MISF
MACAE
Practical Thinking

Volume 1, Number 2
December 2005

Table of Contents

Practical Thinking is published semi-annually and distributed to the mailing lists of MACAE and MISF. The return address for this publication is PO Box 80235, Lake Street Station, Minneapolis, MN 55408-8235.

The Value of Values

by Roger Sween

Values are in contention with one another in our society and world. Of that there is no doubt even though, at some core, values hold us all together. Some will say our differences are exaggerated due to antagonistic extreme positions and that the middle majority retains the central position on the values question. Efforts to sort this out elude easy solution despite continued attention to the subject. Nevertheless, some perspective, however limited, is necessary.

Ideally, values comprise a system of qualities of intrinsic and applied worth, expressed in principles, that are severally and interdependently desirable and beneficial to the people individually and collectively who live under that system. So said, the values bundle needs some unraveling to see if this definition really means what it pretends. The question then becomes how a values system applies to us as persons and citizens. Finally, what ought we to do about that application?

Identifying values

We can identify values by thinking about our human situation in order to discover what quality underlies or should underlie good ways of living together. Good ways, simply put, means everyone benefits and no one gets hurt. The thinking approach to values, we call philosophy. Presumably, everybody has a philosophy of life based on personally integrated values—whether they have thought them through or been less rigorous about determining the meaning, consistency and excellence of the values adopted.

Such rigor is not for everyone, and the prevailing way of integrating values into one's life is to absorb them by living in the received culture. While philosophy exists to determine, examine, or clarify values, culture nurtures its values by example and reinforces their adoption through approval of the appropriate responses and disapproval of the inappropriate ones. Cultural anthropologists have found that although every one of 5,000 existing cultures has a value system, all values are relative to the particular home culture and that there is no such thing as universal values. As expected, this professional principle of cultural relativism is also in dispute. While some values may be dysfunctional to social and human wellbeing, universally everyone expects to be treated with respect.

Religion or recognition of the spiritual dimension also portends values. I say *portends*, since not all spiritual expressions come across in the same way as to claims on the lives of their believers or explicitness as found in their history of teaching, dogma, or doctrine. A common element of spiritual systems, however, is that they draw upon sources or revelations that are outside the human experiences of thinking or making empirical discoveries about the world and our lives in it. Thereby values gain another context in that it is not just we ourselves who are the sum and substance of value; some greater entity outside us, but somehow related to us, is also part of the value system.

Three ways of approaching values

Though these three prominent ways of getting at values—the philosophic, cultural and religious—exist and may be the major ones, they are not the only ones. And, of course,

Continued on following page

these methods overlap. We can think about each approach and develop philosophies of them; we can enrich each avenue to values by our cultural traditions and its history of informants; we can peer beyond human limits through religion as to purpose and holism. Though few of us are professionals, especially concerning technicalities, in philosophy, culture, or religion, we are likely to inhabit each approach and can gain from their methods that which we have the will to pursue.

When, however, we look about our national situation, we find that all three approaches to comprehending values, their systems, and imports fail to bring us into cohesion. Part of the problem is that the United States and most of what we have in the three value-determiners before us is not like most of the 5,000 cultures in the world. They are small, bounded, authoritarian, established, and homogenous. We are large, globally enmeshed, democratic, new and changing, and diverse. The very freedom, individualism, and expansiveness that we prize and espouse undercut the stability that value systems are supposed to bring to a society. So, we curse one another for the practice of our values and do not have the wit—collectively at least—to find our way out of this troubling achievement.

The American dilemma

As a nation, we have little cohesiveness because we are a bundle of contradictions. We debate, but the debate causes dissension. We adjudicate for justice, but the decisions divide. We proliferate choice, particularly in the economic sphere, and are amazed at the lack of taste, decorum, and civic involvement. We accelerate abundance and are surprised by pollution. We expect even grade school children to take the loyalty oath of the Pledge of Allegiance, but fail to exercise the responsibilities of citizenship. We promote globalization, but fail to see ourselves as citizens of the world.

Let us admit that life is complex, but we all start from the same irreducible base. Every individual must sort out his or her responses to life in five areas. These are the physical conditions of earthly existence, the existence of the self as a distinct entity, the presence of other people, our cultural inheritance, and the possible future. Everything else stems from these five. One may ignore the areas as they choose, but such unconsciousness does not do away with their pressures upon us.

This framework admits that whatever one's particular culture may be, it has its influences on each of us. But because of the mix of the five areas, no one area is exclusive, and it is a dubious distinction to pinpoint any one area, culture included, as dominant when they all interact.

In the physical arena we have issues of the appropriate long-term use of finite natural resources, of population size and viability, of health, and of responsibility for the environment in which we cannot but live. For ourselves we face numerous life choices that hover around individual identity, potential, achievement and happiness; here no one can do for us what we must do ourselves.

Concerning others, our relationships flow from the private and interpersonal to our roles in the neighborhood, community, economy, politics, and for the common good. Cultural inheritance, let me emphasize, is a treasure trove of the past up to the present moment during which humanity experienced what we face and need to know (if we have wit to learn and benefit from it). An evolving culture is open to all of history's enrichment. By comparison, the future may stretch on as long and potently as the human past, but exactly in what manner we do not know. With such uncertainty comes less clarity and the tendency for less thought and neglect. Thereby, we may be engineering our own extinction.

Some working principles

We cannot address questions of the value-base of culture and society unless we share some working principles. As a career information professional of forty-plus years, I offer the following for consideration.

- It is better to know than not to know.
- Knowledge, the product of knowing, is imperfect and therefore individuals' search for truth (the knowledge that is perfect) is unending.
- Consequently, we need to be modest about our own knowledge, and reflective on our own limitations.
- Ambiguity about the certainty of our own knowledge requires psychological security, the realization that our conclusions may be the best at present but are tentative.
- In seeking knowledge and examining our own conclusions, we need criteria, which criteria are also subject to continued examination and improvement.
- Whatever the criteria of coherence, currency, verifiability,, correspondence with others may be, we must continually test knowledge against experience and be attuned to the results.
- We need to be alert to all human weaknesses—laziness, distraction, and self-deception—and realize that our knowing requires learning as a continuous endeavor.
- Learning may have its automatic features, that is, learning by living, but the greatest potential for learning comes from focused attention and endeavor to identify and overcome our persistent ignorance and mistaken nature.

In brief, we live profitably by knowledge that we must seek while being humble about what we already know.

Conclusion

I have tried to look deeply into the values question; I find that primarily, we are not geared *en mass* to share, in any but the most token way, a commonality on values. Most of our institutions are posited on an assumption of inherent human disagreement and not on the desire for solutions. Our laws arise out of factions where agreements are reached by compromises at best or overpowering at worst. All these efforts continually model that someone is right while someone else is wrong, and that taking up the cudgels, even if the cudgels are words, is the answer.

The answer, the only answer, to our fundamental differences is to be in conversation. Though the problems identified are enormous, global, and often out of our hands, we have plenty of opportunities to do what we can in our spheres of contact to make amends. We can know others face to face, make more friends than enemies, work together for mutual understanding and problem solving, show respect, listen and speak in turn.

In this manner we have a better means to enter the complexity of existence as it is, where there is always (let us be informed) another side. And by conversation, we can find ourselves more fully through our relationships with others. The principal freedom we have and value is the liberating freedom to be neighborly.

Roger Sween admits the heavy influence of his family of origin, a preference for reading as learning, certain formative books read when young, a particular Lutheran rendition of Christianity, a penchant for introspection, rationality and judgment, a love of history as the holistic discipline, and the career frustration that most people do not make routine use of the abundant information and intellectual resources available to them.

Practical Thinking: Science in Context

by George Anderson

Context within Society

Science (Latin, *scientia*) means knowledge. Galileo, Newton, Darwin, and Einstein, all contributed enormously to science–and to its credibility. As Google and Wikipedia organizations can attest, management of knowledge is now big business. The world has not seen the likes of it since the migration of *Homo sapiens* from the garden of Africa 170,000 years ago.

But knowledge must not be confused with its substantive application. Technology is related to science, but it is not the same. Newton's laws of motion include force, acceleration and many principles that may be used to particular ends: building a better mousetrap or firing a cannon more accurately. The end use of science is important, but the act of *choosing* itself is not science. In context, technology involves ethics, the awareness of others, and the human conscience. What is right, and what is wrong?

In *Hamlet,* act IV.5, Ophelia speaks, "*We know what we are, but not what we may be.*" The author of Shakespeare points to knowledge of a whimsical self, of an identity and purpose that is both known and uncertain. Who we are also includes who we are to become, as an individual and as a person within the larger family (whatever its name). This is not science, and it is not religion either. Call it existential uncertainty: life involves choices that cannot be programmed or simulated by an algorithm. Call it God if you like: it is what yet we may become.

From Robert Winston's perspective, "We must not confuse religion with God, or technology with science. Religion stands in relationship to God as technology does in relation to science. Both the conduct of religion and the pursuit of technology are capable of leading mankind into evil; but both can prompt great good."[1]

In the midst of the uproar over evoltuion vs. Intelligent Design, we asked a chemist and a physiologist to write articles on science and scientific methodology. They explain some principles for conversation about evolution and other problems that confront us as intellectuals in the 21st century. George Anderson is a chemist and a former president of MISF. David Juncker is a physiologist and the current president of MISF. We are grateful to them for their thoughtful insights.

Continued on following page

Science in context, *continued from the preceding page*

Winston's philosophy removes science from contending with religion on equal grounds. Science has nothing to contribute to a religious experience. To say "hope" doesn't exist because one cannot measure it negates one's own ethical "rudder" that discerns good from evil. Humans live in two worlds, one complementing the other. Neither world dominates the other. In this context, science includes knowledge of nature. But it does not pretend to know what science cannot know: namely subjective truths of science's human executor. For man or woman, beauty, freedom, justice, etc. are prized virtues in life. If life is a work in progress, why should humans shrink or be timid about "what they yet may become?" Science is a part, but only a sector of life.

Context within the Academy

Since the publication of *The Two Cultures* by C. P. Snow in 1959, the concept of science and the humanities within the academy has been under question. A gulf has grown between the scientist and the non-scientist that leaves little opportunity for serious dialogue. "Two cultures" have become part of the English language, and this makes discussing ethics and the goals of life a challenge.

That said, the focus of this essay will be on the skeleton of science, not the body of the "elephant" amply filling our room. What are the barebones of science? How are they connected? How are they manipulated by political/ religious leaders… and opportunists? What are some ethical choices that people of conscience have to make? And how might these choices be made with effectiveness?

Topics include: Cause and Effect, the *Polis* of Science, Inductive Reasoning, Hypothesis Building, and the Backbone of Mathematics.

Cause and effect

Considering bare bones—no high-minded theory—scientists in Scandinavia have reported on the effects of "wet underwear on thermoregulatory responses and thermal comfort in the cold." Published in *Ergonomics*, 1994, these scientists later were recognized at Harvard University and awarded the 1995 Ig Nobel Prize in Public Health.[2]

The "wet underwear" report illustrates (to me) how two competing modes of thinking intersect: namely (1) the visceral sensation of feeling wet, and (2) knowing the *cause* of a particular measurable *effect*. Once having felt wet underwear, one may just as soon forget *cause* and *effect*. But we learn from the paper how science methodically proceeds, *sans* feelings.

Sometimes devotion to science can be obsessive. The ironic death of Sir Francis Bacon is an example. In March of 1626, when driving on a snowy day, Bacon was inspired by the possibility of using snow to preserve meat. Sir Francis purchased a chicken to investigate this possibility, but, while stuffing the chicken with snow, Bacon contracted a case of pneumonia. He died soon after, leaving debts to his survivors about three times the value of his assets.[3] Bacon's legacy to science, however, was far greater than any accountant in his day could have gauged.

The *Polis*

Polis (Greek) means a city or community with a collective purpose or charter. Regarding the scientific method, *polis* reminds us that science is a collective enterprise involving organizations dedicated to communication and peer review. The Royal Society of London claims to be the oldest, continuously operating society in the world for the advancement of science. It was founded by royal charter in 1660 through the efforts of Christopher Wren, Robert Boyle, and others interested in discussing natural philosophy and the scientific methods of Francis Bacon.

Francis Bacon (1561 - 1626) made his livelihood in politics and law. But he gave leisure hours to philosophy of the Renaissance and English Reformation. Advocating new ways of reaching knowledge of the natural world, he discounted syllogistic (Aristotelian) logic, finding it useless for scientific discovery. Instead, Bacon proposed an inductive method, a new logic, a *novum organum*. Bacon's critique helped clear the mind of false opinions, prejudices and what he called *idols of the mind*.

Inductive reasoning

For example, consider how to pack pennies in a jar. Actually, there are two ways: (1) randomly adding coins to the jar one at a time, and (2) shaking a jar already filled with coins. Following a sturdy shake-up, see photo, the pennies shift into new positions, stacked face-to-face. The density of pennies increases as they move into a more orderly arrangement.

Orderly pennies in a jar

What was the cause? Did pennies stack because they were made of copper? Did the shape of the penny matter? Was an outside force present, the hand of Intelligent Design directing coins into stacked columns? A vivid imagination is helpful, but in science conjecture needs to be tested.

Building hypothesis

Francis Bacon wrote, " If a man will begin with certainties, he shall end in doubts, but if he will be content to begin with doubts, he shall end in certainties."[4]

Bacon proposed an inductive scientific method, beginning with a hypothesis that can be experimentally tested. If a hypothesis is too complex and a simpler one would suffice that supports all observations, the superfluous hypothesis is removed. Occam's Razor cuts it out.

From experience in handling coins or working with common washers found at any hardware store, one finds things that are flat and round assemble themselves into stacks. They form this pattern of behavior that we now will attempt to summarize as follows:

> **Hypothesis: When order is found in a large collection of similar parts, the cause for large-scale order will include (1) the part's design on a small-scale and (2) the forces of interaction between individual parts imposing attractive/repulsive forces of orientation, that together (1) & (2) allow parts to self-assemble.**

How might this generalized hypothesis be tested more generally?

The Snowflake

An example of self-assembly is the familiar snowflake. In general, a snowflake has six dendrite arms extended and symmetrically balanced. What causes a hoard of gaseous H_2O molecules (about 10^{19}) all moving chaotically near the speed of sound (at 600 miles per hour in the sky) to be confined somehow to a tiny hexagonal latticework of ice?

Linus Pauling (first in 1938) [5] offered a chemist's description of how individual water molecules fit together in ice and why. Each water molecule has the design of a small triangle of atoms (1), and each molecule is attracted to four other molecules (2) in specific (tetrahedral) directions. The attractive/repulsive forces holding the ice together are cooperative and strong. The mutual bonding and spatial compatibility (1) & (2) that relate to self-assembly are described by quantum mechanics.

Quantum mechanics assumes that atoms are not only things, but they are waves in "motion" too. Electrons give atoms their size and shape, while at the same time they are spread out like tsunami waves on a tiny planet. Persistent electrons impose design constraints to molecules individually (#1) and to control of forces between molecules (#2). Heisenberg's uncertainty relationship lies at the base of water's architecture wonder. And the snowflake is a gentle reminder of how quantum structure imposed upon small parts is manifested in exquisite order found at large in an assembly of these same parts.

Saturated and Unsaturated Fats

Fat has important roles to play in animal metabolism, but its part does not come without dramatic liability. Saturated fat tends to solidify more readily (having a higher melting point) than unsaturated fats.

The cause of this behavior relates to the structure of the fat molecule itself (#1). Saturated fat molecules tend to be straight and linear, capable of self-assembly into a compact wax or tallow like solid. Unsaturated fat molecules are bent in one ore more places and do not tend to stack well together into a lattice structure. Bonding forces between fat molecules (#2) are similar and are all typically weak (hydrophobic bonds).

Thus, the general hypothesis holds: unsaturated fats tend to be liquid at room temperature because their molecular design avoids self-assembly into a solid lattice. Whether this hypothesis supports studies of plaque formation in blood arteries, causing arteriosclerosis, remains an open (but very interesting) question.

The Big Bang

By all appearances, laws of the universe have not changed since the beginning of time, since the big bang. This *was* (in my mind) the true act of Intelligent Design. It happened some 13.7 billion years ago by good account. The Cosmic Microwave Background (CMB discovered in 1965) is an awesome reminder of creation's totality.[6]

What does the big bang hypothesis leave out? What came "before" the event when time and space first had their start? Was there some intent to creation? What was/is it?

These and similar questions reach beyond scientific means.

Mathematics, the Backbone of Science

In Roger Penrose's book outlining the laws of the universe, he sees progress being made in science through finding the correct balance between mathematical theory and precise observations of the physical world. Penrose also sees physics as being "mathematically driven."[7]

The mathematics Penrose is describing involves numbers, triangles, spheres, etc. They are Platonic *forms*. They are *ideas* that are independent of material objects (like tables and light bulbs, etc.). They are composed of pure mathematical elements, areas and volumes, but they have precision beyond ordinary means to calculate: for example, the irrational number $\sqrt{2}$ = 1.41421… is a decimal fraction of endless length. There is no physical means of testing or checking it out.

Applied to Newton's second law of motion, this hypothesis appears to be as Platonic as you like:

force = mass x acceleration

Concluded on following page

Science in context, *continued from the preceding page*

But in the laboratory, all three terms (force, mass and acceleration) have experimental errors to be reconciled. And they do not represent the Platonic form. The fact that experimental errors can be reconciled gives support to the initial hypothesis, but it is never complete proof that the physical law is of nature forever true. [Einstein did improve upon Newton's equation in 1905. For very high velocities particles near the speed of light, corrections to the above equation are required. And one equation of Platonic form (Newton's) is replaced by another more precise equation of Platonic form (Einstein's). That's special relativity.]

Historically, many advances in mathematics have been important to advances in science. Here are two examples.

Zero (0) is *not* a number a child first learns to count. Neither was it part of the early mathematics. Zero first may have appeared in India, as Hindu symbols meaning emptiness. Later, Arab merchants in the Middle East included zero in their accounts of trade. Later still, zero found its way west into Renaissance mathematics and philosophy. Zero was an invention of human convenience. It was also a Platonic idea waiting to be discovered.

The square root of minus one ($\sqrt{-1}$) has been an obstacle in learning mathematics. It is a foreign idea not easily grasped. In 1545, an Italian renaissance philosopher, Gerolamo Cardano,[8] proposed using this concept in algebra by assuming $\sqrt{-1}$ *exists,* but it was not part of the set of real numbers. The method worked. Today, this "imaginary" number is known by the symbol, i = $\sqrt{-1}$, and is used routinely in analysis of wave motion (microwave communications, quantum mechanics, etc.). The Swiss mathematician and physicist, Leonhard Euler, further derived an equation of great simplicity,

$$e^{i\pi} = -1 ,$$

where four mathematical constants are forever related: e = 2.71828…, i = $\sqrt{-1}$, π = 3.1416…, and negative one (-1).

What does it mean to know abstractions not of this world but of a mind universal? Things that have utility in operation and offer economy of habit? Things that are not seen by eye nor occupy space? Like music and art, mathematics affords life unseen qualities of beauty rare to behold.

In Conclusion

Seeing science in context of the society and the academy is important. Perhaps context is essential if life's noble experiment is to survive. We need to see with a perspective of the whole: an academy with a center of truth that amends (not institutes) two separate "cultures," with science ethically neutral, and separated from the technological questions where ethical choices are seriously involved.

If there is a public enemy not to be trusted, it may be a patron of science who accedes to the hubris of economic/political power, who has lost all sense of balance in human affairs, who pretends to know precisely what he/she cannot. In short, we are the enemy. Be thankful for "checks and balances" in the governance of science. They work.

In probing the skeleton of science, we have found it has remarkable likeness to a human form. Beauty and truth, freedom and justice are as essential to the survival of science as they are central to liberty and human happiness.

Footnotes

[1] Robert Winston, http://news.bbc.co.uk/2/hi/uk_news/magazine/4488328.stm BBC, 2 Dec. 2005.

[2] Ig Nobel Prize web page, http://www.improbable.com/ig/ig-pastwinners.html#ig2005

[3] Wikipedia web page, http://en.wikipedia.org/wiki/Sir_Francis_Bacon

[4] Francis Bacon, *The Advancement of Learning*, bk. 1, ch. 5 (1605).

[5] Linus Pauling, *The Nature of the Chemical Bond.* (Cornell University Press, Ithaca, NY: 3rd edition 1960.)

[6] NASA's data center for CMB, http://lambda.gsfc.nasa.gov/index.cfm

[7] Roger Penrose, *The Road to Reality: A Complete Guide to the Laws of the Universe* (Knopf: New York, 2005). p. 1014.

[8] Roger Penrose, op cit. p. 71.

Theories vs. Hypotheses, Ideas and Opinions: The Role of Scientific Methodology

by David F. Juncker

What makes science, or scientific endeavors, different from most other logic endeavors is the demand that all findings and opinions be confirmed by repetitious observation and testing before the findings are accepted. The observation, recording, hypothesis, and confirmation steps in scientific practice have themselves evolved over the centuries into what is generally known today as the Scientific Method: Observation, Recording, Problem Identification, Hypothesis, Prediction, and Testing.

It is important to remember that the scientists, themselves, are just another group of professional people with the same set of likes, dislikes and problems as most anyone else. Perhaps an insatiable curiosity provides the difference between them and many other professionals.

Providing a complete historical account of the evolution of scientific thinking is impossible in the space available but the turning point would most likely be when careful observation and controlled testing were added to the developing logic processes. The earliest scientific endeavors were initiated to find answers to societal 'why' questions concerning the origin and meaning of life and were almost never tested. These attempts, and most thereafter, have been based, additionally, on the strong desire to find answers that can be simplified to basic principles, or to one cause (unification). Over the past few hundred years, scientific research has moved toward finding potential answers for those questions that can be subjected to experimental observation and repetitive testing.

Current scientific methods have been almost overwhelmingly successful during the past hundred-plus years in providing knowledge and advances in the understanding of life at all levels on earth. We are in a period in which the ensuing number of successful new technologies physically assisting or extending our adaptation to earth is rapidly growing and also entering a period, as a result of recent breakthroughs in genetic mapping and the genetic code itself, which promises to lead to additional aids directed toward our own bodies, bodily functions, and inherited errors.

What is the Scientific Method?

It is worth looking a bit more carefully at this scientific method.

In the Scientific Method, **Observations** must be made without preconceived ideas or interpretations. It's extremely difficult to enter into scientific efforts without any preconceived answers or interpretations; and therefore, objective, systematic, and very detailed observations and **Recording** have become great aids in finding answers, often dispelling preconceived notions when the data is analyzed. **Problem Identification** tends to be much easier as it's usually the why-did-that-happen type of question that got one started in the first place. **Hypotheses** are the attempts at 'how' something happened: the educated suggestion of answers to the posed question. **Predictions** usually precede testing, are based on the scientist's most likely hypothesis, and are most likely posed as "if . . . then" statements. **Testing** means experimentation. The design and control of experimental tests is neither easy nor always straightforward. Experimental tests must be designed that cover the broadest permissible range of possibilities while evaluating as few variables—preferably one—as possible at a time. Experimental results are also often at odds with so called 'common sense' predictions. This is due to the fact that common sense is usually based on things that we already hold to be familiar, when, in fact, our results may be trying to tell us something new.

When a hypothesis survives multiple tests under the direction of multiple, independent scientists, it is raised to a theory. Many people confuse ideas, i.e., hypotheses, with theories.

It is very important to recognize, even as earlier scientists did, that the Scientific Method, as designed and practiced, cannot prove anything. Simply put, it's impossible to perform every possible experiment under every possible set of conditions; and, experimenters are subject to human error, including not having developed the capability of observing everything that goes on in a given experiment. In addition there are many types of questions for which the Scientific Method cannot create a theory: Is red better than blue? Are females better than males?

Theories are most likely the highest level of certainty that science can achieve, but it is possible to create additional support for a theory by the accumulation of experiments providing evidence that a given theory is correct. Still, we can never be sure. Electricity, light, cells as the basic unit of life, relativity, the Earth revolving around the Sun, etc.—all are well-supported theories. Nonetheless, some, or all, will eventually change with time and/or place.

A given theory may last for many years and be accepted as truth by most scientists and the general public, and yet be overturned by a new set of contradictory experiments. When this happens, a new theory replaces or evolves from the remains of the old. This process is the reason that science is described as changing, or dynamic. Often changes in accepted theories follow the discovery and implementation of major new technologies that have enabled more detailed observations and/or tests to be conducted.

A modern example

A relatively modern example of this process would be the current understanding of the transmission of electrical signals along nerve cell pathways in mammals, including humans. Through the 1940s, 1950s and early 1960s two increasingly antagonistic groups of scientists, worldwide, made hundreds of experiments trying to ascertain if the signals carried by nerve cells traveled 'electrically' (electrons, magnetic fields, etc.) or chemically (charged ions or molecules, diffusion, etc.). The interesting thing about the argument was the fact that both groups, those with strong 'electrical' backgrounds and those with strong 'chemistry' backgrounds, were designing experiments based on their own areas of expertise that gave results supporting their respective theories. Only later was it found by way of an objective and creative new set of experiments that in this case, both had been correct, and incorrect; the transmission of the signal within each nerve cell is primarily 'electrical,' but the signal from the end of one nerve cell to the beginning of the next is almost entirely

Continued on following page

Scientific method, *continued from the preceding page*

'chemical.' The current theory of nerve conduction has a spot for both prior theories.

The theory of evolution

The theory of evolution vs. the idea or hypothesis of either creationism or intelligent design is a non-problem in the scientific sense, due to the fact that we don't have, as yet, two theories to compare.

A major flaw in what is known today as "creation science" is the fact that it starts the process of scientific justification with the answers known. As we saw with the nerve transmission theory, one cannot enter into a scientific justification with the idea that the answers are all decided, because the act of doing so will influence observations so that participants will begin to see things that aren't there, or miss things that are. Two examples of such a research situation have occurred during the long developmental period and medical use of the light microscope: at first, scientists swore they distinctly saw homunculi in the tissues on the viewing slides and carefully drew them in their notes. This fit their understanding of the human body as most likely made up of smaller copies of itself; it took years, and a junior scientist, to dispel the images. Secondly, we still suffer today with many physiology textbooks featuring four sensory nerve end organs 'discovered' by scientists who went looking for four cells to differentiate between touch, pain, heat, and cold (instead of the broad continuum of cell types that accomplish the same purpose and cover even more variables). A second "creation Science" difficulty is the lack of comprehensive testing and test results.

One of the newest supporting findings that strengthen the theory of evolution is the recent experimentally derived understanding of the make-up of our individual DNA packages and their resident genes. The fact that each human's DNA is almost entirely similar in its composition and order, yet never identical, and the added fact that sexual reproduction has increased the odds for multiple variations in each individual's genetic code, is additional support for ongoing evolution. Consider the newly established fact that each of us, when we are born, has a distinctly new DNA that is based half on a delivery system (maternal side) that is designed to protect the status quo (least number of errors or mutations) by insuring the minimum number of cellular splits over both time and space with a second half (paternal side) that maximizes cellular splits and, further, reflects the effects of the most recent environmental time period. That is, the successful sperm cell (one of approximately 400 million per ejaculation) was produced within a few days of its pilgrimage (after some 20-30 splits per day during a male's reproductive years) while under the influence of current environmental conditions (heat, radiation, mechanical stresses, hormonal and chemical imbalances, etc.). The sperm carries the most chances for change both positive and negative. On the other hand, the ovum (egg) penetrated was derived from a cell that stopped splitting at about the 16-cell stage (fourth cellular division) of the maternal grandmother's pregnancy, ending in the birth of the mother where the pre-ovum then split nine or ten more times to produce some 500 – 600 potential eggs that sat around until the mother's reproductive period (puberty to late menopause). Thus our subject egg had to survive only approximately fourteen splits, and its genetic creation was under the environmental influence of conditions some 20 to 50 years ago. In this way, each of us is assured of both a basically unchanged parent DNA and a surely, though most likely very slightly, changed parent DNA from which to make our own brand new copy. As a living earth organism using sexual reproduction, we get both protected history and guaranteed change.

What I find interesting about the timing of the latest attack on the theory of evolution is that the current attack comes at a time when humans as a species are just beginning to be the first living organisms on earth to move away from a dependence on evolution alone. It is now quite possible, medically, to prolong almost any life until sperm or ova are available to pass on to the next generation, thus freeing us, even those most severely damaged genetically, to pass our 'defective' genes on to the next generation. Moreover, it is increasingly possible to correct or synthetically replace mistakes in each individual's genetic expression, i.e., physical body, enabling longer, healthier lives and life spans.

Evolution of ideas

As new discoveries and information leave the laboratories and become available for use in the public sector, another important set of processes is initiated, that of understanding, acceptance, positive and negative usage, and regulation. Major advances in science always produce change, including possible changes in our beliefs, economy, societies, the world-as-we-see-it, and so forth. These changes will always be resisted.

Over the centuries, advances in knowledge are subjected to this 'resistance' process, coming to us (as multiple researchers and philosophers have noted), in three stages:

1. It's impossible; it can't be done.
2. It's against the Bible…or Koran…or Xyz Law…or…

Followed soon thereafter by…

3. What do you mean, we've always believed it. Or, everyone knows that.

Further, as a species we seem to carry within us, an anthropocentric viewpoint that most likely has aided our survival in a pool of

Concluded on the last page

Book review

Arpeggio of Appetite by Morgan Grayce Willow, Finishing Line Press: 2005

reviewed by Judy Yaeger Jones

Twin Cities Poet Morgan Grayce Willow's new chapbook *Arpeggio of Appetite* had me from its Dedication page. "To Adelaide Crapsey (1878-1914) in recognition of her invention and mastery of the cinquain form. Unrhymed, the cinquain consist of five lines containing two, four, six, eight and two syllables respectively-a total of twenty-two."

As a historian specializing in women's history and not a literary scholar, poetry must address me, myself, in some aspect or fixture. The heretofore unknown, uniquely-named Crapsey offered a first course to this reader. I had not known how choice of poetic form could be recipe/tool for a poet. Or, that there is a handbook (one of the most useful, according to Willow) is *The New Book of Forms: A Handbook of Poetics* by Lewis Turco, who includes the cinquain in his catalogue of forms, but, (all too typical in my professional experience), fails to mention Adelaide Crapsey, calling it, simply, "An American form."

The literary light from Crapsey was brief: died young at 36, girlhood spent in Rochester, New York; attended prep school at Kemper Hall in Kenosha, Wisconsin, where she graduated at the head of her class in 1897; entered Vassar, class of 1901; returned to Kemper Hall to teach Literature and History. She went to Europe in 1905, when she began work on *Analyses of English Metrics* and, Willow believes, subsequently devised/invented the cinquain form. Crapsey taught Poetics at Smith College until chronic tuberculosis brought failing health and early death in 1914.

Morgan Grayce Willow, a MISF member, who teaches at MCTC and The Loft, states, "There is a new wave of poets writing in 'received' (historic) forms and a New Formalism movement from the 1990s joining the amazing ranges of poetry venues from Slams to ASL performance we know today."

Willow is offering both mastery and heritage in *Arpeggio of Appetite*. The title demands attention. Morgan is a Wordsmith, a highly skilled tapestry artist of multiple images to explore and savor. One delight: "Crow" affirms the ever-present reality outside my writing window.

Crow

Atop
fence posts, in flight
spirit clusters in black
feather-dress, speaks. Messages from
dream time.

Noted poet Deborah Keenan acclaims Willow's gift. "This poet illuminates the large and small truths of a deeply observed life: eagles as predators, grief about war's steadfast presence, a lover's absence, ...who and what in our lives makes the light and the shadows." Oh yes!

So Much

Leaf caught
in web, swimming
like a fish in wind, up-
stream. Golden. Dance: morning air, leaf
and light.

And the intrigue and wonder:

Cinquain for Basho and Emily

Stillness:
Poet quiet
as center of morning
glory, as bee kissing clover.
Prairie.

The apt,

Forest Management

Grieving,
alder downed in
storm, my hands bless the sleek
grey green skin, your long slender life.
Farewell.

And,

The War Cinquain

Twenty-
two syllables
can't contain the crack in
my soul. War, like ice in sidewalks,
breaks. Breaks.

Morgan Grayce Willow and I first met each other's work in the 1980s in prison—the Women's Facility in Shakopee. She was teaching poetry and I, the history of Minnesota women. We re-connected about ten years ago through my current subject, a deaf woman poet Laura C. Redden Searing, nom de plume "Howard Glyndon." We share a co-editorship of a forthcoming collection from the Tactile Mind Press, but I did not know specifics of her work until *Arpeggio of Appetite.*

Supporting a colleague is pleasure in work. But to savor, with joy, a friend's creation provides sustenance for the soul. This is a rich menu/a dance performance of shimmering beauty. Adelaide Crapsey must be proud!

Afterword 1

Thinking Like A Scientist

Isn't it interesting how we tend to regard science as a workhorse, something to make our lives better by pumping out antidotes, labor-saving devices, and ways to keep us safe from the forces of nature? Our writers this month remind us that science is fundamentally a way of thinking. As such, it challenges us to a discipline sorely needed in the public square. I could not help reading about the scientific method without wondering how our conversations might change if we aligned how we think about issues with some of the terms the method prescribes rather than the shoot-from-the-hip opinionating that has come to dominate so much of our life in common. Think about most any issue that galvanizes attention. What if we started by observing what really is happening around the issue? What are the forces and variables at work? Who are the major players and the people who are defining the issue? Where does the issue have its beginnings? How does the issue seem to impact different segments of the population and why?

Paying close attention to the whole story and the context in which it is embedded is part of the recording process. Every issue has a lineage, and seldom subsists in the anecdotes passed around as fact. Problem identification is a demanding step in its requirement that we try to frame what seems to be at stake in a way that fairly represents what we have learned. These three steps introduce a discipline into interpreting life around us that is sorely missing. Read the letters to the editors or listen to yak-yak radio. People make outrageous judgments and explain complex phenomena with a superficial grasp of real data. Hearsay has as much validity as careful study and analysis. A "news personality" is as credible as someone with direct, sustained firsthand knowledge of what is at stake.

Perhaps what more disciplined thinking evokes, as Roger Sween so deftly notes, is intellectual modesty. Scientists tend to be modest because they know that few things seldom can be pared down to a single factoid. They are curious even as they are skeptical. They ask questions, pose hypotheses, and conduct experiments to refine what seems a viable explanation or a viable solution. The thinking process they use takes time. What it costs to invest such time in the consideration of the issues that crowd our lives pales in light of the dividends we would harvest: an appreciation that the best insight or the best idea is not the quickest.

Victor Klimoski <VKlimoski@CSBSJU.EDU>

Ethics, Science, and Poetry

While we were working on this issue, one of the authors sent me a Lee Lorenz cartoon from the November 21 issue of the *New Yorker.* The setting is the facade of an "All Nude. All Nite" strip joint. Posters of two well-endowed naked ladies flank the door. The marquee reads "Random mutation or intelligent design? You decide." Describing the cartoon does not do it justice, but modesty and copyright laws prevent our reproducing the strip. I hope, however, that you can visualize the jest because it is one of the few light-hearted moments I have seen in the current all-too-acrimonious debate between creationists and evolutionists.

oOo

Recognizing the importance of science in the current debate, we asked two academic scientists to deal with the topic of science in real life, which right now means teaching the theory of evolution in public and private education. George Anderson has chosen to talk about the bones of science, ways of developing theories, and evaluating them. George has taught chemistry for many years. David Juncker explains the Scientific Method and then branches into some thoughts on the evolution of the human species and the uses of the scientific method. David teaches human physiology.

Roger Sween's article has taken on the equally challenging topic of American Values. Roger suggests that we need, as Americans, to revise the way we think. We need to be more civil, more co-operative, and more willing to listen to other views. His remarks are pertinent to the evolutionary debates as well as other debates in our society.

I am pleased also to have a review of Morgan Grayce Willow's new book of poems, *Arpeggio of Appetite*. I am fascinated by the idea that one could make a living (or even a life) as a poet in our very commercial age. Knowing what I know about the need to write, however, I suspect that Morgan does not really have a choice: Poets must be poets! I am all the more grateful that she asked us to review the book, because it gives us a topic that provides a welcome counterpoint to the Scientific Method and the debate on Intelligent Design.

This issue has been a challenge. All the writers for this issue were hard pressed to state what they believe; but all have been grateful for the opportunity to express in written form ideas that they have debated and discussed. I respect their efforts and invite you to read and reflect on their articles.

The next issue will deal in part with education. We have one article about alternate learning styles that is in revision. If you have some thoughts on education or other topics that you would like to air, work on, or argue, please let me know. The deadline for the next issue is May 1, 2006.

Lucy Brusic <lucy@brusic.net>

Practical Thinking is published semi-annually and distributed to the mailing lists of MACAE and MISF. The return address for this publication is PO Box 80235, Lake Street Station, Minneapolis, MN 55408-8235

A subscription to *PT* is a benefit of membership in either of the contributing organizations. Independent subscriptions can be obtained for a $15 annual fee from either organization. Single issues are $7.50.

Send subscriptions and address changes to MISF-MACAE, PO Box 80235, Minneapolis, MN 55408-8235. E-mail to either editor, listed at left.

Practical Thinking welcomes submissions from members and non-members. We are especially interested in topical issues, but will also welcome essays, reviews, and memoirs. Generally articles should not be longer than 1800 words. Please submit articles electronically, as Word or RTF files. Use as little formatting as possible. All submissions will be acknowledged, although the editors reserve the right to decline to publish an article.

The editors have the right to make minor adjustments in the manuscript. *PT* assumes no responsibility for contributors' errors. Opinions expressed by contributors may or may not reflect the opinions of the editors.

Deadline for the next issue is November 1 and for the issue after that, May 1, 2006.

Contributors to this issue:
George Anderson, David Juncker,
Judy Yaeger Jones,
Roger Sween

Scientific method, *concluded from page 8*

species. (One sees this same anthropocentric tendency most dramatically in children.) A short list of the many anthropocentric ideas and hypotheses we've encountered, and in many cases, ideas with which we must still deal, would include the following:

1. The world exists for one individual, and that one is me…
2. The world exists for my parents and me alone…
3. The world exists for my family alone…
4. There's only one race that counts, and that is my race…
5. There's only one true religion…
6. My country right or wrong… Note: each Nation's two-dimensional representational map of the world tends to have that country's location top center…
7. Only our species reasons, plans and carries out actions…
8. The Earth is flat…
9. The stars, our sun and planets all revolve around the Earth…
10. Our solar system is the only place with life…
11. The universe was designed to make us possible…

Resistance to change, though often seen as damaging and delaying to 'progress' (especially by scientists), has an important positive side that relates directly to the processes of evolution. Each new idea, theory, law, or technology must survive the gauntlet of human resistance to change by proving to be an added gain, or an advantage, to the overall system. The evolution of new ideas has a process that mimics the process of human evolution. Over the long haul, good and useful ideas tend to survive.

Over the long haul, that is…… Many mistakes and competing claims will arise along the way. To continue the analogy, living species, including humans, have not been designed to be free from errors, but instead have developed the capacity, over hundreds of thousands of years, to survive and multiply *despite* errors. In the physical world, success in this endeavor has been greatly aided by the development and incorporation of genetically driven redundancies: multiple processes and pathways, duplicate systems and organs, overcapacities of components, and so forth. Might we find an analogy for the philosophical world that would permit us to see that many ideas are better than fewer ideas, and that multiple paths may need to be explored and tested in the world of thought as well?

MISF- MACAE
PO Box 80235, Lake Street Station
Minneapolis MN 55408-8235

ADDRESS SERVICE REQUESTED