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Pattern—Key to the Universe

"The pattern is design,
and design is the subject of Permaculture."
—Bill Mollison

Patricia Michael with Bill Meacham

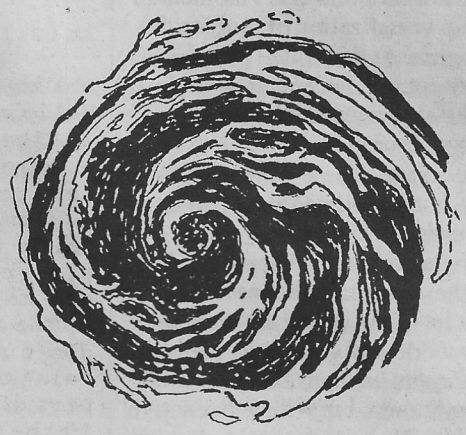
My work as a Permaculture designer continues to impress upon me the importance of pattern. Through observation of pattern we can learn much more than we can by merely measuring things. And with the application of pattern we can achieve fundamental changes in a system. Every day we work with pattern in design. It is the basis of all computer design, management, financial systems, social systems, health and healing. A keen observer can recognize the patterns of a system and identify where to make input or change the pattern to create a desired outcome. A skilled designer can see the relationships of pattern from the micro-scale to the macro-scale, the holographic relationships of a system, and its orders of magnitude, and can design the relationships from one order of magnitude to the other with flows that work effectively. This is the difference between people who only work trees and those who deal with the entire forest as one ecology. The latter understand and use pattern.

In undergraduate school at Wichita State University I had the privilege of attending an honors physics course called "The History of the Concept of Physical Reality." It taught me how agreed-upon beliefs about "natural reality," our concepts of the world, have been the primary creative influence for all human cultures. Our paradigm of "nature," what we think it is and how it works, influences all the thinking and behavior of our culture. Our current cultural bias is that of systems.

When we could all view the world from deep space as that little ball that the NASA photos revealed to us, we got, at a profound level, a new world-view: our world is a tiny sphere in a vast emptiness. Richard Bartel, Chair of the Physics Department at Trinity University in San Antonio, Texas says that less then a billionth of anything is occupied by something. The rest is empty space. If the nucleus of a molecule of steel were the size of a tennis ball, the electrons would be 30 miles away. The whole atom would be 60 miles across.

When the advances of medical research revealed to us a view of the smallest particles within the human body, reality changed. The smallest particle is so small that it is just a point.

We now know through observation that the pattern characteristics of the smallest known events in the universe mirror those of the largest known events, the galaxies and the universe itself. Since we are an undivided part of the natural system we are observing, and our own physical body patterns are the same as those of all matter and energy in the universe, we are like the universe looking at itself. This gives us a responsibility in nature that will shape the significant contributions for our whole future. Brian Swimme and Thomas Berry in *The Universe Story* liken the view of the nature of physical reality we now experience to the universe folding back upon itself. "Each member of the Earth community has its own proper role within the entire sequence of transformations that have given shape and identity to everything that exists." The language of relationships and transformations is pattern.



What is Pattern?

Among the dictionary definitions of pattern are "an artistic or decorative design," "an archetype," "an ideal worthy of imitation," "a plan, diagram, or model to be followed in making things," "a composite of traits or characteristics," "a representative sample or specimen," "a design of natural or accidental origin ("...in the crystalline pattern of new ice on a country pool"—William Carlos Williams)," "a composite of traits or features characteristic of an individual—behavioral patterns." Pattern is repeated regularity. It is the principle by which the universe seems to be designed.

In space, pattern is shape. On every scale, every natural pattern is related to one of only a few fundamental shapes *(see Table A, "The Basic Physical Patterns")* But pattern is not only static form; it is also the rhythm of growth and movement. Our system of counting and language comes from direct observation of natural systems. Each number, one through nine, has a direct correlation with nature. *(see Table B, "The Fundamental Numerical And Geometrical Patterns")* Patterns embody principles of wholeness, polarity, structure, balance, cycles, rhythm, and harmony. All these words imply both movement and rest.

Nature is full of movement. The world we perceive is a small slice of a vast, mostly invisible, energy-event. But nature is also full of movement that is slow enough that it appears to be stationary. For instance, the Greek word *kosmos* means "embroidery," which suggests a static world of orderliness and harmony. Inherent in nature are these two contrasting principles: activity and stasis. Pattern is the key to understanding both.

Pattern is the primary organizing factor in the universe. It is the science that we have often overlooked. It is the key to survival.

Pattern and Symbol

Everything stores information, and we can use our intelligence to read that information, to read nature. But literate cultures, East and West, have gotten off the track. We have confused information stored in words and symbols with real wisdom, and we have given too much weight and power to those who rely only on verbal knowledge. The symbol is not the thing it symbolizes. As Korzybski says: the map is not the territory. Real wisdom is

available to each of us at any breath by sensing ourselves as a part of the whole and being awake to read that whole. We must unhook ourselves from the "taught thoughtlessness" of verbal knowledge, and awake to the ordinary enlightenment of using our whole being to observe and create. We are matchmakers who can rearrange and design the world to create greater abundance and beauty.

To do this we must pay attention to pattern. To illustrate, think of water. Think of its liquidity, its flowing grace, its downward movement. It moves like air, but is more solid. It is solid like earth, but doesn't want to stay put. It is in some ways the opposite of fire; too much water can douse fire, but too much fire can boil away water. It mediates energy.

Theodore Schwenk, an extraordinary explorer of the patterns of water, says that earth and the various forms of life present on it function in harmonious accord with universal processes. Almost every rhythm, from moon rhythms reflected in the hydrosphere and planetary rhythms known to meteorology right down to the numberless physiological rhythms found in every kind of living organism, is based on water's mediation. For example, wood cutters in Brazil still set the price of the wood they fell by the date of its cutting—by the phase of the moon when it was cut—because its water content, and thus its keeping quality, depends on that cosmic influence.

Pattern is repeated regularity.

As Above, So Below

The patterns of movement planets weave in space are reflected in the structure of the various plant families. Thus, for example, the apparent movement of Venus through the heavens is mirrored in the regular pentagram common to all rose plants. If it were not for the mediating role water plays, these formative forces could not work their way into terrestrial manifestation. In the tides, the seas are caught up in the swing of cosmic rhythms that they then hand on to the earth and its creatures. All movement in water is affected by cosmic forces; water serves the function of transmitting them. Water occupies a middle position between earth and sky and is the port of entry through which cosmic forces pass into the earth realm. This understanding of water is far different from the knowledge that it freezes at 0° Celsius and boils at 100°C., that it is composed of two parts hydrogen and one part oxygen, that it covers 69.7% of the earth's surface.

Through observation of pattern we can learn much more than we can by merely measuring things.

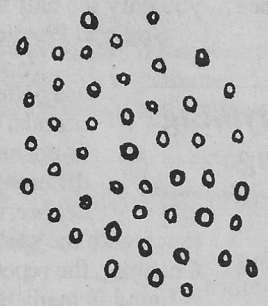
Bill Mollison, a co-founder of the art of Permaculture, says "We are the universe attempting to define its processes." That definition must come from the deep wisdom that recognizes that the one who defines is part and parcel of that which is being defined. "Pattern is design, and design is the subject of Permaculture," says Mollison. "Pattern tells us that all is streams, all particles, all waves. Each defines the other. It tells us that all is one plan." Mollison calls pattern "the linking science." Pattern, he says, is nature's language, and each shape represents a different problem-solving strategy.

Using Pattern

Because pattern is a fundamental underlying principle of all reality, we can use pattern as an intervention point in a system to change it to a different form. Here are some examples from several different realms.

Landscape design

In designing a landscape I look at the mechanics of form. I look at the basic patterns and observe them in action. For years I have carried a camera and looked for and photographed patterns constantly as a way of studying them. Through that practice I realized what they do. For instance, I use a SCATTER pattern to break up and absorb energy from a flow. A number of rocks placed on a dam in a stream breaks up the flow into smaller flows. I plant trees scattered across a field to diminish the wind and redirect it. This is not a full windbreak, but a way to soften the air flow. Another application of scatter is to distribute fertilizer plants throughout the system so that their services are widely available. They make nitrogen or leaf-fall available for mineralization and mulch throughout the whole system.



I also apply the CIRCLE constantly. I get great yields from vegetable gardens designed in a circle around a source of water. When people sit in a circle in a gathering or in a class, something happens that is different from what happens when they sit in rows or in any other pattern. A circular window—letting light in through a circle—is always commented on. This emulates sacred architecture. There is a sense of wholeness and completion. I like to employ circular columns instead of square columns, especially in public places because they do not inhibit the flows from any direction. Nested circles is my favorite planting pattern because I can put the highest plants in the center. Paths past these assemblies can be narrower because the lower plants are placed on the outer edges of the circles. A stacked, nested system grows lots of biomass in a small space.

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Healing and Human Growth

Patterning can be used for healing and human growth. My first experience of this was with my grandmother, who, in dealing with people who had experienced trauma, would watch them, spend a little bit of time with them, and then set up a whole pattern for their lives with family and people around them. Then she would alter the pattern a little bit every week and coach people into health.

Jackie Shift, of the Cathexis Institute in Oakland, California, took young adults who had been in mental institutions from a

very young age and brought them out of their schizophrenia through a series of environmental patterns of physical nurturing. First of all, everyone was on a schedule to provide regularity. Patterns of breath, light and sound, heartbeat, and touch were used to regress people, to help them to re-experience a younger age. Once they were in that state, Shift set up patterns of nurturing, actually re-parenting them. She and her staff fed and bathed them. She gave them tender loving care and then helped them to process the emotions that came up. One of her clients later earned a Ph.D. in psychology!

...less then a billionth of anything is occupied by something.

In Philadelphia, the Better Baby Institute teaches parents how to multiply their baby's intelligence. This work with healthy babies originated in work with people who had been severely brain damaged. Some had been born with half a brain and some had lost part of their brain through accident. Using repeated patterns, Glenn Doman and his associates can assist people in linking capabilities with parts of the brain that normally do not have those capabilities. The patient learns to use a different part of the brain to do something a missing part used to do. First the parents move the child's body in particular patterns. Then the child can do it on its own. The parents show the child how to creep and crawl across the floor. Then they have the child brachiate, swing from an overhead ladder. Other patterns, such as bouncing on a trampoline and rhythmic movements to music, are used to grow the brain in new ways. The same patterns, when used on healthy children, speed up learning and create geniuses.

You can begin immediately when the child is born. Put the child in a pattern of flickering light such as the dark and light patterns of branches and leaves seen from under a tree. The child's learning abilities increase tremendously. Or you can put large black and white checkerboard patterns on the wall next to the newborn's bed. This emulates the flicker-fusion lighting that evolution has adapted us for.

We know from studies of childhood development that eye-gazing with infants is essential to their mental and psychological health. The same principle can be applied in a pattern for healing groups. The Spiral Dance that Starhawk leads allows a large group of people to dance and see everyone's face, and importantly, to look into each person's eyes. In two circles or in partner dances, you only see half the people.

Spiritual Practice

All spiritual traditions use pattern—the repetition of sounds, breathing, movement, or posture—to achieve a different level of consciousness, deeper, calmer, and more in touch with the spiritual dimension of life. Chanting, the repetition of sacred sounds, is found in many traditions, from the serenity of Gregorian chant to the ecstasy of Hindu Bhakti, Sufi Qawwali, or Christian Pentecostal singing. Mantra meditation is the silent repetition of a sacred phrase designed to still the mind and induce a deep alpha or theta level of brain waves. As we become more deeply attuned to our inner Self and the divine nature of all that is, we can become more conscious of our connection with nature and with all of life. We can experience a reverence for our natural heritage that inspires us to take action to protect it.

The symbol is not the thing it symbolizes ...the map is not the territory.

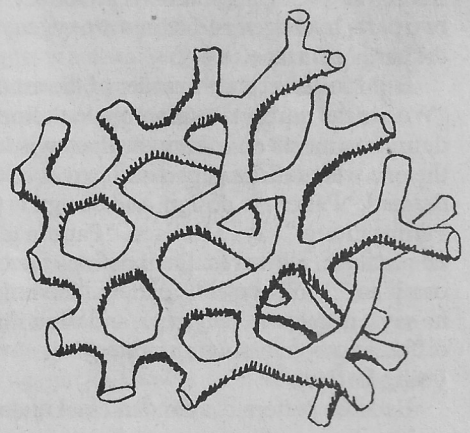
Software Design

Classical forms of software system design such as Data Flow Diagramming rely heavily on observing patterns of the flow of data from place to place, process to process, storage area to storage area. The designer then constructs and models a more efficient and encompassing way to handle the data in a computerized system. New forms of object-oriented analysis have started to discern a number of repeated patterns of typical problems and typical design solutions. Good program design uses only a few fundamental patterns of process, such as sequence, iteration, and branching, to construct very complex systems.

Summary

In all these and many more ways, the intelligent application of pattern—which is what the design process does—can create beauty and harmony where there is chaos and unpleasantness. If we are to create a world of peace and plenty for all, we must understand and apply these principles. In this we learn from and emulate the natural world. Δ

Pattern, "the linking science," is nature's language, and each shape represents a different problem-solving strategy.



Patricia Michael taught design at the University of Oklahoma before taking up permaculture and bioregional organizing in south Texas. A resident of Austin and a consulting landscape designer, she is teaching ecovillage design for the University of Texas (see pg. 68), and will be a featured speaker on Permaculture at the International Feng Shui Ecology Conference in Prague, September 18 to 23. Last year Patricia's design for a green hotel won The City of Austin and Hill Country Foundation's highest ecological Design Award and she was selected for Who's Who In Science and Engineering. She appeared on the cover of PCA *#27 - as a tree. She would like to express her gratitude to Laura DeLaGarza whose interest in pattern has encouraged her work.*

Bill Meacham lives and works in Austin Texas, designing and building software systems. He studies whole-systems design in the context of Eastern and Western philosophy, teaches Sufi Dancing, and seeks to awaken a consciousness of and gratitude for divine love in all its manifestations.

Fundamental Patterns

"Nature's forms are the most practical and functional and most efficient in terms of space, materials, energy, and time. Nature's patterns teach us how to get the most from the least."

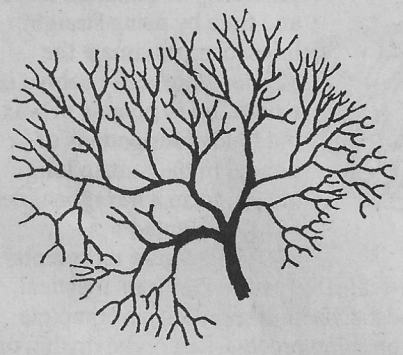
—Michael S. Schneider

Mollison says, "Learning a master pattern is very like learning a principle; it may be applicable over a wide range of phenomena, some complex and some simple. As an abstraction it assists us to gain meaning from life and landscape and to comprehend allied phenomena." The two tables summarize the basic physical and geometrical patterns.

—Patricia Michael

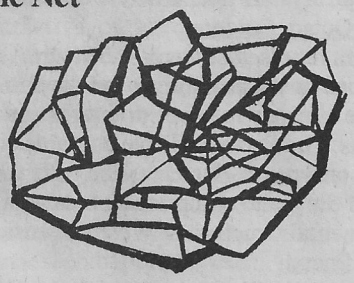
Table A : The Basic Physical Patterns

The Branch



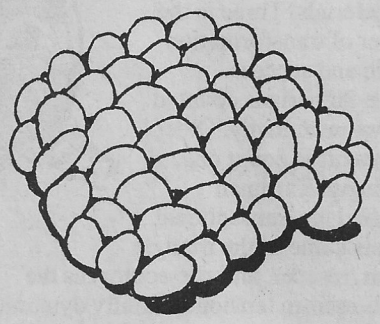
The Branch gathers, collects and distributes the flow of water, air, energy, or material. It increases exchange and transport and anchors them. You can see patterns of branching in trees, in blood vessels, and in the flows of water. Vaginal fluid drawing sperm dries in a pattern of branching. Naturally flowing water collects and distributes as branches. There are orders of magnitude of branches. It is unusual to have more than seven orders in a system; five is more common.

The Net



The Net or Mesh is useful for sorting, collecting, filtering, and small surface exchange. It distributes both tension and force. In nature we find this pattern in spider webs and birds' nests. We can use the pattern to strengthen and reinforce. For instance, straw mulch is very stable; when stacked at different angles it is not easily removed by wind or rain.

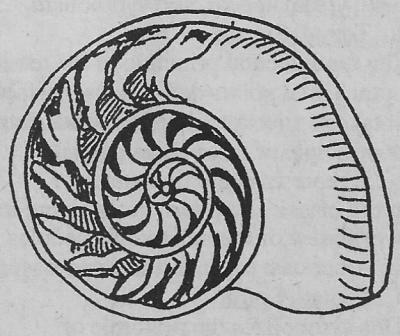
The Lobe



The Lobe provides surfaces for exchange, edges, or interfaces where two things meet. The edge is the most productive and fecund part of a system, where the most interesting things happen.

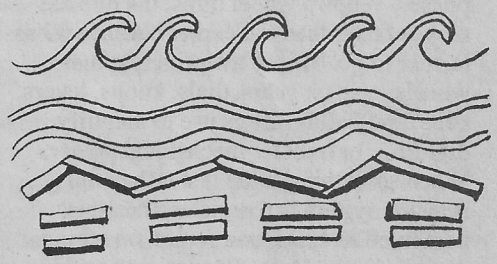
This is the best pattern for bioremediation because it provides lots of surface for growth. For instance, to provide natural wastewater treatment, build stacked rocks with lots of places for things to grow and clean the water, and lots of opportunity for water's movement, bubbling and gushing. Lobular patterns are seen in clouds and the flow of sheets of water across an almost-flat surface. The Great Lakes—formed by retreating glacial ice sheets—form an immense lobular pattern.

The Spiral



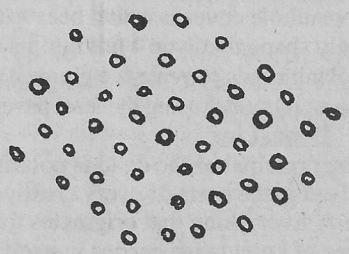
The Spiral, found in water swirling down a drain, the shell of a snail, and in tornadoes, has the function of speeding up or slowing down, of concentrating or dispersing, depending on which way the flow is going. Branches off the stem of a plant go in a spiral, maximizing exposure to the sun. Thermal convection in air provides an effortless ride for migrating geese or human glider pilots.

The Wave



The Wave patterns—streamlines, zigzags and flows—provide pulsation, timing and the possibility of measurement over time into a system. Waves are found in water, of course, but also in static fixtures such as swales on contour. Your heartbeat is a wave pattern.

The Scatter



The Scatter pattern introduces the element of chance into a system. It breaks things up and slows them down. Δ

Table B : The Fundamental Numerical And Geometric Patterns

(Taken from Schneider, *A Beginner's Guide to Constructing the Universe)*

Schneider calls pattern the principal by which the universe is designed: "On every scale, every natural pattern of growth or movement conforms inevitably to one or more of the simple geometric types. Identifying shape and patterns and knowing what principles they represent allows us to understand what nature is doing in any given situation and why these principles are applied in human affairs."

1. Monad, Point or Circle

The circle represents both equal expansion from a point and rotary motion, or cycles. In ancient times the circle symbolized the number one. A circle is an expanded point. The smallest particle is a point. The entire Universe came from one point. The point is the center of the circle. A point with a circle was the Egyptian, Chinese, and Mayan glyph for light. The circle represents nature's universal cycles, circulation, circuits, orbits, periodicities.

All cycles have rising and declining phases. When a wheel turns, the outside moves faster than the center because it has farther to go. This is the principle that wheels, cranks, gears, dials, knobs, levers, belts, and ball bearings use to magnify, diminish, or transfer mechanical power. When something turns faster than our nervous system can register, then it is perceived as solid, one sound, one thing, one smell, taste, etc. Cooperating with nature requires that we recognize the existence of, and learn how to design with, the waves of its omnipresent cycles.

A circle expresses the most efficient geometric space in which for human creations to occur. Of all shapes the circle encloses the most area with the smallest perimeter. A round shield gave the ancient soldier maximum protection behind the largest area while employing the least material and having the least weight.

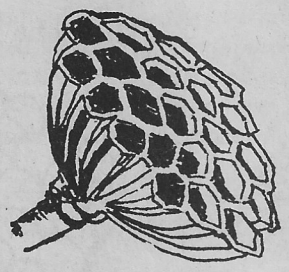
A manhole cover is round because it is the only shape that won't fall into its own hole. Ring roads provide the greatest access to a city center using the least pavement.

2. Dyad, Line

The principal of the dyad is polarity. The dyad is the basis of every creative process. Everything that originates from the tree of knowledge carries in itself duality, says the Zohar, a mystical Jewish text. The ancient Sumerian words for woman and man are also those for one and two. It shows up as rhythmic oscillation between opposite poles, as close as our own heart beat, and as far away as quasars pulsing at the edge of the universe. Polarity, balance, harmony, pattern, and wholeness are basic to all sciences. The dyad's fundamental characteristic is the existence of a pair of distinct but equal opposites that seek to unite in an urge to return to unity.

3. Triad, Triangle

Triangles bestow strength, balance, and efficiency of space, energy, and materials. Three is the number of transformation, rebirth, and success.



The Sumerians counted man, woman, many. Older cultures often count one, two, many. Karpman identified the transactional analysis game of the triangle (victim, rescuer, and persecutor) as the transition from tension in family dynamics to harmony. If one can identify these positions in relationship dynamics and move away from them, most problems can be solved in a win/win solution.

A triangle encloses the smallest area for the greatest perimeter. It is the only polygon structurally rigid by virtue of its geometry alone. It is synergetic in that its stability and superior strength are not predicted by any of its parts, which, by themselves, do not have these properties. We need triangles to create self-supporting structures. The more triangles it has, the more weight a structure will support. A triangular level with a plumb bob is one of the oldest and most efficient of leveling devices. Triangular structure gives the rose's thorn and shark's teeth their bite, the wedge and axe their splitting power. We use triangles in our designs for reasons of superior structure, strength, efficiency, balance, visual appeal, and symbolism.

4. Tetrad, Square

The fundamental principle of the tetrad is depth. Three points define a flat surface, but it takes a fourth to define a solid. Four is the principle of three-dimensional space. It represents the four states of matter in classical western thought and in the worldview of the indigenous peoples of the Americas: earth, air, fire and water.

5. Pentad, Spiral

This symbolizes the principle of regeneration. Pentagonal symmetry is the supreme symbol of life. The quintessence of nature encompasses and infuses the four elements with the life they cannot create by themselves. The spiral's role in nature is transformation. Every "thing" is not something static but a process, a dynamic energy event.

6. Hexad, Hexagon

The hexad stands for strength, for it is a double triangle. Six represents the maximum efficiency of material, labor, and time by using straight lines to approximate the efficient circle. A beehive is a mere 1-1/2 pounds of wax, but holds four pounds of honey. In the human lung, alveoli form a hexagonal net.

7. Heptad

This figure represents non-scaleable nature. Seven is mystical, almost unseen. It represents a complete but ongoing process, a periodic rhythm of internal relationships. Traditionally every seventh year was a "year of release" when a field was allowed to lay fallow, debts were forgotten and slaves were freed. In the Judaeo-Christian-Muslim tradition, the seventh day of the week is a day of rest. The seven-note scale is meant to model the hidden side of macrocosmic design, the universe ruled by mathematical harmonies of music. There are seven spectrums of visible light (ROY G BIV - Red, Orange, Yellow, Green, Blue, Indigo, and Violet, the colors of the rainbow). There are seven crystal systems and seven chakras.

8. Octad, Octagon

Eight represents internal structure. Octagons as starting frames are used to explore a form's internal structures and patterns. The Periodic Table contains eight groups or types of elements. The eight white keys of the piano comprise an octave, a fundamental structure of Western music.

9. Enead

Nine, is the birth of a new whole. Nine is the greatest single digit within the Decad, or first ten digits. Ancient mathematical philosophers called nine "the finishing post" and "that which brings completion." Nine-fold forms seem to be associated with the process of birth. One arrangement of nine points forms an X. From this nine-pointed core comes the secret for constructing the mythic labyrinth. Δ