogy, let's say a musician wants to be consistent in producing a certain kind of sound with a certain kind of quality. This person has to be able to adapt to the acoustical variation of different concert halls, different musical instruments, etc. If somebody really is competent, he or she has to have flexibility in certain areas and inflexibility in others. So the notion of flexibility has to be viewed with respect to the total system. Competence involves consistency. But as soon as you are consistent in one area, you need to have flexibility in another area to be able to accommodate to the parts of the system that are changing.

The fact is that, paradoxically, 'requisite variety' is also needed to effectively "resist change." In order to resist change, one needs to have enough flexibility to fend off the variety of possible actions or interventions being used to attempt to create change. If the part of the system attempting to resist change does not have enough variety, it will simply be overpowered or absorbed, like the Neanderthal.

Thus, in order to maintain stability, of any sort, an increase in the variety of a system's behavior must be matched by an increase in regulatory variety. If a new type of automobile or airplane has been built with more performance features, the driver or pilot will necessarily have to increase his or her

skills in order to safely use the machine. As another concrete example, in California they have big skyscrapers that they want to stay stable. But in order to make sure that the big skyscraper remains standing during an earthquake, they have to build a foundation that is able to tolerate movements of 16 feet side to side. One of the real secrets of effectively regulating a system is determining where to put the points of flexibility in order to support the areas that need to be stable and consistent. The distribution of regulatory variety relates to which part of the system exhibits the most change.

Our earlier illustration of the shoe store dealt with the importance of 'requisite variety' with respect to growth. But the Law of Requisite Variety applies to "downsizing" and "flattening" just as profoundly. Both of these processes involve the reduction of variety with respect to organizational structure; i.e., operating with less people and fewer roles. In order to maintain the regulatory variety necessary to continue to function effectively, this demands an increase in flexibility and variety within the individuals remaining in the organizational system. In other words, in order for the organization to remain consistent in successfully reaching its outcomes, it must redistribute the regulatory variety previously contained in the number of organizational roles. This requires an increase of skill, coordination and flexibility on the part of the remaining individuals. This is no doubt why there has been an increase in the need for coaching and team building as the trend in downsizing and flattening has grown.



Organizational Structure is 'Downsized', Reducing the Variety of People and Roles, But Leaving the Same Number of Tasks and Functions Required for Sufficient Regulatory Variety.

Regulatory Variety Must be Aggregated and Redistributed Among Remaining Members, Demanding More Coordination and Flexibility From Individuals.

Individual Flexibility and Variety Must Increase As Structural Variety is Decreased

A large European automobile manufacturer that I consulted for, for instance, discovered that a group of skilled workers operating with innovative and effective tools were able to outproduce their other engine plants using only half the number of people. This represented a great savings in costs. The catch was that the 'discretionary space' of those workers had to be much greater. That is, they needed to have greater flexibility and individual decision making power. Instead of collecting leadership abilities and responsibilities into the position of a single plant manager, they needed to be redistributed amongst the members of the team. This situation lead to the need for an increase in regulatory variety in terms of leadership style and ability. Rather than imposing procedures through a hierarchical structure, the company needed to switch to coaching and team building to promote motivation and productivity.

This type of redistribution or "re-aggregation" of regulatory variety can lead to greater efficiency and productivity. 'Aggregation' of regulatory variety relates to where it is collected and placed in the system. For example, I have authored over

a dozen books. Publishing a book requires a variety of activities: typing the manuscript, proofreading, editing, typesetting, making corrections, printing galleys, reviewing blue lines, making a cover, etc. My first book, published in 1980, took almost a year to reach the press from the time the manuscript was finished. Each of these stages involved a variety of different people in different places. With the advent of modern desktop publishing tools this cycle has been reduced to a fifth of the time, because the regulatory variety has been collected into one place. Computer spell-checkers, desktop publishing software, high resolution laser printers, etc., allow me to lay out, proof, and print my own books practically at the same time that I am writing them. These days, in the mid 1990's, I simply hand my publisher the camera ready master and it is sent directly to the printer.

The Dominant Law of Social Systems

It seems clear that the Law of Requisite Variety has many important implications for social systems. In fact, in his book *Designing Freedom* (1974), Stafford Beer treats the Law of Requisite Variety as a 'law of nature', calling it "the dominant law of societary systems." Pointing out that our deep desire for freedom is a manifestation of the Law of Requisite Variety, Beer says we must face the fact that one of the challenges of our modern world is how to absorb an ever increasing amount of diversity of all types; cultural, technical, organizational and social.

While the trend towards the expansion of diversity and individual freedom is built into our biological and social nature, history has also shown that unregulated freedom can be the source of chaos and conflict. Too little diversity leads to stagnation and rigidity, but too much variety leads to confusion and chaos.

Throughout history, social systems have struggled to maintain the balance between "inclusion" and "control." In social systems, 'amount of variety' is often related to how many different types of people, topics, issues, etc., are allowed to be included in social interactions. The more diversity that is included, the more regulatory variety is required to direct the system to positive outcomes. The more different people, opinions and backgrounds that the members of a particular team bring to the group, the more skill, vision, creativity and flexibility will be required from the team leader. To stay vital and maintain a sense of identity, social and cultural richness need to be offset by regulatory richness and stability.

Similar to the example of the growing shoe store, there are two basic ways groups and social systems can attempt to deal with diversity and variety: to attempt to 'absorb' it, or to 'attenuate' it. In the realm of government, democracy and "pluralism" are examples of political regulatory systems based on the principle of increasing regulatory variety in order to absorb system variety. (Ancient Greece and Renaissance Europe are good examples of where this type of social order flourished.)

Fascism, militarism and totalitarianism are social regulatory systems which attempt to attenuate, reduce or inhibit system variety. Unfortunately, as history has shown, the "shadow" side of the attempt to reduce or attenuate diversity in social systems shows up as racism, "ethnic cleansings", inquisitions, class boundaries and ultimately war.

In dealing with social systems, Beer reminds us that variety can never truly be attenuated. It can only be "absorbed". The attempt to attenuate it will simply deflect it somewhere else or cause it to remain latent in the population.

A classic example of the attempt to attenuate social diversity (and the failure to accomplish it) in our century is that of Hitler and early 20th century Germany. Fascism grew out of the positive intention to bring stability to the economic and social chaos created by World War I. Nazi principles, however,

were based on attempting to reduce racial and cultural diversity, not to absorb it. The Jews (whose history demonstrates a remarkable ability to adapt) were viewed by the Nazis as a primary source of variety and were displaced to ghettos and "concentration camps". Some fortunate ones were "absorbed" into other countries and cultures. Freud, for instance, went to England. Einstein went to the USA. But their ideas and their impact still remained on the planet. The establishment of the State of Israel was an eventual repercussion of this displacement. Hitler's "final solution" in the form of death camps was a last desperate, almost pitiable, attempt to try to get around the Law of Requisite Variety.

Ultimately, democracy and totalitarianism reflect the difference between 'Cro-Magnon' and 'Neanderthal' social orders, and will no doubt follow the same pattern of evolution as our ancestors.

In earlier times, social diversity on our planet could be absorbed geographically. Continents like the Americas used to be the places which absorbed the variety displaced by the attempt to attenuate it in other parts of the world. The Americas were populated by people escaping religious and political persecution (not to mention the hundreds of thousands of Irish, including my own ancestors, seeking refuge from the potato famine). The relative prosperity and explosive population growth of the second half of the 20th century have made it clear that the geographical absorption of variety is limited and that we can no longer effectively attenuate diversity through barriers, such as the Berlin Wall or the "Iron Curtain." Beer maintains that other means of regulatory variety must be developed. Economically, the attempt to absorb diversity and variation shows up in increased choices of products, customization and the rapid innovation rate of technology. Technologically, examples such as the automobile engine plant and desk top publishing tools described earlier, demonstrate how technology may be used to aggregate and redistribute both system and regulatory variety.

With remarkable prescience, Beer anticipated such trends and predicted the personal computer revolution as a necessary outcome of applying the Law of Requisite Variety to the social changes occurring on our planet. Years before the first Apple II personal computer, Beer correctly foresaw that, rather than being a tool of oppression and control (as it was feared at that time), computers and technology could be a tool to increase system variety and decentralize and redistribute regulatory variety. Beer believed that the increased regulatory variety offered by technological tools would lead to increased individual freedom, and vice versa. Instead of creating the nightmare of a super-powerful "Big Brother" type of society, technological developments, such as interactive multimedia, the Internet, cable television, the World Wide Web, etc., offer increased possibilities to both promote and "absorb" more and more diversity. According to Beer, such technological developments are necessary to support individual freedom.

In the still dark days of the "cold war" in the 1980's there was a paranoia in the United States about the Soviet Union getting access to Western technology. Strong restrictions were placed on the sale or transfer of technology to Eastern bloc countries. I always argued that the most powerful way to undermine a totalitarian communist regime would have been to actually air drop Macintosh computers into their territory. By Karl Marx's own rule of 'dialectical materialism'[1] it would have changed their consciousness. (This approach would be like increasing the regulatory variety of the immune system instead of trying to kill a virus with chemotherapy). In fact, we can view the proliferation of technology in the 20th century as the obvious continuation of our Cro-Magnon heritage.

---

[1] Marx claimed that human consciousness was shaped by the relationships that people formed and the tools that people used in their workplace.

In the words of systems theorist Magoroh Maruyama (1963):

> *We may say that "cultural selection" rather than natural selection is the mechanism of human evolution since much of man's environment is man-made...Perhaps fitness should be defined not in terms of the capacity of the individual without tools, but in terms of the tools which he can mobilize.*

Another important consideration with respect to the regulation of social diversity relates to the level at which consistency and flexibility are encouraged. System variety at one level can be absorbed and directed by regulatory variety on another level. Shared values, for instance, can unite people of diverse backgrounds and capabilities. And beyond that, people of many different values, skills and strengths may be united by a common 'vision' on a higher level. This principle has many implications for the future management of social systems.

It should be remembered that requisite variety is ultimately about adding choices, not taking them away. For example, Einstein's $E=MC^2$ "absorbs" Newton laws in that it accounts for the same phenomena but also explains more physical conditions than Newton's F=MA.

Power and Dependence

In the regulation of social systems, it seems that the desire for "freedom" often comes in conflict with the need and desire for "power". The fact is, however, that both "freedom" and "power" ultimately relate to choice and 'requisite variety'. How many times have we heard someone who has done something violent or harmful, either to him/herself or to others, lamenting that he or she "had no other choice" or that "they left me no choice." The application of the Law of

Requisite Variety is related to the truism that "having the choice is always better than not having it," regardless of the situation we are in.

In his book *Organizations in Action* (1967), James Thompson applies the principle of 'requisite variety' to redefine "power" as the opposite of "dependence". Thompson points out that organizations must operate inside of a system that is larger than themselves; what Thompson calls their "task environment." This system is composed of customers, suppliers, competitors, etc. According to Thompson, an organization is *'dependent'* on some element of its task environment:

1) in proportion to the organization's need for resources or performances which that element can provide.

2) in inverse proportion to the ability of other elements to provide the same resources or performances.

Thompson argues that an organization has *power*, relative to an element of its "task environment", to the extent that the organization (a) has the capacity to satisfy the needs of that element and (b) to the extent it monopolizes that capacity. According to Thompson, this definition escapes the 'zero-sum' concept of power which assumes that in a system of A and B, the power of A is at the expense of the power of B. In Thompson's definition, A and B may be powerful with respect to each other if they each have something that the other needs. Then, rather than being "dependent" on the other, they become "interdependent"

Individuals and organizations can also become "interdependent" by making commitments to one another (choosing to reduce their other alternatives). Under cooperative strategies, the effective achievement of "power" rests on the exchange of commitments and reduction of uncertainty for both parties with respect to elements of the larger system upon which they both depend.

In the late 1970's and 1980's, for example, Apple computer's open architecture and easy to use operating system gave it greater flexibility than its nemesis IBM, and thus substantial "power" in the personal computer marketplace. Apple represented the attempt to "absorb" diversity, while "Big Blue" was the symbol of the attempt to standardize and reduce variation. With the advent of the "Windows" operating system in the 1990's the situation changed substantially. IBM became more versatile and Apple reduced its 'requisite variety' by attempting to hold on too tightly to its operating system. The two former enemies eventually opted to become interdependent, and increasing their mutual "power" with respect to the global computer marketplace by establishing joint ventures and other projects.

Thompson points out that "power" and "dependence" issues arise when needs critical to an individual's or organization's survival become concentrated in one or a few elements of the "task environment" (like the dependence of the Irish population on a particular type of potato). In such situations, organizations naturally seek to minimize the 'power' of system elements over them by maintaining alternatives (i.e., 'requisite variety') which reduce their "dependence" on those elements. Thompson defines "perfect competition" as a system in which there are a sufficient number of "suppliers and demanders" to make the actions of any one insignificant.

Reflecting on the ideas of both Beer and Thompson, we can see that, while freedom and power both relate to choice, "freedom" primarily relates to system variety. "Power," on the other hand, relates to regulatory variety. Thus, a "powerful" organization or "free" individual is not necessarily one who is larger, stronger, richer or older than others, but rather one that has more alternative responses and the intelligence and wisdom to recognize and utilize those choices.

Requisite Variety, Evolution and Self-Organization

As we continue to widen our perspective of the influence of the Law of Requisite Variety, we can see that evolution and natural selection are also a function of flexibility and diversity more so than they are of aggression and physical strength. Stability and ecology emerge when system variety is matched by regulatory variety. As Magoroh Maruyama (1973) maintains:

> *The general rule of biological and social processes is heterogenisation [increasing diversity - R.D.], and what survives is not the strongest, but the most symbiotic.*

In his seminal article, *The Second Cybernetics: Deviation-Amplifying Mutual Causal Processes* (1963), Maruyama describes the natural tendency toward variety in biological and social systems. He claims that deviation amplifying processes operate to produce increasing complexity and sophistication similar to the mechanism of a mathematical fractile. The direction and nature of the variation is determined by the "initial kick" which begins the process of diversification. It is then the feedback between what we have been calling "system variety" and "regulatory variety" that determines whether the variety is amplified or inhibited. As Maruyama explains:

> *At the beginning, a large plain is entirely homogeneous as to its potentiality for agriculture. By some chance an ambitious farmer opens a farm at a spot on it. This is the initial kick. Several farmers follow the example and several farms are established. One of the farmers opens a tool shop. Then this tool shop becomes a meeting place of farmers. A food stand is established next to the tool shop. Gradually a village grows. The*

> *village facilitates the marketing of the agricultural products, and more farms flourish around the village. Increased agricultural activity necessitates development of industry in the village, and the village grows into a city...The secret of growth of the city is in the process of deviation-amplifying mutual positive feedback networks rather than in the initial condition or in the initial kick. This process rather than the initial condition, has generated the complexly structured system.*

A healthy or "ecological" pattern of growth develops when there is a *feedback loop* such that the increasing system variety is matched and absorbed by the necessary regulatory variety. When a system has the appropriate feedback connections, Maruyama claims, the system is able to ecologically regulate itself.

> *An example is the principle of diminishing returns. An increase in investment causes an increase in capital, and an increase in capital makes more investments possible. Before the profit reaches a certain level the effect of income tax is negligible. But as the profit becomes greater, the influence of income tax becomes greater and eventually stabilizes the size of the capital.*

Examples such as this illustrate the importance of the Law of Requisite Variety in "self-organizing" systems. Systems with the appropriate amount of complexity, flexibility and feedback can show "self-organizing" characteristics. Such systems often appear to have "a mind of their own." As Gregory Bateson (1973) claims:

> *[A]ny ongoing ensemble of events and objects which has the appropriate complexity of causal circuits and the appropriate energy relations will surely show mental*

characteristics. It will compare....it will 'process information' and will inevitably be self-corrective either toward homeostatic optima or toward the maximization of certain variables.

With enough feedback and 'requisite variety' a system is able to reach a higher level of integration and show characteristics of self-organization. This is the principle applied by Peter Russel in his concept of "The Global Brain" (1983, 1995). Russel perceives evolution as the progressive collecting together of units into larger systems - from elementary particles to atoms, to molecules, to cells, to tissues, and so forth up to self-conscious organisms. Each leap to a larger unit may be seen as the result of the application of the Law of Requisite Variety: System variety and regulatory variety stimulate each other in an escalating pattern until a particular threshold is reached establishing a new self-organizing pattern (similar to the phenomenon of the 100th monkey).

According to Russel, the increasing population density of the planet and the accelerating developments in communications technology have produced a situation in which human beings have the potential to reach a higher level of integration and act as a type of nervous system or 'brain' to the rest of the planet. (People are like neurons and cell phones, television, radios, the Internet, etc. are like the synaptic connections between them.) Russel postulates that the human race is poised to achieve a whole new level of "consciousness" and self-organization - perhaps comparable to the shift between the Neanderthal and the Cro-Magnon.

In considering Russel's hypothesis, keep in mind that the threshold required for a new level of integration does not have to be large. The DNA of humans and chimpanzees, for instance, is 98% the same. In the example of the card game, Ms. Cro-Magnon needed only one card to reach the threshold necessary to eclipse Mr. Neanderthal and direct the outcome of the game.

Summary and Review: A Vocabulary for Systemic Thinking

The following is a summary and synthesis of some of the key terms and concepts we have been exploring in this discussion of the Law of Requisite Variety.

A **System** is a group of interconnected elements which mutually influence one another through causal loops and feedback.

Variety relates to the phenomena of change or variation within a system. *Diversity* is variety with respect to space. Dynamic *fluctuation* is variety with respect to time. *Complexity* and *uncertainty* are a result of the combination of both types of variety.

System variety is the amount of potential variation within a system in a particular time and space. Too little variation and diversity leads to rigidity and stagnation. Too much diversity leads to instability and chaos.

Collateral Energy relates to the fact that in many dynamic systems (such as biological and social systems) all of the parts carry their own source of energy. This makes the systems much more complex because energy does not flow through the system in a fixed mechanical way. Gregory Bateson pointed out that if you kick a ball, you can determine where it will end up with a fair degree of accuracy by calculating the angle of the kick, the amount of force put into the kick, the friction of ground, etc. If you kick a dog, on the other hand, with the same angle, with same force, on the same terrain, etc., it will be much more difficult to predict where it will end up, because it has its own "collateral energy."

Deviation amplification is a process through which variety is increased by feedback between mutually enhancing elements in a system (such as the mutual escalation between supply and demand). Deviation amplification requires the elements involved to have their own source of energy to some

degree and is therefore primarily a characteristic of biological and social systems.

Regulation involves directing a system to a desired state. Regulation should be distinguished from "control". Control implies a unilateral influence. Regulation requires a selection from a variety of alternative responses. According to Gregory Bateson, a regulator essentially operates as a "sense organ or transducer which receives a transform of the difference between the actual [state] and some ideal or preferred [state]," and then selects an appropriate response. Regulations often involves *selecting* or choosing from a variety of possible responses.

'Requisite Variety' relates to the fact that all systems must both possess and manage diversity in order to survive. Diversity may come from either inside a particular system or from the larger systems of which it is a part. A system may try to either *attenuate* or *absorb* diversity. Requisite variety has to do with the amount of flexibility required to deal with change.

Attenuation is the attempt to stop or inhibit the proliferation of variety. Attenuation is effective if variety can be deflected and absorbed somewhere else in the system. *Filtering* is an example of a means of decreasing system variety; e.g., natural selection.

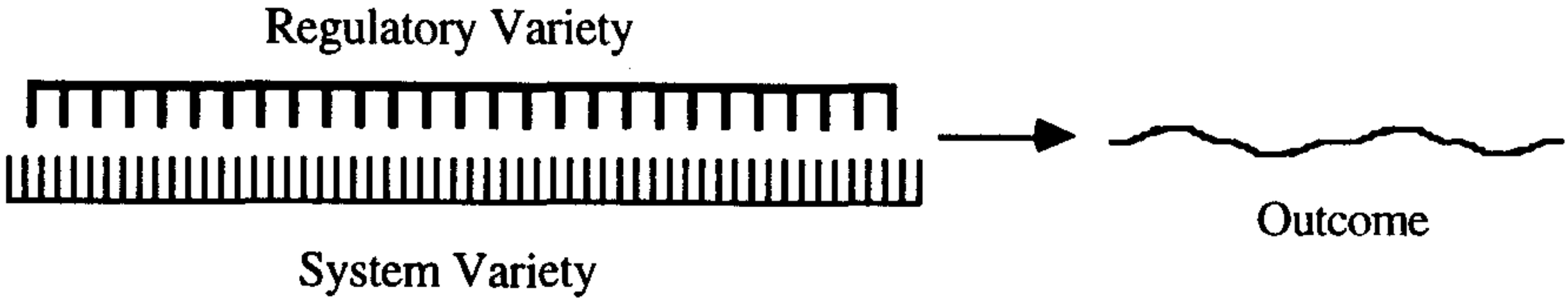
Specialization is a result of attenuation involving the reduction of diversity through the selective application of only certain choices. A danger of specialization is of putting too many "eggs in one basket" (like the Neanderthal or potato famine).

Regulatory variety relates to the number of actions or responses necessary to react appropriately to variation and direct the system to a positive outcome. Technological innovation is a means of increasing both regulatory variety and system variety.

Stability is achieved when there is enough regulatory variety to respond appropriately to all of the possible varia-

tions in the system in order to consistently reach the desired state.

Flexibility is the potential for adaptive variation in a system. Flexibility comes from having sufficient system variety and regulatory variety.

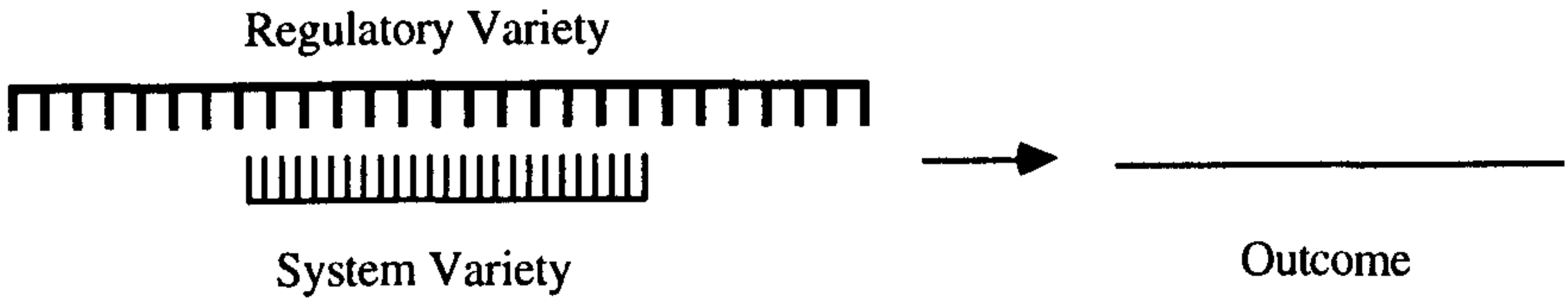


Stability With Flexibility is Achieved When System Variety is Matched by an Appropriate Amount of Regulatory Variety

Absorption occurs when regulatory variety expands to match the amount of variety in the system, allowing the system to remain stable nd continue to consistently reach desired states. An example of this is when a store has sufficient inventory and salespeople to successfully handle the needs of potential customers.

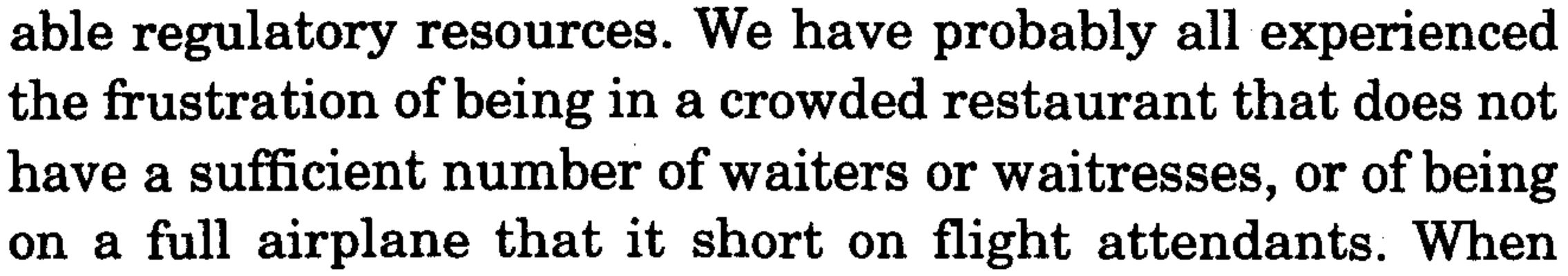
Saturation occurs when the degree of regulatory variety begins to exceed system variety. To increase regulatory variety beyond the point of absorption is wasteful. It can create rigidity in the system and conflict at the level of regulatory variety, as is reflected in the old adage that "too many cooks spoil the broth."

Stagnation and oppression occur when there is not enough system variety. When there is too much regulatory variety the system becomes oppressive. Some innovation is necessary for a healthy system.



Stagnation and Rigidity Arise When There is Too Little System Variety With Respect to Regulatory Variety

Overload occurs if the proportion of regulatory variety to system variety drops too low, taxing the limits of the available regulatory resources. We have probably all experienced the frustration of being in a crowded restaurant that does not have a sufficient number of waiters or waitresses, or of being on a full airplane that it short on flight attendants. When regulatory variety is insufficient, the system becomes unstable and eventually unviable.



Saturation and Overload Occur When Regulatory Variety is Insufficient, Leading to Inconsistency With Respect to Reaching Desired Outcomes

Freedom relates to the degree of diversity and choice within a system.

Aggregation has to do with where and how regulatory variety is collected or distributed throughout a particular system. Re-aggregation of regulatory variety through techni-

cal innovations (such as desk top publishing software, for instance) can greatly increase the efficiency, effectiveness and flexibility of a system.

Power relates to the number of alternatives one has at the level of regulatory variety. A system lacks power, or is *dependent*, when it has few choices with respect to attaining a resource that it needs for survival.

Interdependence arises when individuals or organisms require one another in order to achieve desired states.

Growth arises when an increase in regulatory variety stimulates more variety in the system. For example, when an increase in the variety of shoes or number of salespeople serves to attract new customers.

Feedback and **Redundancy** are essential for the effective regulation of a system. The behavior of all systems is guided by feedback between its parts. Without feedback a system couldn't function. Redundancy involves how many parts of a system receive a particular feedback - i.e., how much of the system receives the same feedback.

Ecology results from establishing effective feedback loops between system variety and regulatory variety.

Levels of change and processing occur in systems when parts of a system operate on other parts (the way that regulatory variety operates on system variety). A new "level" of process often arises from the collecting together of units into larger systems to reach a higher degree of integration. In human behavior, for example, beliefs and values can be said to function on a different "level" than specific actions. The processes that influence and reinforce values and reflexive actions are not the same. For instance, we can say that 'what' we want to do often determines 'where and when' we need to take action. At a higher level, 'how' we think determines what actions we decide to take in a particular environment. At another level, our beliefs and values ('why' we are motivated to think and act) determine the skills and behaviors we mobilize. Our sense of who we are at the level of role and

identity determines our selection of beliefs and values. Our spiritual perception of the larger systems in which we operate (who and what else) deeply influences our sense of self.

Alignment relates to where stability and variation are placed in a system. When one part of a system needs to be kept stable, other parts must necessarily vary and adapt in order to help maintain stability. Consistency at one level requires flexibility at other levels.

Self Organization is possible in systems in which there is enough interconnection, alignment and feedback between system variety and regulatory variety to produce effective self regulation.

Intelligence may be seen as the capacity for requisite variety.

Wisdom is the exercise of the capacity for requisite variety through the selection of appropriate and ecological responses.

Putting the Law of Requisite Variety Into Practice

It seems evident that if we are to survive into the next millennium it will be important to teach our leaders, politicians and children the Law of Requisite Variety in the same way that we teach the law of gravity. Putting the principles provided by the Law of Requisite Variety into practice, however, requires innovations in our ways of thinking and the tools we use to understand systems and make decisions.

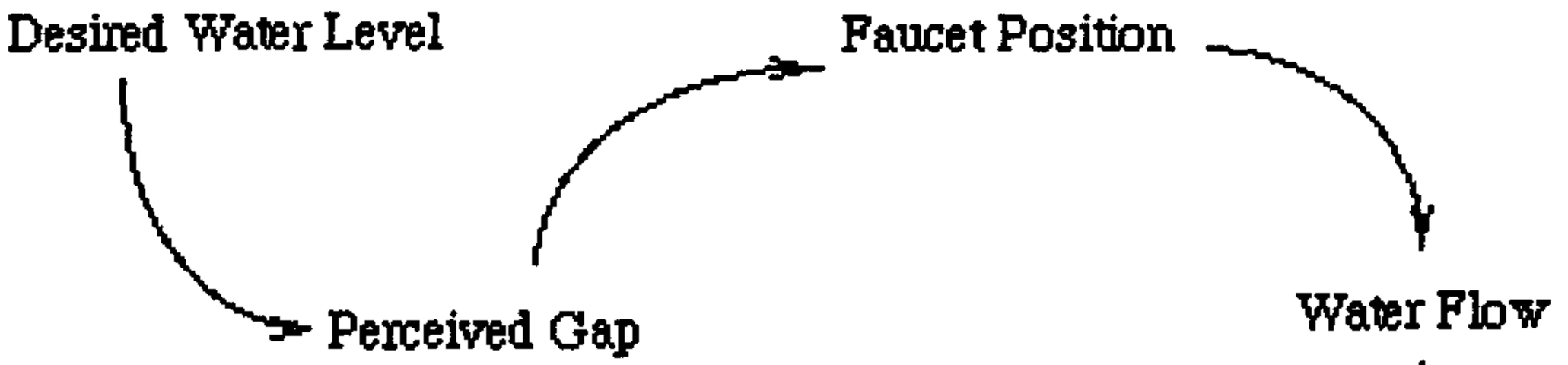
Clearly the Law of Requisite Variety emphasizes the importance of processes like 'learning to learn' and the development of more technologies which increase both system variety and regulatory variety. Processes like "modeling" are also important to effectively apply the Law of Requisite Variety. Creating successful models, however, ultimately requires effective systemic thinking ability. According to Peter Senge (1990) the 'essence' of the discipline of systems thinking is:

a) seeing relationships rather than linear cause-effect chains

b) seeing the process of change rather than snapshots.

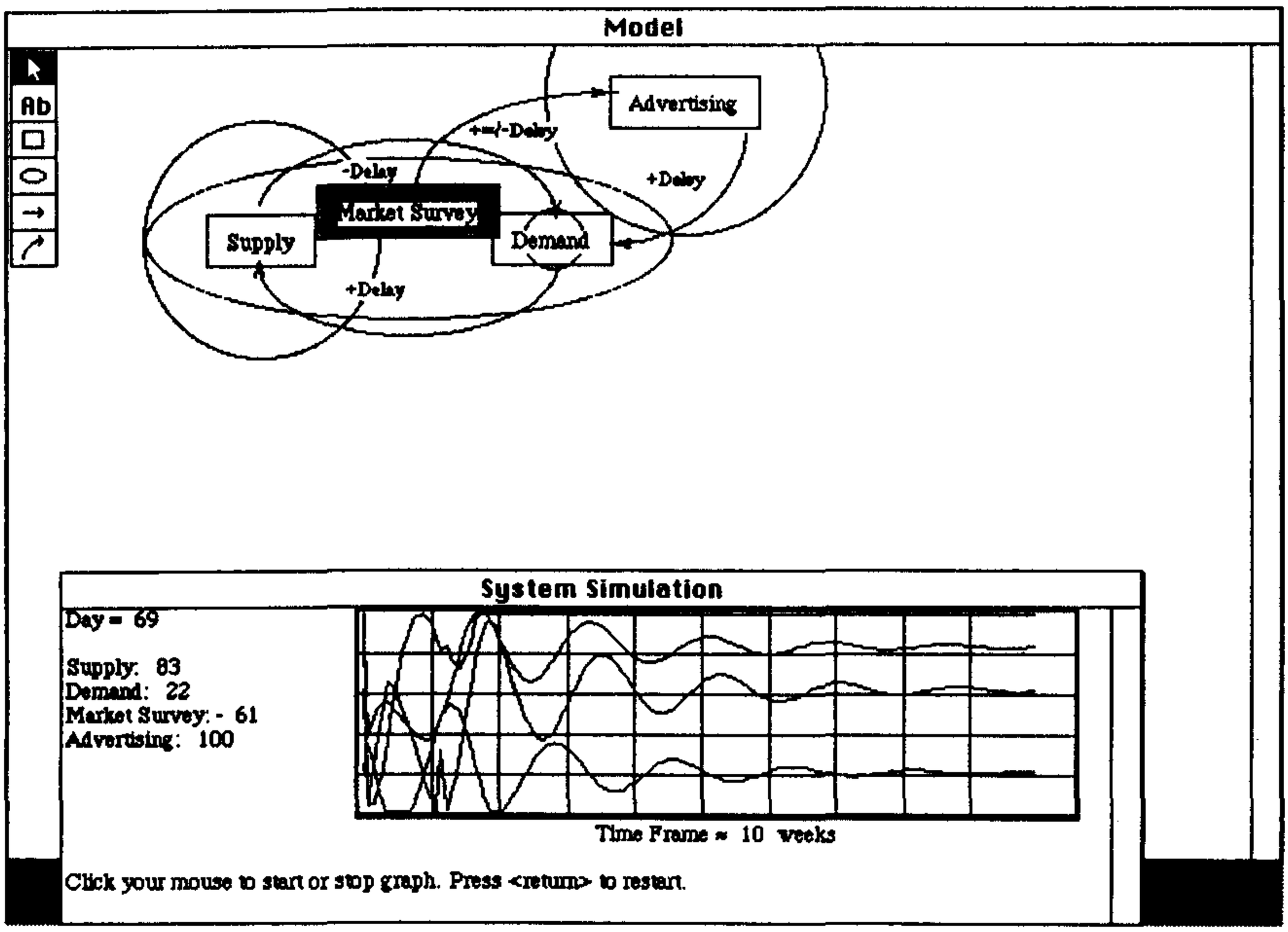
This involves being able to identify and map 'circles of causality' and to understand the concept of 'feedback' which determines how actions can either reinforce or counteract (balance) each other. Senge suggests that we must alter our ways of visualizing and mapping the structure of the systems we are attempting to influence.

As a starting point, Senge suggests the type of structure shown in the following figure. The diagram depicts the basic elements in a simple feedback loop involving the adjustment of a water faucet to achieve the desired water level in a glass or sink. The relevant elements of the system are depicted by arrows indicating the "influence" the various elements have on one another. Clearly, the "faucet position" is the system's regulator, which determines water flow and the resulting water level. Senge emphasizes the use of 'circular' arrows as a way to ensure that a person envisions the entire feedback 'loop' and breaks the habit of 'linear' and 'mechanical' thinking.



Senge's Diagram of a Simple Feedback Loop

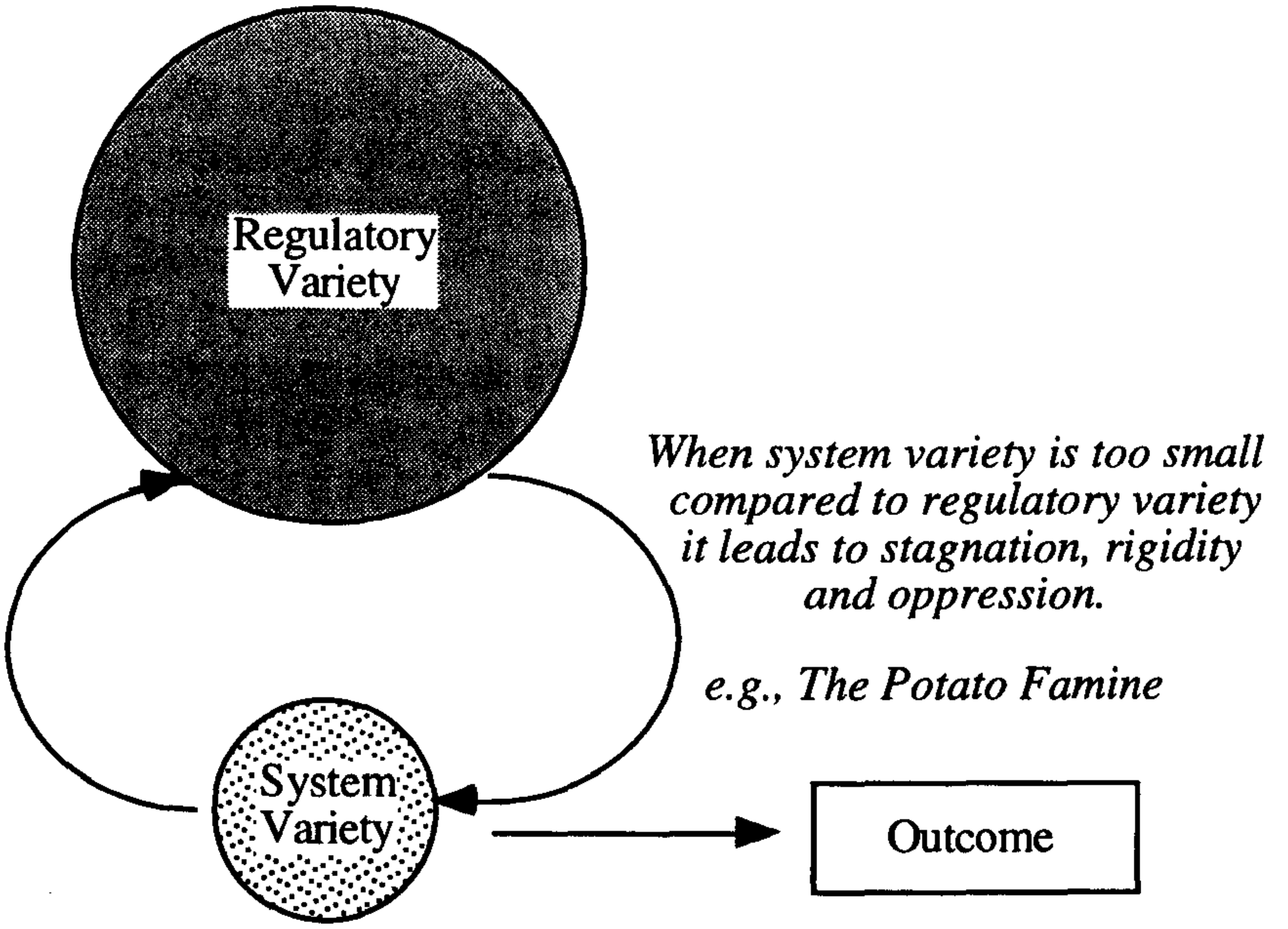
As an example of the development of technological tools that can help to increase our own flexibility and capabilities, I have developed a set of software tools that allow a person to create models of systems based on Senge's 'causal loop' diagrams. The program is then able to simulate the behavior of a system over time.



Example of System Modeling Tool Which Supports Better Systemic Thinking

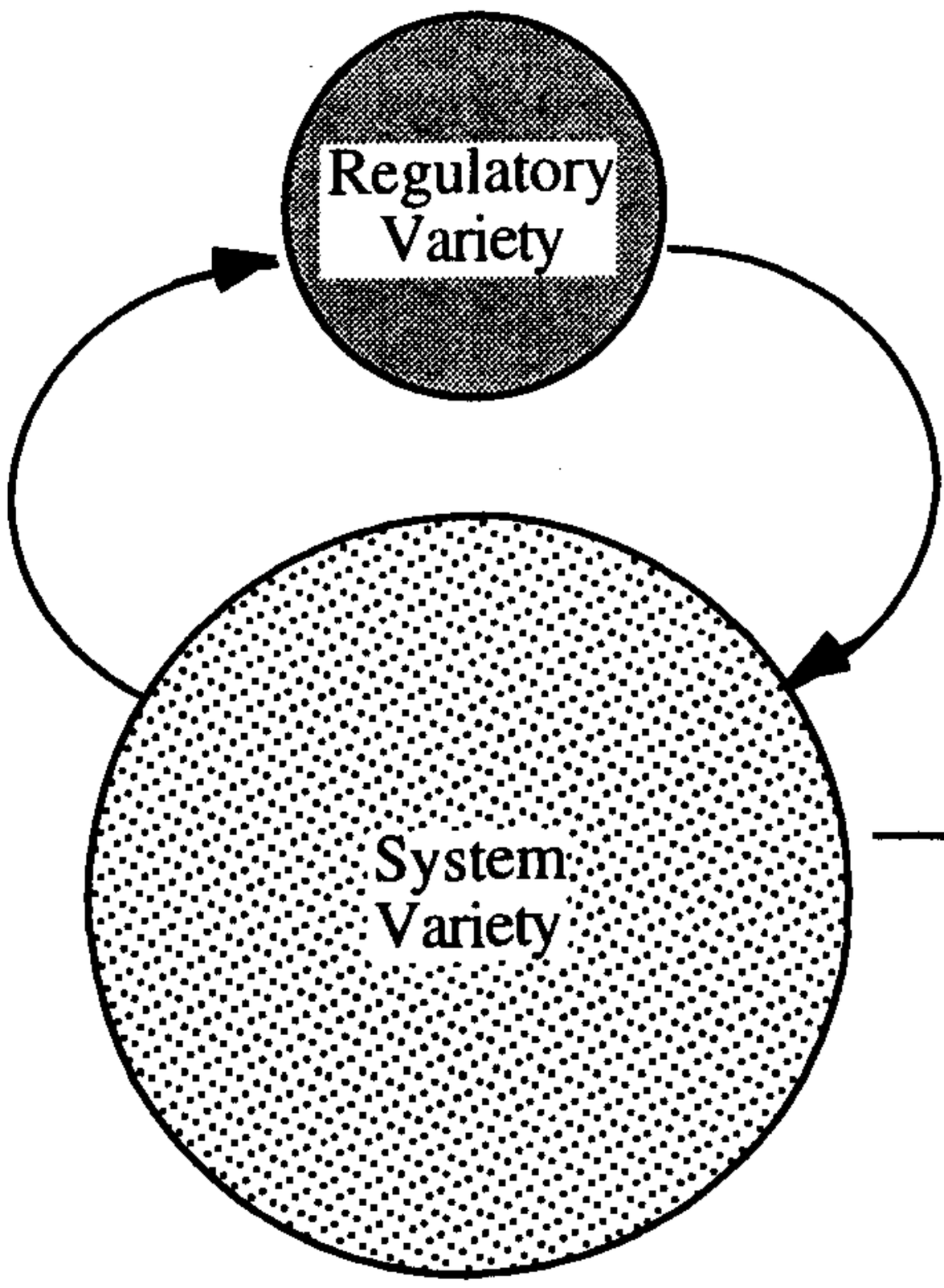
One way to put the Law of Requisite Variety into practice is to assess in which situations you or your organization have been operating more like a Neanderthal than a Cro-Magnon. Applying Senge's suggestion about using "causal loop" diagrams, we can represent the Law of Requisite Variety as a feedback loop between the system variety and regulatory variety in a system.

One set of problems we have explored can occur if there is not enough system variety or if there is too much regulatory variety.



Too Little System Variety Creates Stagnation And Rigidity

Another set of problems occurs when the variety in the system is too much for the system to effectively regulate.



When system variety is too large compared to regulatory variety it leads to overload, dependence and powerlessness.

e.g., The Neanderthals

Too Little Regulatory Variety Creates Overload, Instability and Dependence

As an exercise, see if you can identify situations in which you or your organization are:

a) Stagnant or rigid (not enough system variety).

What can be done to stimulate or add more diversity to the system?

b) Oppressed or squelched - i.e., There are too many cooks (too much regulatory variety).

In what areas can you reduce, "relax" or redistribute regulatory variety?

c) Over-specialized on something that has been successful in the past - i.e., All your eggs are in one basket.

What are some other options or choices that you can add into your "mix" or "portfolio" of activities?

d) Overloaded (not enough regulatory variety to absorb the system variety).

What can be done to increase regulatory variety? What skills, capabilities or tools could you add that would make it easier to achieve desired outcomes?

e) Powerless or dependent (too few alternatives at the level of regulatory variety).

What can be done to find more alternatives to help get what you need? What other alternatives exist?

f) Unstable or confused (too much system variety, not enough regulatory variety).

What can be done to increase regulatory variety to absorb system variety? What new models or tools would help you to better understand or address the system in which you are operating?

As the desk top publishing example that I related earlier indicates, these principles and questions have offered me guidance many times in my own life. In fact, as much as I have been able, I have tried to fashion my own life and career according to the Law of Requisite Variety.

Throughout my college years, for instance, I took classes that would give me the widest range of skills and potential professional competences; including biology, art, physics, calculus, neurophysiology, computer programming, politics, linguistics, even animation. (These subjects offer ways of understanding and increasing both system variety and regu-

latory variety.) One of the greatest benefits I received from studying such a diversity of areas was the development of effective 'learning to learn' skills. These have allowed me to continue my process of learning long after my "school years" were completed. I have continued to research, read and study throughout my adult life. (My work on Strategies of Genius is a result of this continual learning process.)

My choice of professional field, Neuro-Linguistic Programming, offers applications to a rich range of topics. The work that I do covers a wide variety of areas including learning, communication, management leadership, health and, of course, creativity. Over the past decade I have strived to maintain at least a 20% innovation rate in my own developments in these areas.

My college background and 'learning to learn' skills have allowed me to pursue a diversity of professional activities; including training, authoring books and articles, consulting, research, software design and computer hardware development. As a result, I have been able to maintain a level of relatively stable growth and prosperity, even during economically difficult times.

I try to conduct my seminars in a diversity of seminar locations (system variety), throughout the US, Western Europe, South America and the Pacific Rim. I attempt to strategically select a sequence of locations so that no one area will become 'saturated'. As a result I have needed to continually improve and enrich my teaching and presentation skills (regulatory variety).

As my professional activities expanded, I realized fairly early on that I could not handle all of the needs of students and clients (system variety) on an individual basis. Realizing that the need for my services could not truly be "attenuated," I began to do seminars as a way to serve a greater number of individuals at one time (i.e., 'absorb' more system variety), and began to train others in my own developments and develop a network of colleagues (increase regulatory variety).

The establishment of NLP University and the NLP World Health Community are examples of the "aggregation" and redistribution of regulatory variety.

Similarly, using technological tools, such as personal computers, telephones, fax machines, e-mail, etc., for years I was able to run my training business from an office in my home by myself. Several years ago, however, I became so overloaded that I had to hire an assistant. This indeed helped, but consequently stimulated even more growth due the increased efficiency. Since then I have further increased "regulatory variety," by adding two more people and expanding the size of my office, in order to absorb the widening diversity of tasks. In addition, I continue to review and update my technology at least every two years. For instance, I found that having a two page monitor for my computer more than doubled my writing efficiency. Of course, as a result, my staff has needed to allocate more time to proof reading and editing. The feedback loop continues.

Conclusion

The Law of Requisite Variety offers important guidance for managing our lives, organizations and social systems. As our world becomes more complex and dynamic, it is critical to understand and apply the principle of 'requisite variety' in order to produce quality products or services, be an effective professional, help others to learn or change, maintain competitive ability, build a successful enterprise, create a functioning learning organization or simply to survive.

Postscript

The *Law of Requisite Variety* is a fundamental tenet of systems theory. It is also a core principle in the 'epistemology' of NLP. The Law of Requisite Variety, in its true form, is essential to make the other NLP presuppositions more practical in their application. It changes nothing, for instance, to identify the "positive intention" of a limiting behavior if one can find no other choices to satisfy the positive intention in another way.

As with a number of the other basic NLP presuppositions, however, the Law of Requisite Variety is sometimes misquoted and misunderstood. There is more to the Law of Requisite Variety than the notion that "the person with the most flexibility wins." NLP provides cognitive and behavioral tools to help absorb a greater degree of diversity in thinking strategies, learning styles, beliefs and values and other individual differences. The purpose is not to help one person "win" or "control" the system, but to achieve consistent results in contexts of change and to more effectively serve the variety of needs within a system.

Appendix A:
(William) Ross Ashby
(b. 1903 - d. 1972)

W. Ross Ashby was a key theorist and a major contributor to the fields of cybernetics and systems theory. Author of the classics *Introduction to Cybernetics* (1956) and *Design for a Brain* (1952), Ashby was a pioneer in the study of the organization and control of complex systems. Director of the Burden Neurological Institute in the Dept. of Electrical Engineering at the University of Illinois, Urbana (1961-70), he was elected a fellow of the Royal College of Psychiatry in 1971.

Ashby's Law, also known as the *Law of Requisite Variety*, essentially states that "variety is required to regulate variety within a system." In other words, the more complex and variable a particular system becomes, the more flexibility and variety is required to manage those changes. Ashby's law relates to systems of all types, including organizations, economics, families, interpersonal relationships and mental processes. Ashby's Law of Requisite Variety serves as one of the most important guiding principles of NLP. It is the basis for many NLP processes including Reframing and Pacing and Leading, and for the NLP emphasis on behavioral flexibility.

The following quotations provide an idea of the range of Ashby's wit, wisdom and insight:

On Cybernetics and System Thinking

The Cyberneticist observes what might have happened but did not.

A System is a set of variables sufficiently isolated to stay discussable while we discuss it.

Division of the world's system into Natural and Man-made died with Darwin.

On Evolution

The brain is merely Nature's latest means of self-preservation.

The goals of a species, such as Homo, are what natural selection has driven it to.

On Psychology

For two thousand years psychology was a simple description of Man's highest faculties--most of which he does not posses.

A man no more knows how he thinks, just because he has a brain in his skull, than he knows how he makes blood, because he has marrow in his bones.

On The Brain

The brain has no brain inside to guide it.

The brain controls nothing--it transmits.

The brain organizes nothing--it acts. To think is to act--inside the brain.

The brain has no gimmick, just five billion years of research and development.

A mechanism is "brain-like" so far as it is effective.

On Learning

No man knows what to do against the really new.

All wisdom is wisdom after the event.

Every system changes its mind by breaking.

The educated brain is the wreckage left after the experiences of training.

On Memory

A system that stores its memories away from their site of action must do much work remembering where it put that memory.

Don't appoint, as the President's driver, an Englishman who has spent thirty years learning to drive on the left.

On Intelligence

Today, those who don't know what "intelligence" means must give way to those who do.

The only people who talk today of "real" intelligence are those who hope to find a meaning for the adjective later.

Intelligent is as intelligent does.

Change the environment to its opposite and every piece of wisdom becomes the worst of folly.

Everyone is World Champion at some game (although some of the games have not yet been recognized).

An Intelligence Test measures the degree to which Tester and Subject think alike.

On Artificial Intelligence

He who would design a good brain must first know how to make a bad one.

Pattern-recognition is a throwing away of information. Any device that can lose information can generalize.

On Computers

The general purpose computer is freer than the trained brain.

Today's digital computer is organized like an army of a million men that can only get two into action at a time.

On Organization

It is an open question which has the richer organization: a living cow or a working silo.

Can a system be self-organizing? No system can permanently have the property that it changes properties.

On Requisite Variety

Which biological organization proved more resistant to the Spainards: the Aztecs of Mexico or the jungle of the Amazon?

Man adapts by conquering the reducible; the irreducible is impregnable.

Bibliography

Introduction to Cybernetics, Ashby, W. Ross, Chapman & Hall, Ltd., London, England, 1956.

Design for a Brain, Ashby, W. Ross, Chapman & Hall, Ltd., London, England, 1960.

Mind and Nature, Bateson, G.; E. P. Dutton, New York, NY, 1979.

Steps To an Ecology of Mind, Bateson, G.; Ballantine Books, New York, New York, 1972.

Designing Freedom, Beer, S., CBC Publications, Toronto, Ontario, 1974.

The Great Leap Forward; Why We Succeeded and Neanderthal Failed, Diamond, J., ***Discover***, pp. 50-60, May, 1989,

Skills for the Future, Dilts, R. with Bonissone, G.; Meta Publications, Capitola, CA,1993.

The Second Cybernetics: Deviation-Amplifying Mutual Causal Processes, M. Maruyama, ***American Scientist,*** Vol. 51, pp. 164-178, 1963.

A New Logical Model for Futures Research, Maruyama, M., Futures, October 1973, pp. 435-437.

The Global Brain Awakens, Russell, P., Global Brain, Inc., Palo Alto, CA, 1995.

The Fifth Discipline; Senge, P.; Doubleday, New York, New York, 1990.

Organizations in Action, Thompson, J., McGraw-Hill, Inc., San Francisco, CA, 1967.

Cybernetics, Wiener, N., The M.I.T. Press, Cambridge, MASS, 1965.

Index

T

U

V

W

Z