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Universal Functional Requisites of Society: The Unending Quest

Ovid C. Lewis

THE SEARCH FOR AN immutable and universal set of objective standards for human behavior continues unabated. In the past this search has been identified with one form or another of the natural law tradition.¹ Today sociologists, anthropologists, and comparative jurists seem bent on continuing the quest, most often under the guise of discovering the functional requisites of society.² At the outset, however, they are met with a difficult methodological problem: There are no uncontaminated cultures left. Both chemical and cultural pollution seem pervasive on our globe. When, in 1876, with the death of Lalla Rookh, the

¹ Professor d'Entrèves suggests three basic approaches to natural law: technological, deontological, and ontological. We are here concerned primarily with the ontological school which assumes that there is an ordering in the scheme of things which is immutable, universal, and knowable, which can provide a point of departure for an objective moral standard. d'Entrèves, *The Case for Natural Law Re-Examined*, 1 NATURAL L. F. 5, 31-40 (1956). See generally E. PATTERSON, JURISPRUDENCE 332-75 (1953); Gurvitch, *Natural Law*, 11 ENCYCLOPEDIA OF THE SOCIAL SCIENCES 284 (1933). Typical of this type of thinking is Brendan Brown's averment: "The Natural Law creates the norm of an objective morality." Brown, *Natural Law: Dynamic Basis of Law and Morals in the Twentieth Century*, 31 TUL. L. REV. 491 (1957).

² Many comparative jurists are engaged in the task of discovering the basis for a science of law. Hans Kelsen, for example, contends that a pure theory of law is attained only by "a comparison of all the phenomena which go under the name of law [which will enable us] to discover the nature of law itself, to determine its structure and its typical forms, independent of the changing content which it exhibits at different times and among different peoples." Kelsen, *The Pure Theory of Law and Analytic Jurisprudence*, 55 HARV. L. REV. 44 (1941). This comparative study will provide, he contends, a science of law, which will "comprehend all human law in one system of norms." *Id.* at 70. Édouard Lambert, who also espoused the notion that comparative law is a science, saw its function as that of discovering "through the establishment of a universal history of law the rhythms or natural laws of the succession of social phenomena which direct the evolution of legal institutions." Lambert, *Comparative Law*, in 4 ENCYCLOPEDIA OF THE SOCIAL SCIENCES 126, 127 (1930). Max Rheinstein described comparative law as "the observational and exactitude-seeking science of law in general . . . [I]t searches for . . . law in the sense in which the word is used in the 'sciences,' laws of the kind of Newton's laws of gravitation[,] . . . laws in that sense in which the word is understood in modern natural science." Rheinstein, *Teaching Tools in Comparative Law*, 1 AM. J. COMPARATIVE L. 98, 99 (1952). For similar views see J. HALL, COMPARATIVE LAW AND SOCIAL THEORY 10-12 (1963). Sociologists are quite active in the quest for a common denominator to compare societies, especially since they are acutely aware that "No comparison of a single pair of natural objects is interpretable." Campbell, *The Mutual Methodological Relevance of Anthropology*

Tasmanians passed into oblivion — a victim of the technologically superior civilization that invaded the island of Tasmania, located off the southeastern coast of Australia, our progress toward a mankind perspective was manifest.³ Clearly, if each existing cultural group is significantly influenced by other cultures, it is impossible to say that certain aspects of that culture are solely indigenous.⁴ This

and Psychology, in *PSYCHOLOGICAL ANTHROPOLOGY* 333, 344 (F. Hsu ed. 1961). For one of the most notable attempts to delineate the functional prerequisites of a society, see Aberle, Cohen, Davis, Levy, & Sutton, *The Functional Prerequisites of a Society*, 60 *ETHICS* 100 (1950); D. MARTINDALE, *THE NATURE AND TYPES OF SOCIOLOGICAL THEORY* 490-93 (1960). For a defense of functionalism, see W. GOLDSCHMIDT, *FUNCTIONAL ANTHROPOLOGY* 118-39 (1966). For an analysis of Talcott Parsons' structural-functional approach, see D. MARTINDALE, *supra* at 421-25, 484-90; W. MITCHELL, *SOCIOLOGICAL ANALYSIS AND POLITICS* (1967); J. STONE, *SOCIAL DIMENSIONS OF LAW AND JUSTICE* 20-28, 609-16 (1966). The most recent school seeking to establish transcultural principles is that of general systems theory. "General system theory contends that there are principles of systems in general . . . irrespective of the nature of systems, of their components, or of the relations or 'forces' between them." von Bertalanffy, *General System Theory and Psychiatry*, in 3 *AMERICAN HANDBOOK OF PSYCHIATRY* 705, 708 (S. Arieti ed. 1966). See generally L. VON BERTALANFFY, *GENERAL SYSTEM THEORY* (1968).

³ For an account of the tragic eradication of the Tasmanians, see G. MURDOCK, *OUR PRIMITIVE CONTEMPORARIES* 1-19 (1934). Professor Service characterizes his anthropologist colleagues' reaction to the destruction of primitive cultures as one of feeling "disheartened, sad, or even helplessly angry." E. SERVICE, *PROFILES IN ETHNOLOGY* at ix (rev. ed. 1963). Anthropologists react this way for the following reasons.

First, . . . our sympathies are aroused by the frequent suffering of the people, and by the realization that much of it is caused by the ignorance and sometimes the cruelty with which 'civilized' peoples have treated them. Another feeling . . . is a sense of the great loss to human knowledge, to art, history, and particularly to science, as these cultures disappear. . . . Modern man is losing this living evidence of his own past, and at the same time he is losing the laboratory which the diversity of primitive cultures provides.

Id. at ix-x.

⁴ Ralph Linton's "solid American citizen" provides the classic proof for cultural diffusion:

Our solid American citizen awakens in a bed built on a pattern which originated in the Near East but which was modified in Northern Europe before it was transmitted to America. He throws back covers made from cotton, domesticated in India, or linen, domesticated in the Near East, or wool from sheep, also domesticated in the Near East, or silk, the use of which was discovered in China. All of these materials have been spun or woven by processes invented in the Near East. He slips into his moccasins, invented by the Indians of the Eastern woodlands, and goes to the bathroom, whose fixtures are a mixture of European and American inventions, both of recent date. He takes off his pajamas, a garment invented in India, and washes with soap invented by the ancient Gauls. He then shaves, a masochistic rite which seems to have derived from either Sumer or ancient Egypt.

. . . .

On his way to breakfast he stops to buy a paper, paying for it with coins, an ancient Lydian invention. At the restaurant a whole new series of borrowed elements confronts him. . . .

When our friend has finished eating he settles back to smoke, an American Indian habit, consuming a plant domesticated in Brazil in either a pipe,

fact is responsible, apparently, for the great excitement generated among anthropologists when Dr. Jeremiah Pangloss, the renowned anthropologist, recently revealed that he had returned from a stay of several years duration with a tribe that had had virtually no exposure to the outside world. Dr. Pangloss' report is of course highly significant for those who would establish universal functional requisites for society. In the following pages we shall set forth briefly what the good doctor believes he observed, and then comment on the relevance of his report to the functional requisite issue.

Several years ago, while studying Kapauku Papuans, Dr. Pangloss, quite by accident, discovered a secluded valley located in the Central Highlands of Western New Guinea. Here he found the Zuckaroo tribe which in many respects was like the Kapauku Papuans.⁵ Apparently the Zuckaroo are aware of their neighbors but have intentionally remained isolated. There are several significant ways in which the Zuckaroo differ from other Papuan tribes. First, their language is far more complex and exhibits none of the transcultural invariance some contend exists.⁶ Second, the Zuckaroo appeared to Pangloss far more intelligent than any primitive tribe that he had studied. Indeed, the cunning with which they had avoided contact with the outer world indicates a high degree of cognitive ability. Third, many of the norms of behavior deviated significantly from those practiced by neighboring tribes.⁷

Briefly, the essential characteristics of the Zuckaroo are as follows. Physically the people are very similar to the Papuans. They are slightly taller (153 centimeters average height of both male and female as compared with 151.2 centimeters average height of the

derived from the Indians of Virginia, or a cigarette, derived from Mexico. If he is hardy enough he may even attempt a cigar, transmitted to us from the Antilles by way of Spain. While smoking he reads the news of the day, imprinted in characters invented by the ancient Semites upon a material invented in China by a process invented in Germany. As he absorbs the accounts of foreign troubles he will, if he is a good conservative citizen, thank a Hebrew dicty in an Indo-European language that he is 100 per cent American.

R. LINTON, *THE STUDY OF MAN* 326-27 (1936).

⁵ For an informative and concise account of the Kapauku Papuans, see L. POSPISIL, *THE KAPAUKU PAPUANS OF WEST NEW GUINEA* (1966). The comparative jurist will find most helpful L. POSPISIL, *KAPAUKU PAPUANS AND THEIR LAW* (1958).

⁶ For an excellent discussion of this issue, see Bar-Hillel, *Syntactical and Semantical Categories*, in 8 *ENCYCLOPEDIA OF PHILOSOPHY* 57 (1967). Of special interest to us is the recent work of Uriel Weinreich that has "cast doubts on the possibility of making a clear distinction between syntactical and semantical categories." *Id.* at 61.

⁷ In some instances they almost appear to accept notions similar to the Dionysian Dobu who believe that "[t]he good man, the successful man, is he who has cheated another of his place." R. BENEDICT, *PATTERNS OF CULTURE* 131 (Mentor Book ed. 1946).

Kapauku male and 142.1 centimeters average height of the Kapauku female), brachycephalic (male and female cranial index 82), mesorrhine, hair straight, wavy, curly, or woolly, and skin color a light bronze. Obviously these characteristics do not permit an easy classification of the Zuckaroo along conventional lines.⁸ The natives place great emphasis on rationalism, secularism, and quantitative orientation. There is no concern displayed regarding the supernatural or religious rituals. Rather atypical of most primitive tribes, there is an almost Benthamite preoccupation with the individual to the exclusion of any apparent concern for the common good. This goes so far that even the bridges used by the general populace are owned, plank by plank, by individuals, who can at any time decide to collect their property. This seldom occurs since it would mean a loss of face to admit that one had need of something he had loaned to others.

The most prominent persons are the *troi* who by one means or another have acquired great wealth consisting generally of livestock (pigs, marsupials, and rats), fields (in which they grow sweet potatoes), shell money, and personal property (abaci, dice, canoes, bamboo knives, etc.). The *troi* loan property in return for work in their fields and other personal services.

It is especially interesting to learn that there is no noun for the concept of bad or good in Zuckaroo. Instead, these concepts appear only in adjective form, perhaps explaining why the natives seem to avoid totally the reification fallacy so prevalent in our culture.

The climate is moderate, rainfall appreciable, and soil good. Thus the Zuckaroo are able to produce abundant food without expending the time and energy that other primitive tribes find necessary. This is perhaps why they have had the time to construct a complex language, including a fascinating number system that enables them to solve in seconds complicated mathematical problems using primitive abaci.

The *Weltanschauung* of the Zuckaroo is not easily explicated. They believe that the world always has been and always will be. Further, that they exist in order to act, especially in order to produce elegant conceptual structures in their minds, generally mathematical. In accordance with their stress on individualism and free will, it is impossible for the Zuckaroo to conceive of sin. Dr. Pangloss, good Christian that he is, during his stay with the natives continually tried to convert them to the true faith until one day when a young Zuck-

⁸ See, e.g., B. BERRY, RACE AND ETHNIC RELATIONS 45-49 (2d ed. 1958).

aroo asked him some very disturbing questions. "How can you think," asked the youngster with a broad grin, "that a man can sin and have a free will, and at the same time believe that your God is omnipotent, and that he created the world and determined all the happenings? If he determined all that happens, and (therefore) also the bad deeds, how can a man be held responsible? Why, if he is omnipotent, did the Creator have to change himself into a man and allow himself to be killed (crucified) when it would have been enough for him to order men to behave?"⁹ Unfortunately Dr. Pangloss was not adequately trained in the casuistic art of theology. Regardless of the response he gave, the youngster was able to point to some logical inconsistency which had eluded Pangloss' discernment. He finally gave up, accepting sadly that the boy, and probably the rest of the tribe, would live forever without the blessings of Christianity. As a corollary of the emphasis placed on individualism and free will, the natives do not use the device of official sanction to coerce individuals to act according to group norms. The sanctions appear generally to be strictly social, not legal. It is true, however, that in some instances there is resort to a type of official decision making. Suppose, for example, that one native wrongfully takes the abacus of another. The individual claiming that a wrongful act has been committed finds a *troi* (if he is a *troi* then he must find a superior *troi*, which is determined on a strictly quantitative basis) who will resolve the dispute through a most curious procedure. First he brings the two litigants before him. Then, after throwing dice in a manner agreed upon by the parties, he awards the abacus to one of them. Pangloss was unable to find a neutral principal that was applied and often complained that the Zuckaroo were violating natural justice by not treating like cases alike.¹⁰ The Zuckaroo would listen to Pangloss for many hours, but he never could convince them that the grand methods of the common law were more appropriate for resolving their conflicts.

ANALYSIS

Dr. Pangloss reports that the Zuckaroo view man from a view-

⁹ L. POSPISIL, *THE KAPAUKU PAPUANS OF WEST NEW GUINEA* 85 (1966).

¹⁰ Professor Herbert Wechsler contends that a principled decision is one that rests on neutral principles: "A principled decision, in the sense I have in mind, is one that rests on reasons with respect to all the issues in the case, reasons that in their generality and their neutrality transcend any immediate result that is involved." Wechsler, *Toward Neutral Principles of Constitutional Law*, 73 HARV. L. REV. 1, 19 (1959). See Lewis, *The High Court: Final . . . But Fallible*, 19 CASE W. RES. L. REV. 528, 556 n.120 (1968).

point similar to Cartesian dualism. Since man has mental and material aspects, the Zuckaroo naturally ask, as did Descartes, "Who am I?" They conclude that the Ego refers to "the thinking process that is the cooperative effort of the body and the . . . mind."¹¹ Thus Pangloss concluded that they believe that to think is to be — *cogito ergo sum*.

A people that can conceive *cogito ergo sum* clearly displays the facility for elaborating a conceptual universe. Assuming for the moment that this facility is the *differentia specifica* of *Homo sapiens*, the quest for universal functional requisites beyond minimal physical and creature needs becomes a labor of Sisyphus. This is apparent when we consider the significant impact of man's conceptual artifacts on his behavior patterns.¹²

According to our present conceptual scheme, it is analytically possible to distinguish the conceptual from the non-conceptual and to identify some significant differences between them. This separation is itself artificial, since the non-conceptual is epistemologically subordinate to the conceptual apparatus in that it is always perceived in a particular context. What we *know* through preception of the universe must necessarily filter through the conceptual artifacts that define what we *mean*. Thus the semeiotic and epistemological questions are inextricably interrelated.

Our current view of external non-conceptual reality (expressed in our relative concepts) is that it constitutes a continuum. There are no natural joints in nature, rather our conceptual categories are man-imposed. The accepted categories at one time separated living matter from the rest of the universe partially on the basis that its manifest organized complexity was in violation of the second law of thermodynamics. While the explanation of why living matter does not violate the second law provides the key to man's *differentia*, it appears to lock the door on the quest for universal functional requisites. Why this is so will occupy the remainder of our analysis.

The second law involves the energy degradation principle that

¹¹ L. POSPISIL, *supra* note 9, at 87.

¹² Granted the minimal "can't help" dictated by the demands of our biophysical systems which must maintain equilibrium and homeostasis, it is nonetheless clear that our concepts and categories, attitudes and habits are "the products not only of physiological and psychological constraints but also, to a substantial degree of cultural and historical variables" [Toulmin, *Neuroscience and Human Understanding*, in *THE NEUROSCIENCES* 822, 829 (G. Quarton, T. Melnechuk, & F. Schmitt eds. 1967)] that produce behavior patterns and beliefs as diverse as those of the Dionysian Dobu and Appollonian Zuni. Lewis, *Systems Theory and Judicial Behavioralism*, 21 CASE W. RES. L. REV. 361, 404-05 (1970).

the entropy of a closed system can never decrease, although it may increase. There is in fact a tendency for it to increase, which means that "in the absence of outside interference, probability distributions tend to become flatter."¹³ As we have noted, living matter seems to violate this principle since it tends to become more organized over time, both phylogenetically and ontogenetically. In 1871 Clerk Maxwell posed the problem in the form of his famous sorting demon paradox.¹⁴ And in 1929, Leo Szilard provided the solution:

[N]o . . . contradiction arises if due account is taken of the fact that the demon (who must be considered as part of the closed system involved) is acting on "information" concerning the detailed motion of the gas and is actually converting information into negative entropy [negentropy]. . . .

These investigations were remarkable for preceding the development of modern information theory by Claude Shannon in 1948. In this theory, information is not concerned with meaning but with the statistical character of a whole range of possible messages and is, in fact, the measure of the amount of freedom of choice we have in constructing messages. Shannon's investigation had an important bearing on Boltzmann's statistical analogue of entropy, for Boltzmann had left open the question of whether there might be an even more suitable statistical analogue. Shannon specified certain general mathematical properties which the required function must satisfy and found that the only possible function was Boltzmann's.

Entropy has already been described as a measure of the amount of disorder in a physical system, but it is now clear that a more precise statement is that entropy measures lack of information about the structure of a system. . . .

¹³ P. LANDSBERG, *ENTROPY AND THE UNITY OF KNOWLEDGE* 16 (1961).

¹⁴ One of the best established facts in thermodynamics is that it is impossible in a system enclosed in an envelope which permits neither change of volume nor passage of heat, and in which both the temperature and the pressure are everywhere the same, to produce any inequality of temperature or of pressure without the expenditure of work. This is the second law of thermodynamics, and it is undoubtedly true so long as we can deal with bodies only in mass and have no power of perceiving or handling the separate molecules of which they are made up. But if we conceive a being whose faculties are so sharpened that he can follow every molecule in its course, such a being, whose attributes are still as essentially finite as our own, would be able to do what is at present impossible to us. For we have seen that the molecules in a vessel full of air at uniform temperature are moving with velocities by no means uniform though the mean velocity of any great number of them, arbitrarily selected, is almost exactly uniform. Now let us suppose that such a vessel is divided into two portions, A and B, by a division in which there is a small hole, and that a being who can see the individual molecules opens and closes this hole, so as to allow only the swifter molecules to pass from A to B, and only the slower ones to pass from B to A. He will thus, without expenditure of work, raise the temperature of B and lower that of A, in contradiction to the second law of thermodynamics.

J. MAXWELL, *THEORY OF HEAT* 338-39 (10th ed. 1891).

The importance of negative entropy in biology has been stressed by Erwin Schrödinger. Any living organism delays its decay into thermal equilibrium (death) by its capacity to maintain itself at a fairly high level of orderliness (and hence fairly low level of entropy) by continually absorbing negative entropy from its environment.¹⁵

It appears then that in our interaction with the world we perceive reality and fashion conceptual models that are "as different from the world as a geographical map is from the surface of the earth."¹⁶ But although man is capable of discerning regularities and patterns and ordering the world to suit his ends, he does not operate in violation of the second law. Like Maxwell's sorting demon, man responds and interacts¹⁷ on the basis of information or negentropy,¹⁸ which offsets the decrease in entropy.¹⁹ But because of his capacity to learn and to generate alternate meanings for similar stimuli and then "to build up and use different patterns of interrelationships within the same set of meanings,"²⁰ and to duplicate and distribute this information, a seeming paradox results. By reproducing information with a printing press are we not creating negentropy in violation of the second law? In discussing this

¹⁵ Withrow, *Entropy*, in 2 ENCYCLOPEDIA OF PHILOSOPHY 526, 528 (1967). The relevance of Boltzmann's constant (1.3803×10^{-16} g cm²/sec² degree C) to entropy is easily shown. Let $I_1 = k \ln (P_0/P_1) = k \ln P_0 - k \ln P_1$ where: P_0 = the number of equally probable possible outcomes in a situation. This means that there is no information for sorting outcomes. This is expressed algebraically as $I_0 = 0$. With information there are fewer equally probable outcomes.

Then $I_1 = 0$ and $I_1 = k \ln P_0 - k \ln P_1$. The constant k depends on the units used. Where "bits" or binary digits are used $k = \frac{1}{\ln 2}$. In physical problems units similar to entropy are used and $k =$ Boltzmann's constant.

¹⁶ L. BRILLOUIN, SCIENTIFIC UNCERTAINTY AND INFORMATION 52 (1964).

¹⁷ It had been recognized long ago that an observation required some sort of interaction between the observer and the observed element; but it was currently assumed that this interaction could be made very small and negligible. For instance, looking at the object under observation was supposed to cause no trouble! Quantum theory has completely modified the situation. The finite quantum of action h discovered by Planck makes it impossible to go to the limit of infinitely small action. When you look at an object, you can see it only if you receive at least a few quanta, $h\nu$, from it. The interaction is finite; the coupling between observer and observed object cannot be ignored. *It is impossible to make any observation without perturbing the object.*

L. BRILLOUIN, *supra* note 16, at 52.

¹⁸ Erwin Schrödinger suggests that living matter feeds on negentropy. See E. SCHRÖDINGER, WHAT IS LIFE? 71-72 (1945). See also Brillouin, *Life, Thermodynamics, and Cybernetics*, 37 AM. SCIENTIST 554 (1949); L. BRILLOUIN, *supra* note 16, at 8.

¹⁹ See Onsager, *Thermodynamics and Some Molecular Aspects of Biology*, in THE NEUROSCIENCES 75 (G. Quarton, T. Melnechuk, & F. Schmitt eds. 1967).

²⁰ H. SCHRODER, M. DRIVER, & S. STREUFERT, HUMAN INFORMATION PROCESSING 5 (1967).

paradox Brillouin, distinguishing absolute from distributed information, suggested that only absolute information is bound by the second law. As Mortimer Ostow, who most effectively resolves the problem, points out, this is correct, since distributed information constitutes negentropy only when perceived. In the act of creating the organizational negentropy of this text, the author has expended energy to make the text conform, to the extent possible, with the mental pattern cerebration has produced. That does not mean that there has been a transfer of the negentropy from the mind to the written page, rather that the mental pattern has acted as a template for the writing activity which in turn has produced a physical ordering of ink on the paper. Only when that ordering is perceived and in turn used as a template is information created again. Thus negentropy does not exist *in vacuo*. The reader expends mental effort, more or less depending on his capacity and background, in reading meaning into the visual ordering that confronts him by mentally establishing relationships. Thus we may consider that the negentropy "of the brain change is provided by intraneural metabolism and that the retinal image is used merely as a template; similarly that the negative entropy or the retinal image is provided by the luminous source with the object itself used as a template."²¹

It bears emphasizing that distributed information is only as useful as the perceiver's capability to assimilate it and generate relationships between the template pattern and other mental patterns. The more knowledgeable the "knower," the more information conveyed.²² In dealing with complex adaptive systems that process information, one must thus often deal with entropy and negentropy values that depend on the definition of the initial and final stages

²¹ Ostow, *The Entropy Concept and Psychic Function*, 39 AM. SCIENTIST 140, 141 (1951). As Karl Deutsch has stated:

[A] message is not a physical object in the sense of everyday language. It is a pattern of physical changes of physical objects. It has physical reality: it can be measured and subjected to repetitive treatment. Only by physical processes can it be preserved, received, transmitted, destroyed, or operated on, in any way whatsoever. Yet it can be transferred in succession or duplication from one set of physical objects to another. It can be in several places at once. Unlike "matter" and "energy," "information" — that is, the patterns that can be abstracted from messages — is not subject to their laws of conservation. It can be created and annihilated.

Deutsch, *Some Notes on Research on the Role of Models in the Natural and Social Sciences*, 7 SYNTHESIS 506, 518 (1948-49).

²² Mortimer Ostow offers the example of the mixing of solutions of a given sugar, with one containing synthetic and the other natural sugar, which results in an increase in entropy only to an individual with a knowledge of polarimetry. See Ostow, *supra* note 21, at 143.

of the system affected. When these variables are taken into account the second law holds and the paradox is explained.

The conceptual models of external reality constructed by Man, the information processor and negentropy creator *par excellence*, are veridical only to the extent that the theoretical systems are isomorphic with the existing non-conceptual systems.²³ However, for a variety of reasons, including Gödel's proof,²⁴ no model constructed by man can ever reflect completely all of reality, although an overlapping of complementary models can add perspective.

One of the best examples of the necessity for developing overlapping models is provided by the apparent conflict between the corpuscular and wave theories concerning properties of light. Certain observations support one theory, other observations the other. Niels Bohr suggests that neither is false, rather they are complementary, focusing on different aspects of reality for which no single conceptual system yet invented is entirely isomorphic.

Complementarity entails a corollary: *uncertainty* (in Heisenberg's meaning). The example of quantum physics can explain this relation. Let us examine an electron in motion: it may pass through a narrow opening in a diaphragm; its position can then be rather accurately defined, and the experiment leads to the image of a particle in motion. However, this experiment and this representation, which constitute the first aspect of complementarity, cannot be followed up with extreme precision. On the other hand (second complementary aspect), we can observe interference ef-

²³ Isomorphism between systems exists when there is a one-to-one correspondence between the elements of each system and "[t]he relations among the elements are preserved by the same correspondence." Rapoport, *General Systems Theory*, 15 INTERNATIONAL ENCYCLOPEDIA OF SOCIAL SCIENCES 452, 455 (1968). A well-known example of isomorphism between mathematical models relates mechanical harmonic motion to the "behavior" of an electrical circuit. The behavior of a system that will oscillate with harmonic motion where frictional forces are involved is closely approximated by the differential equation:

$$M \frac{d^2x}{dt^2} + R \frac{dx}{dt} + kx = F(t)$$

Where M is the mass of the moving object, k the restoring force constant, x the instantaneous displacement, and F(t) constitutes the external force impinging on the mass. The isomorphism is apparent when we compare the above equation with that representing an electrical circuit:

$$L \frac{d^2q}{dt^2} + R \frac{dq}{dt} + Cq = E(t)$$

Where L is inductance, R is resistance, C capacitance, E(t) an impressed electromotive force, and q constitutes the charge. See HARMONIC MOTION, THE INTERNATIONAL DICTIONARY OF APPLIED MATHEMATICS 427-28 (1960); Rapoport, *supra*, at 455. Another isomorphism of special interest to us is that between the equation for entropy and for the uncertainty of a set in information theory. See Rapoport, *The Promises and Pitfalls of Information Theory*, 1 BEHAVIORAL SCIENCE 303 (1956).

²⁴ See generally E. NAGEL & J. NEWMAN, GÖDEL'S PROOF (1958).

fects and thus measure a wavelength λ . This defines a momentum p related to the wave length λ by the relation

$$p = \frac{h}{\lambda} \quad (\text{L. de Broglie}) \dots$$

and leads to a wave representation. These two categories of experiments limit and exclude each other. Both cannot be conducted at once with absolute precision. That is what is specified in Heisenberg's principle of uncertainty, which determines the border line between the two methods, and makes sure that complementarity cannot turn into contradiction.

The corpuscular model and the wave model have more points in common than was previously imagined. Thanks to the finite value of Planck's constant h , the quantized particle and the quantized wave yield similar values for energy and for momentum; a "wave packet," as defined by Schrodinger, is located in a certain limited region that corresponds to the "position" of the particle. If we try to define this position too exactly, the momentum can no longer be measured with great accuracy; the error Δx of position, and the error Δp_x of momentum, are related by Heisenberg's uncertainty relation

$$\Delta x \Delta p_x \geq h \quad [\text{V.2}]$$

In other words, the quantized particle has many physical properties that make it very different from a large-size particle (say, a billiard ball); the quantized wave, too, is very different from a sound wave or a wave on the sea. Both models have many points in common, and overlap nicely, but neither of them can be easily visualized and the border between both models is defined by condition (V.2).²⁵

Thus we are precluded from ever ascertaining the "essence" of the universe, and instead must scan "features of the universe [as] we shift range and focus back and forth between telescopic and microscopic vision . . ." ²⁶ Our conceptual instruments are never entirely veridical, but they are useful insofar as they are isomorphic to the particular aspect of reality on which we are focusing. We can agree that as we move down on the scale we gain precision and lose perspective,²⁷ and that as we move up "new and relevant features, formerly unrecognizable and unsuspected," appear.²⁸ Further, it does appear that this "emerging novelty . . . reflects properties of

²⁵ L. BRILLOUIN, *supra* note 16, at 53-54.

²⁶ Weiss, *1 + 1 \neq 2 (One Plus One Does Not Equal Two)*, in THE NEUROSCIENCES 801, 802 (G. Quarton, T. Melnechuk, & F. Schmitt eds. 1967).

²⁷ The advent of computers, however, may mean that "the relative balance of advantage has shifted from simplifying a theory in order to make it solvable toward retaining complexity in order to increase its accuracy and realism." Newell & Simon, *Simulation: Individual Behavior*, in 14 INTERNATIONAL ENCYCLOPEDIA OF THE SOCIAL SCIENCES 262 (1968).

²⁸ See Weiss, *supra* note 26, at 810-14.

collectives,"²⁹ and their patterns of organization and communication.³⁰ We see then that organization, entropy, uncertainty, information, and meaning are interrelated. Modern information theory constitutes an attempt to unravel the relations. The easiest way to appreciate what is entailed is probably best explicated by discussing Fred Attneave's checkerboard example.³¹ Consider what happens when in a game of twenty questions a player attempts to determine which of the 64 squares of a checkerboard has been selected for him to guess. He can always choose the correct square by asking only six questions. For example, suppose the square selected was in the position indicated by the x in Figure 1.

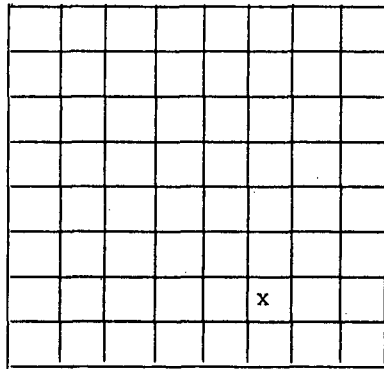


Figure 1

The following series of questions would locate the square: Is the square: (1) on the right half of the board (Yes); (2) in the lower half of the right 32 (Yes); (3) in the right half of the remaining 16 (No); (4) in the lower half of the remaining 8 (Yes); (5) in

²⁹ George Simmel half a century ago wrote extensively on the emergent qualities of groups as the number of individuals composing the group increased. "[A] group of a certain extent and beyond a certain stage in its increase of numbers must develop for its maintenance certain forms and organization which it did not previously need; and . . . , on the other hand, more restricted groups manifest qualities and reciprocal activities which, in the case of their numerical extension, inevitably disappear." Simmel, *The Number of Members as Determining the Sociological Form of the Group*, 8 AM. J. SOCIOLOGY 1, 2 (1902). More recently it has been demonstrated that the very configuration of homes within a community will affect the "web of friendship" among the inhabitants. See W. WHYTE, *THE ORGANIZATION MAN* 330-49 (1956). See also Bavelas, *Communication Patterns in Task-Oriented Groups*, 22 J. ACOUSTICAL SOC'Y AM. 725 (1950); B. COLLINS & H. GUETZKOW, *A SOCIAL PSYCHOLOGY OF GROUP PROCESSES FOR DECISION-MAKING* 204-09 (1964).

³⁰ See generally Lewis, *supra* note 12, at 370-89.

³¹ See F. ATTNEAVE, *APPLICATIONS OF INFORMATION THEORY TO PSYCHOLOGY* 1-11 (1959). See generally W. GARNER, *UNCERTAINTY AND STRUCTURE AS PSYCHOLOGICAL CONCEPTS* (1962).

the lower half of the remaining 4 (No); (6) the right square of the remaining 2 (Yes). If 1 = yes, and 0 = no, then we can write in the binary system the sequence of responses as 110101, which means that only six bits are necessary to specify one alternative from among 64 equally likely alternatives. It appears that the number of bits of information necessary then is the power by which 2 must be raised to equal the number of alternatives involved. We can thus generalize and write:

$$m = 2^H \text{ or } H = \log_2 m \quad (1)$$

where: m = the number of equally probable alternatives H = the amount of uncertainty or information expressed in bits. Since all m are equally probable, the probability (p) of any specific alternative is $\frac{1}{m}$. Thus we may write:

$$p = \frac{1}{m} ; \text{ or } m = \frac{1}{p}$$

substituting in (1):

$$H = \log_2 \frac{1}{p} \quad (2)$$

Where the alternatives involved are not equally probable the relations involved are expressed in the following way:

Let b_1 = information for the occurrence of a particular alternative
 p_1 = probability of the occurrence of a particular alternative.

Substituting in (2):

$$b_1 = \log_2 \frac{1}{p_1} \quad (3)$$

Given m alternatives, each with a specific b and p , the weighted average H is given by the equation:

$$H = p_1 b_1 + p_2 b_2 \dots p_1 b_1 \dots p_m b_m$$

$$\text{or } H = \sum^i p_i b_i \quad (4)$$

Combining (3) and (4):

$$H = \sum^i p_i \log_2 \frac{1}{p_i}$$

$$\text{or } H = - \sum^i p_i \log_2 p_i \quad (5)$$

This formula (5) is the Shannon-Wiener measure of information.

Optimal efficiency would exist when H is at its greatest possible

value for a given situation. This occurs when alternatives are equally probable.

$$H_{\max} = \log_2 m$$

The relative entropy (R) constitutes the ratio of a particular value of H to H_{\max} . Thus

$$R = \frac{H}{\log_2 m}$$

Redundancy (C) is the complement to R and is expressed as:

$$C = 1 - R$$

According to the Shannon-Wiener approach the greater the redundancy, the greater the certainty, with a concomitant loss in efficiency. We have already alluded to the relation of information to uncertainty, as well as to organization, entropy, and meaning.

[I]nformation and ignorance, choice, prediction, and uncertainty are all intimately related [I]t seems intuitively reasonable to speak of degrees of uncertainty. The wider the choice, the larger the set of alternatives open to use, the more uncertain we are as to how to proceed — the more information we require in order to make one decision.³²

Is it possible to use the Shannon-Wiener approach to establish a transcultural measure of efficiency of information processing? Initially this seems probable, but on closer examination this new measure is as fictional as game theory prescriptions when actual psychological processes are examined. When the *meaning* variable is added the template conveys information only within a specific context. A graphic illustration is provided by asking the reader to peruse John Donne's poem, *Loves Alchymie*, to discover its meaning.

LOVES ALCHYMIE

Some that have deeper digg'd loves Myne than I, [1]
 Say, where his centrique happiness doth lie:
 I have lov'd, and got, and told,
 But should I love, get, tell, till I were old,
 I should not finde that hidden mysterie; [5]
 Oh, 'tis imposture all:
 And as no chymique yet th'Elixar got,
 But glorifies his pregnant pot,
 If by the way to him befall

³² Frick, *Information Theory*, in 2 *PSYCHOLOGY: A STUDY OF SCIENCE* 611, 614-15 (S. Koch ed. 1959).

Some odoriferous thing, or medicinall, [10]
 So, lovers dreame a rich and long delight,
 But get a winter-seeming summers night.

Our ease, our thrift, our honor, and our day,
 Shall we, for this vaine Bubles shadow pay?
 Ends love in this, that my man, [15]

Can be as happy' as I can; If he can
 Endure the short scorne of a Bridegroomes play?
 That loving wretch that sweares,
 'Tis not the bodies marry, but the mindes, [20]
 Which he in her Angelique findes,
 Would sweare as justly, that he heares,
 In that dayes rude hoarse minstralsey, the spehares.
 Hope not for minde in women; at their best
 Sweetnesse and wit, they'are but *Mummy*, possest.³⁸

Donne's facility for effective use of imagery, figurative language, and metaphysical conceits enabled him to communicate with the appropriately educated person thoughts not readily discernible to the average reader. Did you appreciate that the search for the essence, the "centrique" or "hidden mysterie" of love pursued by the Renaissance Platonists, is initially presented as parallel to a mining operation, thereby suggesting the difficulty of the "digging" task? The difficulty is transformed into a virtual impossibility (" 'tis imposture all") when Donne develops the conceit that the search for love's essence is essentially like that of the alchemist's search for the *prima materia*. The Renaissance Platonists contended that love became purer and less adulterated by becoming more spiritual, just as the alchemist's alembic purified base matter and reduced it to *prima materia*. But Donne draws a different parallel: both are frauds ("impostures"). This is so even though the alchemist may fortuitously discover a perfume ("some odoriferous thing") or medicine ("medicinall") or the Platonists some incidental verity. The ironic antithesis of the last two lines of the first stanza also seem to involve this conceit. Lovers' dreams are like the dreams of the alchemists and Platonists, ending in futility and frustration — not everlasting spirituality but a "winter-seeming summers night" of lust. The reader already notes that the elliptical nature of these conceits requires considerable familiarity with the background against which

³⁸ JOHN DONNE 47-48 (J. Hayward ed. 1950).

these pieces were written, both for identification of the conceits and a comprehension of their significance.

In the second stanza Donne stands on its head a favorite conceit of the Platonists — the notion that only fools would trade the everlasting essence and substance of true love for the ephemeral and evanescent shadow of love's essence, *i.e.*, physical or sensual love. Donne reverses the conceit and suggests that one is a fool to trade his ease, thrift, honor, and day for an essence that has all the substance of a "Bubbles shadow." Indeed, the lowly manservant can find as much happiness in lovemaking as the one who attempts to attain spiritual love. The related Platonic conceit, that since ultimately minds, not bodies, are involved in true love, one may evolve from crude physical love to the highest spiritual love, is met by the conceit that from a "rude hoarse" minstrel one can hear ultimately the celestial music of the "spheares."

In the pessimistic final lines Donne returns to the alchemy conceit suggesting that since women are without mind the proper alchemic "medicinall" is mummy, a drug composed of mummy powder. "Mummy" is of course completely matter without spirit and thus this medicine, not the *prima materia* (appropriate for spiritual love), is for mindless women.

In addition to the noted conceits Donne dresses *Loves Alchemy* in a veritable panoply of figurative language. There are obvious metaphors such as "loves Myne" (line 1), "winter-seeming summers night" (line 12), "he hears . . . the spheares" (lines 21-22), and women are "*Mummy* possest" (line 24). There are personifications such as "pregnant pot" (line 8) and "dayes rude hoarse minstralsey" (line 22). The paradox presented by the ironic antithesis of the last two lines of the first stanza has been noted above.

The use of puns is also rather obvious. In many cases the puns are based on sexual colloquialisms of the time: "digg'd" (line 1), "centrique" (referring both to essence and the female genitals, line 2), "pot" (womb and alchemist's alembic, line 8), and "*Mummy*" (alchemic drug and mummy, line 24).

The difficulty involved in ferreting out the meaning of this poem is nothing in comparison to a situation where different languages are involved. Then two separate symbol structures with differing constraints impose new problems. Benjamin Whorf has taught us that "language patterns [and] cultural norms . . . have grown up together, constantly influencing each other. But in this partnership the nature of the language is the factor that limits free plasticity

and rigidifies channels of development in the most autocratic way."³⁴ Whorf was of course influenced in arriving at this conclusion by his teacher, Edward Sapir, who also contended that there is a linguistic determinism that constrains culture:

Human beings do not live in the objective world alone, nor alone in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society The fact of the matter is that the "real world" is to a large extent unconsciously built up on the language habits of the group. No two languages are ever sufficiently similar to be considered as representing the same social reality. The worlds in which different societies live are distinct worlds, not merely the same world with different labels attached.³⁵

It does appear that the language acquired by a person affects his cognitive apparatus in such a way that it is easier to learn material that is structured in a fashion isomorphic with that language.

Miller and Selfridge and others have demonstrated that ease of learning and retention of meaningful materials varies with the degree of approximation to English structure. Along similar lines, one of my students, Mr. Albert Swanson, compared the ease of learning nonsense sequences that retained the structure of the English sentences from which they were derived, for example,

The maff vlems oothly um the glox nerfs
with matched materials in which the grammatical cues had been eliminated, for example,
maff vlem ooth um glox nerf.³⁶

Even though there is more information, in the Shannon-Wiener sense, in the structured sentences, they were learned more readily than the unstructured ones. It appears that redundancy makes for psychological efficiency in information processing, although that too may be culturally determined. There is today an increasing

³⁴ B. WHORF, *LANGUAGE, THOUGHT AND REALITY* 156 (J. Carroll ed. 1956).

³⁵ E. SAPIR, *SELECTED WRITINGS IN LANGUAGE, CULTURE, AND PERSONALITY* 162 (D. Mandelbaum ed. 1949). More recently William Bright has observed: Pending the outcome of extensive, strictly controlled, cross-cultural testing of the Whorfian hypothesis, we may limit our acceptance to the following modified formulation:

Insofar as languages differ in the ways they encode objective experience, language users tend to sort out and distinguish experiences differently according to the categories provided by their respective languages. These cognitions will tend to have certain effects on behavior. [Carroll, *Linguistic Relativity, Contrastive Linguistics, and Language Learning*, 1 INT'L REV. APPLIED LINGUISTICS 1 (1963).]

Bright, *Language and Culture*, in 9 *INTERNATIONAL ENCYCLOPEDIA OF THE SOCIAL SCIENCES* 18, 22 (1968).

³⁶ Osgood, *A Behavioristic Analysis of Perception and Language as Cognitive Phenomena*, in *MODERN SYSTEMS RESEARCH FOR THE BEHAVIORAL SCIENTIST* 186, 191-92 (W. Buckley ed. 1968).

awareness that the syntax of language affects behavior in various subtle ways. For example:

[W]ords become associated whenever there is an "error of anticipation" — one word is expected but another is heard as one listens to speech. Thus, words which share similar sentence environments are placed into contiguity covertly. This hypothesis is experimentally testable and has been verified. Such formulations suggest linguistic theories of pathological concept formation. For example, imagine a phobic parent reiterating the sentence frames "Don't touch the _____," or "Don't touch _____," the blank being alternatively filled by "penis," "sister," "dirt," "knives," or "food." The frequency of such powerful conditioning responses, over the course of years, far exceeds those used in experiments on verbal learning and occurs during the impressionable early phases of childhood concept formulation. Subsequent acculturation separates these nouns into different conceptual classes for their appropriate use in conventional verbal communication. But it is conceivable that when such conventional communication becomes disorganized under stress, or is for some reason suspended, for example, in word association tests, dreams, reverie on the analyst's couch, or sensory isolation experiments, the initial grammatical identifications will be in evidence. Attempts at conventional behavior under such circumstances would appear overtly deviant.³⁷

How can we compare the Zuckaroo culture with ours and say that at the level of symbol manipulation there are common functions manifest, let alone agreeing that they are functional requisites for maintenance of the social system? We have noted that the cultural context is different, which is why we use a functional analysis. Yet semantics, syntactics, and pragmatics are inextricably interrelated. As Wittgenstein already perceived, a term has meaning only within a context. If I tell a babysitter to teach my child a game, and she instructs him in how to play craps, I will suggest rather vehemently that I did not have that type of game in mind.³⁸ So too the semantic dimension of "function" is necessarily enmeshed in the syntax of the symbol systems of a society, including not only language,³⁹ but all the other symbolic artifacts that make up a cul-

³⁷ Jaffe, *Psycholinguistics and Computational Linguistics*, in 3 AMERICAN HANDBOOK OF PSYCHIATRY 689, 699 (S. Arieti ed. 1966). See generally *Symposium: Communication in Behavior and Behavioral Science*, AM. BEHAVIORAL SCIENTIST, April 1967, at 1.

³⁸ See Hart, *Positivism and the Separation of Law and Morals*, 71 HARV. L. REV. 593, 627-28 (1958).

³⁹ Much communication occurs without words, involving not only visual-gestural signs (kinesics), but touch, odor, warmth, and variables as subtle as the austere arrangement of a lawyer's office, the dignity of a courtroom, and the barren nature of an interrogation room.

The interrogator should sit fairly close to the subject and between the two there should be no table, desk, or other piece of furniture. Distance or the

ture. It is at best problematical whether a transformational syntax does exist that transcends cultural limits.⁴⁰ Further, when the prag-

presence of an obstruction of any sort constitutes a serious psychological barrier and also affords the subject a certain degree of relief and confidence not otherwise attainable. . . . As to the psychological validity of the above suggested seating arrangement, reference may be made to the commonplace but yet meaningful expressions such as "getting next" to a customer by a salesman.

F. INBAU & J. REID, *CRIMINAL INTERROGATION AND CONFESSIONS* 14 (1962). The second edition omits the above language. See F. INBAU & J. REID, *CRIMINAL INTERROGATION AND CONFESSIONS* 11-13 (2d ed. 1967). This probably reflects the authors' attempt to conform to the requirements of due process enunciated in *Miranda v. Arizona*, 384 U.S. 436 (1966).

And where language is involved, the breaks in voice, tone, rate of talking, pauses, and other aspects of paralanguage are of significance.

Language . . . can be used to communicate almost anything. By comparison, nonverbal behavior is very limited in range. Usually, it is used to communicate feelings, likings and preferences, and it customarily reinforces or contradicts the feelings that are communicated verbally. Less often, it adds a new dimension of sorts to a verbal message, as when a salesman describes his product to a client and simultaneously conveys, nonverbally, the impression that he likes the client.

A great many forms of nonverbal behavior can communicate feelings: touching, facial expression, tone of voice, spatial distance from the addressee, relaxation of posture, rate of speech, number of errors in speech. Some of these are generally recognized as informative. Untrained adults and children easily infer that they are liked or disliked from certain facial expressions, from whether (and how) someone touches them, and from a speaker's tone of voice. Other behavior, such as posture, has a more subtle effect. A listener may sense how someone feels about him from the way the person sits while talking to him, but he may have trouble identifying precisely what his impression comes from.

Mehrabian, *Communication Without Words*, *PSYCHOLOGY TODAY*, Sept. 1968, at 53. See also M. WIENER & A. MEHRABIAN, *LANGUAGE WITHIN LANGUAGE: IMMEDIACY, A CHANNEL IN VERBAL COMMUNICATION* (1968); *THE COMMUNICATION OF EMOTIONAL MEANING* (J. Davitz ed. 1964); Wescot, *Introducing Coenetics: A Bio-social Analysis of Communication*, 35 *AM. SCHOLAR* 342 (1966).

Human language has at least seven significant characteristics: duality, productivity, arbitrariness, interchangeability, specialization, displacement, and cultural transmission. Lawrence Fogel describes these as follows:

Duality. Human language has both sound symbols (phonology) and a grammatical system (morphology). The combination, called duality, is especially useful in a communication system in which large numbers of morphemes must be distinguished from each other, since duality is a means of coding between the message and the symbol. Although most communication between human beings takes place through the vocal-auditory channel, other channels are also used. Therefore, more generalized terms than phonemes (sound symbols) and morphemes (grammatical structure) are needed to explain duality. Hockett suggests the term *cenemes* for phonemes and *pleremes* for morphemes. Thus no matter what the medium of communication, the elements of the communication system have names and functions.

Productivity. Human language is plerematically complex, that is, some of the messages in the communication system consist of two or more pleremes. Combinations of these pleremes, in infinite variety, produce new messages. Because of this, it is possible for a speaker to make a statement that he has never made before, or for that matter has never heard or read before, and it is just as possible for the listener to understand the statement without realiz-

matic variable is added we are set adrift. The Zuckaroo live in a different symbolic universe. For example, even the fact that they

ing that the message is completely new to the speaker as well as to the listener.

Arbitrariness. If there is some natural reflection of the meaning within the pleremes, then the meaning can be described as iconic. Otherwise the semantic relationship between the pleremes and its meaning is arbitrary. Human language is almost entirely arbitrary in its semantic conventions. (The exceptions which reflect iconicity are either wholly or partially onomatopoeic.) Since the complexity of human language is facilitated through the property of arbitrariness, this property has been fortuitous for the development of human language.

Interchangeability. The individual is equipped for both transmission and reception of messages within the same communication system. The speaker can be a listener, the listener can be a speaker, and the speaker can listen to his own messages.

Specialization. An action of one organism triggers behavior in another organism, but the action may also produce direct physical consequences. To gauge the amount of specialization in a communicative system, we analyze the difference between the direct physical consequences of an action and the response triggered in another individual. If there is slight difference, the system is not specialized; if there is great difference, then the system is highly specialized. For example, a shop foreman announces to his men that he will hold a meeting with them in five minutes. The direct physical consequence is simple audible disturbance in the surrounding area, but the response in another individual might be the turning off of machinery and the laying down of tools, acts so divergent from the message that the high degree of specialization in the communicative system is obvious.

Displacement. A message is said to be displaced when its antecedents and its consequences are removed from the time and place of the message transmission. Any message about objects or events of the past or the future, or about objects or events spatially removed from the transmitter or receiver, have the property of displacement.

Cultural Transmission. Cultural transmission is the passing on of the conventions of the communicative system to subsequent organisms. The genetic structure of an individual provides some essential features of the communicative system, but the individual also acquires habit, by means of cultural mechanisms, which provides specific communicative behavior. Thus cultural transmission change makes for efficiency of communication with respect to changing environment. It provides means for a whole group of organisms to find effective communication media and so adapt at a much higher rate than would be achieved through natural selection.

L. FOGEL, HUMAN INFORMATION PROCESSING 329-31 (1969).

Fogel notes that "[p]roductivity and arbitrariness are only to be found in recent human language. These properties were developed subsequent to the era of the latest common ancestor of all Hominoidea and distinguish man from his lesser rivals. Although it is not yet possible to say whether duality preceded productivity, these must have occurred in close conjunction as an efficient means for erecting a sufficiently large number of discriminably different signals." *Id.* at 332.

It is true that human language does show some trans-cultural invariance, such as the "m" sound found in the term for mother in most cultures, connected perhaps with the smacking of the lips. It is also true that certain words have characteristics that enhance and sometimes transcend their meaning. In addition to onomatopoeia there is the example of sharp sounds and words often cited. "[T]here is something rounded and soft about the word *waleula* and . . . something square and sharp about *quidikaka* . . ." G. ALLPORT, PATTERN AND GROWTH IN PERSONALITY 491 (rev. ed. 1961). Still, all in all the symbols of human language are freely created with the symbol acting only as a template, the creative act of giving meaning to the symbol occurring in the

do not commit the fallacy of reification in axiological matters may be significant. Who can say that this does not alter the eufunctional value of a particular pattern of behavior? The declaratory myth so apparent in our legal system would be dysfunctional, or at least meaningless, for their judges.⁴¹

Which system, ours or that of the Zuckaroo, is more adaptive? Our approach thus far indicates that Man's *differentia* is the capacity to create and live in elegant symbol systems which are not constrained by the first law of thermodynamics. Since these systems are freely created,⁴² it is possible to produce worlds even more diverse than Western culture and Zuckaroo.⁴³ Yet, when we evaluate each, our evaluation is in turn encapsulated in our own system perspective, albeit at a higher level of abstraction — a critical metalanguage.⁴⁴ The capacity to formulate symbol systems, however, entails the capacity to respond to the meaning of the symbol systems, including the metalanguage. It is this capacity that produces a qualitative difference between the referent of natural laws of physics and the behavior patterns of Man. Man is a complex adaptive system operating at a high integration index level.⁴⁵ Molecules, and non-self-reflexive systems, are not affected by our conclusions concerning their behavior. Whether we develop a strictly deterministic theory about the behavior of atoms, or a statistical probabalistic theory, the atoms continue to act in the same manner. But remove our substantive conclusions about Man's behavior at both the micro-

neural processes. As Ross has pointed out "the feeling that goes with a word derives from its meaning, not its sound. 'War,' we might say, 'is a grim and ugly word.' But is it ugly *as a word* or because of what it signifies? 'Warm' is only slightly different in sound and appearance, but it evokes pleasant emotions." R. ROSS, *SYMBOLS AND CIVILIZATION* 13 (1962).

⁴⁰ See note 6 *supra*.

⁴¹ See Lewis, *supra* note 10, at 540-44.

⁴² See note 21 *supra*.

⁴³ See G. MURDOCK, *supra* note 3; E. SERVICE, *supra* note 3.

⁴⁴ H. L. A. Hart has proposed that we call the extant mores of any society "positive morality" and those general moral principles or ideals used as criteria for evaluation of positive morality and other social institutions "critical morality." See H. L. A. HART, *LAW, LIBERTY AND MORALITY* 20 (1963). After an extensive study, using a similar dichotomy, May and Abraham Edel concluded that

the general lesson of our inquiry would seem to be that ethical concepts, no matter how detached they are felt to be in consciousness, have cultural roots and cultural functions, and their meaning is to be found in the offices they perform. And criteria would seem to have a similar character. The criteria in any evaluation of virtues, goals, ideals, needs, and so on, are other virtues, goals, ideals, needs, more abstract or more concrete, which have become enlisted on behalf of the ethical concepts to carry out their office in the given context.

M. EDEL & A. EDEL, *ANTHROPOLOGY AND ETHICS* 226 (1959).

⁴⁵ See Lewis, *supra* note 12, at 391-93.

and macro-level of analysis, and his behavior would change substantially. We know that Man's evaluation is largely in the realm of his conceptual world, and that that evaluation may be inconsistent with his biological nature. One recalls the Romans drinking wine preserved with lead, not realizing the deleterious effects of lead accumulation in one's body. Within their context, the behavior was eufunctional, whereas we now view it, from our enlightened perspective, as dysfunctional. Whether the Zuckaroo would agree, or men of our own culture fifty years from now, is a matter of speculation. Because we respond to the substance or meaning of knowledge, there exists not only an analogue to the Heisenberg uncertainty principle where human behavior is involved (*e.g.*, the Hawthorne and Rosenthal effects),⁴⁶ but a new and different type of behavioral methodological difficulty — a substantive Heisenberg uncertainty principle. It is contended that by a process of successive approximation the "true" patterns of behavior may be discovered. Unfortunately, we have agreed that our symbol systems are freely constructed, and thus that process, rather than working itself pure, can lead to the capacity to create a thermonuclear bomb — the ultimate in inconsistency between enfunctional biological drives and dysfunctional conceptual systems.⁴⁷

Even if we agree that man is biologically active, and that he can create, process, and transmit information,⁴⁸ this does not mean that he need follow any set sequence in how this is done. Most functional requisite analyses are phenomenologically oriented, at least to the extent of assuming a need for communication of information. For example, the frequently cited scheme of Messrs. Aberle, Cohen, Davis, Levy, and Sutton begins by defining society as "*a group of human beings sharing a self-sufficient system of action which is capable of existing longer than the life-span of an individual, the group being recruited at least in part by the sexual reproduction of its members.*"⁴⁹ Here we find an assumption that a group exists, which requires some means of maintaining interaction between group members.⁵⁰ What is meant by a "self-sufficient system of action" is indicated by the authors' elaboration of the func-

⁴⁶ See *id.* at 424.

⁴⁷ For a discussion of Lon Fuller's notion that the law works itself pure and the teleological stance of scholastic law, see Lewis, *Book Review*, 17 W. RES. L. REV. 349, 353-54 (1965).

⁴⁸ See Lewis, *supra* note 12, at 401-04.

⁴⁹ Aberle, Cohen, Davis, Levy, & Sutton, *supra* note 2, at 101.

⁵⁰ See E. WILSON, *SOCIOLOGY: RULES, ROLES, AND RELATIONSHIPS* 437 (1966).

tional requisites necessary to maintain a society, *as they have defined it*. These include: (1) provision for adequate relationship to the environment and for sexual recruitment; (2) role differentiation and role assignment; (3) communication; (4) shared cognitive orientations; (5) a shared articulated set of goals; (6) the normative regulation of means; (7) the regulation of affective expression; (8) and the effective control of disruptive forms of behavior.⁵¹ Aside from the usual objections to a functional analysis⁵² we note that these particular statements contain evaluative criteria that are nowhere delineated. What is an *adequate* relationship to the environment? Why, one that results in a self-sufficient system of action. This circular process is manifest throughout *normative* regulation of *means*, *effective* control of *disruptive* behavior, and others. The reason for the apparent lapse in the critical faculty of sociologists when they commence generating functional requisites is the impossible nature of the task. We might all (members of our culture) agree that law is one means of regulating affective expression and controlling disruptive behavior. Many anthropologists and jurists would contend that the Zuckaroo exhibit an institution for resolving conflicts that qualifies as a legal system. Others would disagree.⁵³ But whether Zuckaroo decisions resolving abaci disputes

⁵¹ See Aberle, Cohen, Davis, Levy, & Sutton, *supra* note 2, at 104-10.

⁵² See FUNCTIONALISM IN THE SOCIAL SCIENCES 7, 9, 14, 22-25, 30, 33, 78, 87, 121-24, 140, 142-43, 157-59 (D. Martindale ed. 1965). Admittedly functionalism is a rubric that subsumes a wide variety of methodological and philosophical views. See Dore, *Function and Cause*, 26 AM. SOCIOLOGICAL REV. 843 (1961).

⁵³ The great variation in definitions of law is often noted:

Ehrlich (1936) and Petrazycki (1955) seem to regard all essential expectations-obligations as part of the living law, since they apparently locate law in the habitual insistence of individuals rather than in public agreement. Or one may base law and legal obligation on tacit agreement, as Hume does. Or as with Llewellyn and Hoebel . . . one may limit law to those authoritative norms agreed on after public dispute, and relegate tacit agreements to the borderland of law. In this definition the existence of a court of some sort, that is, a public dispute-settling place, is essential to the existence of law. A still narrower definition is that of Weber . . . and of Hoebel . . . , in which law is limited to those norms supported by specific sanctions of specific public officials. . . . Finally in the definition of John Austin . . . and his followers, only norms sanctioned by full-time officials of a modern state are legal.

. . . .

The narrower one's definition of law is, the more remote from daily life the legal order becomes. With wide definitions such as those of Ehrlich and Petrazycki the legal order is an intimate part of life; with narrow definitions such as those of Austin and Gray . . . , the legal order is reserved for lawyers and judges, and ordinary people have almost no contact with it.

P. DIESING, REASON IN SOCIETY 127-28 (1962). See also H. CAIRNS, LEGAL PHILOSOPHY FROM PLATO TO HEGEL 556 (1949). For Ehrlich the Zuckaroo manifest law; for Austin law is totally absent from their culture. For an interesting critique of

are "law," the fact is that the constellation of actors is very different from that involved in our legal system. Further, to separate ends from means in this regard is extremely difficult.⁵⁴ Is our commitment to freedom of expression, established in our Constitution, a means or an end? If we adopt the Tugwell constitution (a means to an end), what effect?⁵⁵ Will the difference in structure produce unforeseeable results?⁵⁶ Even admitting *arguendo* that certain functions must be maintained if society is to survive, there are myriad ways in which these functions can be met, and, indeed, the teaching of cultural anthropology is that conflict resolution is handled by different societies at different times in radically divergent ways. It may be that a social system can survive only if it changes its structure and institutional arrangements over time. To apply the thinking of positivistic organicism to social systems would be the best way to assure that they do not attain ultrastability. Indeed, to survive, function as well as structure must be altered. Imagine the not too fanciful notion of a world in which fusion power and automation releases Man from the arduous task of producing goods so that he can devote his time to those things which he then considers to constitute the good life. How different the functional req-

broad conceptions of law as applied to primitive societies see Timasheff, *Law as a Social Phenomenon*, in READINGS IN JURISPRUDENCE 868 (J. Hall ed. 1938). There are a variety of theories concerning the evolution of legal systems generally. Weber maintains that there is a movement from charismatic to rational authority; Maine finds the progression that of the themists, unwritten law, codification, fiction, equity, legislation; Maine's well-known view is the transition from status to contract. See generally J. HALL, *supra* note 2, at 23-24. Paul Diesing suggests evolution toward legalism, which consists of

(1) a trend toward complexity of distinctions and clarity of detail, such as highly technical terms, (2) a trend toward clear and distinct hierarchical differentiation, for example, job specification, (3) a trend toward uniformity, equality, and universalization where differentials are not involved, and (4) more generally, a trend toward rigidity, unchangeability, action according to rule. Once rules are made, they may be clarified, made more precise, extended, but not changed. Of these trends, (1), (3), and (4) have clearly occurred in Western Law, and their effects are also obvious in Roman Law.

P. DIESING, *supra* at 140.

⁵⁴ As John Austin once observed: "[I]t is far easier to conceive justly what would be useful law, than so construct that same law that it may accomplish the design of the lawgiver." 2 J. AUSTIN, JURISPRUDENCE 1136 (4th ed. 1873). Lon Fuller not too long ago noted that it is virtually impossible to draw neat distinctions between ends and instrumental means for achieving those ends. See J. STONE, LEGAL EDUCATION AND PUBLIC RESPONSIBILITY 103 (1959).

⁵⁵ The Tugwell constitution appears in 3 THE CENTER MAGAZINE, Sept. 1970, at 24.

⁵⁶ See generally C. BLACK, STRUCTURE AND RELATIONSHIP IN CONSTITUTIONAL LAW (1969).

uisites. There is no longer the press for role differentiation and role assignment as well as a dilution of the need for fostering the other functional requisites listed above. It is even possible to conceive of a society in which ESB is used to maintain all persons in society in a state of euphoria from birth to death, with all conditions necessary for biological survival being met by fusion-automation means. In our culture, with great emphasis placed on the value of work and suffering to attain goals that never arrive, such a society is almost unthinkable — certainly repulsive to our values. And, for all we know, such a system could not long endure. The fusion-automation institutions might not possess the plasticity that compels us to place Man on a higher and different level than computers — as presently constituted.⁵⁷ Man, and perhaps computers, are systems capable of operating at a high integration index level.⁵⁸ One of the characteristics of such a system is the capacity to behave in a manner relatively autonomous from environmental influences by symbol manipulation. Generally this capacity is considered as eufunctional for survival of the system, which is another reason for the stress placed on communication nets by those constructing societal requisites. Unfortunately, not being prescient, our capacity to see latent dysfunctionality is severely limited. Future generations will tell us if we did the right thing, if there are future generations.

One way out is to develop a simulation program that would permit a telescoping of the time required for processes to run to the self-destruct point. If Pangloss could capture the nuances of Zuckaroo society and program it into a computer, and do the same with our society, we could see the results of our present structural commitments and reevaluate them effectively. Unfortunately such a plan is sheer daydream, for a variety of reasons,⁵⁹ chiefly because we would always be evaluating the program from the perspective of the existing critical morality. For this reason it has been suggested that the best decision process is one of disjointed incrementalism.⁶⁰ Unfortunately such an approach solves the problem by ignoring it, since it is possible to incrementalize yourself into a position where the next decision is a Hobson's choice into oblivion.

⁵⁷ See Lewis, *supra* note 12, at 395 n.162.

⁵⁸ *Id.* at 393-94.

⁵⁹ *Id.* at 397.

⁶⁰ See D. BRAYBROOKE & C. LINDBLOOM, A STRATEGY OF DECISION: POLICY EVALUATION AS A SOCIAL PROCESS 84-85 (1963).

CONCLUSION

By now the reader is programmed to accept the view that man possesses the capacity to create freely the conceptual world in which he lives. The old saying about neurotics building castles in the sky, psychotics living in them, and psychiatrists collecting the rent, is not too far off the mark for most of us. The difference is that we claim our concepts are right — veridical or authentic — or some such self-certifying justification is offered. Within a culture this may be assumed, but as soon as the transcultural dimension becomes involved, we cannot be so smug. Although man can freely construct symbol worlds, once constructed the constraints of these worlds are as real for us as the psychotic's castle.

A variety of means of breaking out of our conceptual cocoons have been proposed, ranging from Frederick the Great's experiment with children to LSD and simulation. Frederick's experiment failed when all the children he isolated died, and simulation does not appear too promising. Realistically, the only chance man has of maintaining an array of alternative symbol worlds is offered by an isolated group of individuals who are free from our constraints. The Zuckaroo did not have our past, and without imposition by our advanced civilization of our cultural handicaps on them, they could have evolved to a position very different than ours. Admittedly it would be difficult to insulate such a people from our cultural diseases, especially since we so often feel righteous about sharing our technological wealth with the rest of the world. But, short of such a moral experiment, how else can we possess the freedom that theoretically our information processing capability offers? It may even be a matter of survival, since the plasticity that this capability provides is our best chance for adaptation to a Heraclitean universe. Unfortunately, the plasticity evaporates as we build our cumbersome conceptual contraptions.

It is now clear why the discovery of the Zuckaroo was greeted with such enthusiasm. Dr. Pangloss himself was acutely aware of the tremendous implications of his find. But, as is so often the case, his human nature got the better of him, and rather than reporting his discovery before transacting with the tribe, he spent several years with them. As we have seen, he even tried to convert them to Christianity. The ideal scientist is above such things, but Jeremiah Pangloss was all too human. And so it was that when he realized that he had contaminated the Zuckaroo beyond redemption, Jeremiah concluded his habitation in our world and passed to

the next. While the ultimate culture to which he ascended may have the objective criteria he sought on earth, it is unlikely that his enlightenment will serve those still struggling with the unending quest.