DESTRUCTION AND CREATION

John R. Boyd

September 3, 1976

To comprehend and cope with our environment we develop mental patterns or concepts of meaning. The purpose of this paper is to sketch out how we destroy and create these patterns to permit us to both shape and be shaped by a changing environment. In this sense, the discussion also literally shows why we cannot avoid this kind of activity if we intend to survive on our own terms. The activity is dialectic in nature generating both disorder and order that emerges as a changing and expanding universe of mental concepts matched to a changing and expanding universe of observed reality.

Goal: Improve capacity for independent action

Studies of human behavior reveal that the actions we undertake as individuals are closely related to survival, more importantly, survival on our own terms. Naturally, such a notion implies that we should be able to act relatively free or independent of any debilitating external influences—otherwise that very survival might be in jeopardy. In viewing the instinct for survival in this manner we imply that a basic aim or goal, as individuals, is to improve our capacity for independent action. The degree to which we cooperate, or compete, with others is driven by the need to satisfy this basic goal. If we believe that it is not possible to satisfy it alone, without help from others, history shows us that we will agree to constraints upon our independent action—in order to collectively pool skills and talents in the form of nations, corporations, labor unions, mafias, etc.—so that obstacles standing in the way of the basic goal can either be removed or overcome. On the other hand, if the group cannot or does not attempt to overcome obstacles deemed important to many (or possibly any) of its individual members, the group must risk losing these alienated members. Under these circumstances, the alienated members may dissolve their relationship and remain independent, form a group of their own, or join another collective body in order to improve their capacity for independent action.

Scarcity produces conflict

In a real world of limited resources and skills, individuals and groups form, dissolve and reform their cooperative or competitive postures in a continuous struggle to remove or overcome physical and social environmental obstacles (11, 13). In a cooperative sense, where skills and talents are pooled, the removal or overcoming of obstacles represents an improved capacity for independent action for all concerned. In a competitive sense, where individuals and groups compete for scarce resources and skills, an improved capacity for independent action achieved by some individuals or groups constrains that capacity for other individuals or groups. Naturally, such a combination of real world scarcity and goal striving to overcome this scarcity intensifies the struggle of individuals and groups to cope with both their physical and social environments (11, 13).

Need for decisions

Against such a background, actions and decisions become critically important. Actions must be taken over and over again and in many different ways. Decisions must be rendered to monitor and determine the precise nature of the actions needed that will be compatible with the goal. To make these timely decisions implies that we must be able to form mental concepts of observed reality, as we perceive it, and be able to change these concepts as reality itself appears to change. The concepts can then be used as decision models for improving our capacity for independent action. Such a demand for decisions that literally impact our survival causes one to wonder: How do we generate or create the mental concepts to support this decision-making activity?

Creating concepts: Systems to model reality

There are two ways in which we can develop and manipulate mental concepts to represent observed reality: We can start from a comprehensive whole and break it down to its particulars or we can start with the particulars and build towards a comprehensive whole (28/24). Saying it another way, but in a related sense, we can go from the general to the specific or from the specific to the general. A little reflection here reveals that deduction is related to proceeding from the general to the specific while induction is related to proceeding from the specific to the general. In following this line of thought can we think of other activities that are related to these two opposing ideas? Is not analysis related to proceeding from general to specific? Is not synthesis, the opposite of analysis, related to proceeding from specific to general? Putting all this together: Can we not say that general-to-specific is related to both deduction and analysis, while specific-to-general is related to induction and synthesis? Now, can we think of some examples to fit with these two opposing ideas? We need not look far. Differential calculus proceeds from general to specific—from a function to its derivative. Hence is not the use or application of differential calculus related to deduction and analysis? Integral calculus, on the other hand, proceeds in the opposite direction—from a derivative to a general function. Hence, is not the use or application of integral calculus related to induction and synthesis? Summing up, we can see that general-to-specific is related to deduction, analysis, and differentiation, while specific-to-general is related to induction, synthesis, and integration.

Now keeping these two opposing idea chains in mind, let us move on a somewhat different tack. Imagine, if you will, a domain (a comprehensive whole) and its constituent elements or parts. Now, imagine another domain and its constituent parts. Once again, imagine even another domain and its constituent parts. Repeating this idea over and over again we can imagine any number of domains and the parts corresponding to each. Naturally, as we go through life, we develop concepts of meaning (with included constituents) to represent observed reality. Can we not liken these concepts and their related constituents to the domains and constituents that we have formed in our imagination? Naturally, we can. Keeping this relationship in mind, suppose we shatter the correspondence of each domain or concept with its constituent elements. In other words, we imagine the existence of the parts but pretend that the domains or concepts they were previously associated with do not exist. Result: We have many constituents, or particulars, swimming around in a sea of anarchy. We have uncertainty and disorder in place of meaning and order. Further, we can see that such an unstructuring or destruction of many domains—to break the correspondence of each with its respective constituents—is related to deduction, analysis, and differentiation. We call this kind of unstructuring a destructive deduction.

Faced with such disorder or chaos, how can we reconstruct order and meaning? Going back to the idea chain of specific-to-general, induction, synthesis, and integration, the thought occurs that a new domain or concept can be formed if we can find some common qualities, attributes, or operations among some or many of these constituents swimming in this sea of anarchy. Through such connecting threads (that produce meaning) we synthesize constituents from, hence across, the domains we have just shattered (24). Linking particulars together in this manner we can form a new domain or concept—providing, of course, we do not inadvertently use only those "bits and pieces" in the same arrangement that we associated with one of the domains purged from our imagination. Clearly, such a synthesis would indicate we have generated something new and different from what previously existed. Going back to our idea chain, it follows that creativity is related to induction, synthesis, and integration since we proceeded from unstructured bits and pieces to a new general pattern or concept. We call such action a creative or constructive induction. It is important to note that the crucial or key step that permits this creative induction is the separation of the particulars from their previous domains by the destructive deduction. Without this unstructuring, the creation of a new structure cannot proceed—since the bits and pieces are still tied together as meaning within unchallenged domains or concepts.

Recalling that we use concepts or mental patterns to represent reality, it follows that the unstructuring and restructuring just shown reveals a way of changing our perception of reality (28). Naturally, such a notion implies that the emerging pattern of ideas and interactions must be internally consistent and match-up with reality (14, 25). To check or verify internal consistency we try to see if we can trace our way back to the original constituents that were used in the creative or constructive induction. If we cannot reverse directions, the ideas and interactions do not go together in this way without contradiction. Hence, they are not internally consistent. However, this does not necessarily mean we reject and throw away the entire structure. Instead, we should attempt to identify those ideas (particulars) and interactions that seem to hold together in a coherent pattern of activity as distinguished from those ideas that do not seem to fit in. In performing this task we check for reversibility as well as check to see which ideas and interactions match-up with our observations of reality (27, 14, 15). Using those ideas and interactions that pass this test together with any new ideas (from new destructive deductions) or other promising ideas that popped out of the original destructive deduction we again attempt to find some common qualities, attributes or operations to re-create the concept—or create a new concept. Also, once again, we perform the check for reversibility and match-up with reality. Over and over again this cycle of destruction and creation is repeated until we demonstrate internal consistency and match-up with reality (19, 14, 15).

Suspicion: Mismatches will arise

When this orderly (and pleasant) state is reached, the concept becomes a coherent pattern of ideas and interactions that can be used to describe some aspect of observed reality. As a consequence, there is little, or no, further appeal to alternative ideas and interactions in an effort to either expand, complete, or modify the concept (19). Instead, the effort is turned inward towards fine tuning the ideas and interactions in order to improve generality and produce a more precise match of the conceptual pattern with reality (19). Toward this end, the concept—and its internal workings—is tested and compared against observed phenomena over and over again in many different and subtle ways (19). Such a repeated and inward-oriented effort to explain increasingly more subtle aspects of reality suggests the disturbing idea that perhaps, at some point, ambiguities, uncertainties, anomalies, or apparent inconsistencies may emerge to stifle a more general and precise match-up of concept with observed reality (19). Why do we suspect this?

On one hand, we realize that facts, perceptions, ideas, impressions, interactions, etc. separated from previous observations and thought patterns have been linked together to create a new conceptual pattern. On the other hand, we suspect that refined observations now underway will eventually exhibit either more or a different kind of precision and subtlety than the previous observations and thought patterns. Clearly, any anticipated difference, or differences, suggests we should expect a mismatch between the new observations and the anticipated concept description of these observations. To assume otherwise would be tantamount to admitting that previous constituents and interactions would produce the same synthesis as any newer constituents and interactions that exhibit either more or a different kind of precision and subtlety. This would be like admitting one equals two. To avoid such a discomforting position implies that we should anticipate a mismatch between phenomena observation and concept description of that observation. Such a notion is not new and is indicated by the discoveries of Kurt Gödel and Werner Heisenberg.

Incompleteness and consistency

In 1931 Kurt Gödel created a stir in the world of mathematics and logic when he revealed that it was impossible to embrace mathematics within a single system of logic (12, 23). He accomplished this by proving, first, that any consistent system that includes the arithmetic of whole numbers is incomplete. In other words, there are true statements or concepts within the system that cannot be deduced from the postulates that make-up the system. Next, he proved even though such a system is consistent, its consistency cannot be demonstrated within the system.

Such a result does not imply that it is impossible to prove the consistency of a system. It only means that such a proof cannot be accomplished inside the system. As a matter of fact since Gödel, Gerhard Gentzen and others have shown that a consistency proof of arithmetic can be found by appealing to systems outside that arithmetic. Thus, Gödel's proof indirectly shows that in order to determine the consistency of any new system we must construct or uncover another system beyond it (29, 27). Over and over this cycle must be repeated to determine the consistency of more and more elaborate systems (29, 27).

Keeping this process in mind, let us see how Gödel's results impact the effort to improve the match-up of concept with observed reality. To do this we will consider two kinds of consistency: The consistency of the concept and the consistency of the match-up between observed reality and concept description of reality. In this sense, if we assume—as a result of previous destructive deduction and creative induction efforts—that we have a consistent concept and consistent match-up, we should see no differences between observation and concept description. Yet, as we have seen, on one hand, we use observations to shape or formulate a concept; while on the other hand, we use a concept to shape the nature of future inquiries or observations of reality. Back and forth, over and over again, we use observations to sharpen a concept and a concept to sharpen observations. Under these circumstances, a concept must be incomplete since we depend upon an ever-changing array of observations to shape or formulate it. Likewise, our observations of reality must be incomplete since we depend upon a changing concept to shape or formulate the nature of new inquiries and observations. Therefore, when we probe back and forth with more precision and subtlety, we must admit that we can have differences between observation and concept description; hence, we cannot determine the consistency of the system—in terms of its concept and match-up with observed reality—within itself.

Furthermore, the consistency cannot be determined even when the precision and subtlety of observed phenomena approaches the precision and subtlety of the observer—who is employing the ideas and interactions that play together in the conceptual pattern. This aspect of consistency is accounted for not only by Gödel 's proof but also by the Heisenberg Uncertainty or Indeterminacy Principle.

Indeterminacy and Uncertainty

The Indeterminacy Principle uncovered by Werner Heisenberg in 1927 showed that one could not simultaneously fix or determine precisely the velocity and position of a particle or body (14,9). Specifically he showed, due to the presence and influence of an observer, that the product of the velocity and position uncertainties is equal to or greater than a small number (Planck's Constant) divided by the mass of the particle or body being investigated. In other words,

$$\Delta V * \Delta Q \geq h/m$$

Where

ΔV is velocity uncertainty

ΔQ is position uncertainty and

h/m is Planck's constant (h) divided by observed mass (m).

Examination of Heisenberg's Principle reveals that as mass becomes exceedingly small the uncertainty or indeterminacy, becomes exceedingly large. Now—in accordance with this relation —when the precision, or mass, of phenomena being observed is little, or no different than the precision, or mass, of the observing phenomena, the uncertainty values become as large as, or larger than, the velocity and size frame-of-reference associated with the bodies being observed (9). In other words, when the intended distinction between observer and observed begins to disappear (3), the uncertainty values hide or mask phenomena behavior; or put another way, the observer perceives uncertain or erratic behavior that bounces all over in accordance with the indeterminacy relation. Under these circumstances, the uncertainty values represent the inability to determine the character or nature (consistency) of a system within itself. On the other hand, if the precision and subtlety of the observed phenomena is much less than the precision and subtlety of the observing phenomena, the uncertainty values become much smaller than the velocity and size values of the bodies being observed (9). Under these circumstances, the character or nature of a system can be determined—although not exactly—since the uncertainty values do not hide or mask observed phenomena behavior nor indicate significant erratic behavior.

Keeping in mind that the Heisenberg Principle implicitly depends upon the indeterminate presence and influence of an observer (14), we can now see—as revealed by the two examples just cited—that the magnitude of the uncertainty values represent the degree of intrusion by the observer upon the observed. When intrusion is total, that is, when the intended distinction between observer and observed essentially disappears (3), the uncertainty values indicate erratic behavior. When intrusion is low the uncertainty values do not hide or mask observed phenomena behavior nor indicate significant erratic behavior. In other words, the uncertainty values not only represent the degree of intrusion by the observer upon the observed but also the degree of confusion and disorder perceived by that observer.

Entropy and the Second Law of Thermodynamics

Confusion and disorder are also related to the notion of entropy and the Second Law of Thermodynamics (11, 20). Entropy is a concept that represents the potential for doing work, the capacity for taking action, or the degree of confusion and disorder associated with any physical or information activity. High entropy implies a low potential for doing work, a low capacity for taking action or a high degree of confusion and disorder. Low entropy implies just the opposite. Viewed in this context, the Second Law of Thermodynamics states that all observed natural processes generate entropy (20). From this law it follows that entropy must increase in any closed system—or, for that matter, in any system that cannot communicate in an ordered fashion with other systems or environments external to itself (20). Accordingly, whenever we attempt to do work or take action inside such a system—a concept and its match-up with reality—we should anticipate an increase in entropy hence an increase in confusion and disorder. Naturally, this means we cannot determine the character or nature (consistency) of such a system within itself, since the system is moving irreversibly toward a higher, yet unknown, state of confusion and disorder.

Constructing decision models: A dialectic engine

What an interesting outcome! According to Gödel we cannot—in general—determine the consistency, hence the character or nature, of an abstract system within itself. According to Heisenberg and the Second Law of Thermodynamics any attempt to do so in the real world will expose uncertainty and generate disorder. Taken together, these three notions support the idea that any inward-oriented and continued effort to improve the match-up of concept with observed reality will only increase the degree of mismatch. Naturally, in this environment, uncertainty and disorder will increase as previously indicated by the Heisenberg Indeterminacy Principle and the Second Law of Thermodynamics, respectively. Put another way, we can expect unexplained and disturbing ambiguities, uncertainties, anomalies, or apparent inconsistencies to emerge more and more often. Furthermore, unless some kind of relief is available, we can expect confusion to increase until disorder approaches chaos—death.

Fortunately, there is a way out. Remember, as previously shown, we can forge a new concept by applying the destructive deduction and creative induction mental operations. Also, remember, in order to perform these dialectic mental operations we must first shatter the rigid conceptual pattern, or patterns, firmly established in our mind. This should not be too difficult since the rising confusion and disorder are already helping us to undermine any patterns. Next, we must find some common qualities, attributes, or operations to link isolated facts, perceptions, ideas, impressions, interactions, observations, etc. together as possible concepts to represent the real world. Finally, we must repeat this unstructuring and restructuring until we develop a concept that begins to match up with reality. By doing this—in accordance with Gödel, Heisenberg and the Second Law of Thermodynamics—we find that the uncertainty and disorder generated by an inward-oriented system talking to itself can be offset by going outside and creating a new system. Simply stated, uncertainty and related disorder can be diminished by the direct artifice of creating a higher and broader, more general concept to represent reality.

However, once again, when we begin to turn inward and use the new concept—within its own pattern of ideas and interactions—to produce a finer grain match with observed reality, we note that the new concept and its match-up with observed reality begins to self-destruct just as before. Accordingly, the dialectic cycle of destruction and creation begins to repeat itself once again. In other words, as suggested by Gödel's proof of Incompleteness, we imply that the process of Structure, Unstructure, Restructure, Unstructure, Restructure is repeated endlessly in moving to higher and broader levels of elaboration. In this unfolding drama, the alternating cycle of entropy increase toward more and more disorder and the entropy decrease toward more and more order appears to be one part of a control mechanism that literally seems to drive and regulate this alternating cycle of destruction and creation toward higher and broader levels of elaboration. Now, in relating this deductive/inductive activity to the basic goal discussed in the beginning, I believe we have uncovered a *dialectic engine* that permits the construction of decision models needed by individuals and societies for determining and monitoring actions in an effort to improve their capacity for independent action.

Furthermore, since this engine is directed toward satisfying this basic aim or goal, it follows that the goal-seeking effort itself appears to be the other side of a control mechanism that seems also to drive and regulate the alternating cycle of destruction and creation toward higher and broader levels of elaboration. In this context, when acting within a rigid or essentially a closed system, the goal-seeking effort of individuals and societies to improve their capacity for independent action tends to produce disorder towards randomness and death. On the other hand, as already shown, the increasing disorder generated by the increasing mismatch of the system concept with observed reality opens or unstructures the system. As the unstructuring, or as we'll call it the destructive deduction, unfolds, it shifts toward a creative induction to stop the trend toward disorder and chaos to satisfy a goal-oriented need for increased order.

Paradoxically, then, an entropy increase permits both the destruction or unstructuring of a closed system and the creation of a new system to nullify the march toward randomness and death. Taken together, the entropy notion associated with the Second Law of Thermodynamics and the basic goal of individuals and societies seem to work in dialectic harmony, driving and regulating the destructive/creative, or deductive/inductive, action—that we have described herein as a dialectic engine. The result is a changing and expanding universe of mental concepts matched to a changing and expanding universe of observed reality (28, 27). As indicated earlier, these mental concepts are employed as decision models by individuals and societies for determining and monitoring actions needed to cope with their environment—or to improve their capacity for independent action.

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