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Yearning To Be Round

John Caddy

2. Thinking in Wholes

The Forest and the Trees

There is an old saying that you have probably heard: “You can’t see the forest for the trees.” We know you understand what the saying means, but let’s make sure. It refers to a common human problem—the inability to see the big picture because you can’t stop focusing on individual “trees.” Being able to see the **Whole** forest is absolutely essential to clear thinking sometimes.

We do like trees, and looking closely at single trees can be very rewarding. The point, though, is that if you look only at the trees one-by-one, you will not see the forest as a whole, complete thing. The forest is not just a collection of trees, it is a thing by itself, a unit, a whole, a system.

> **So what is a system, anyway?** A system is a grouping of connected parts which work together to form a whole. The skeletal system of your body is one example. The sun and planets plus asteroids & moons & comets together form our solar system. A snowmobile is a system. A love triangle is a system.

Two–Faced Wholes

We have all looked at an ant. Is an ant a whole? Sure it is. It is obviously a separate creature. But we also know that an ant is part of a larger whole, the ant colony. A single ant is itself a whole system and at the same time it is one part of a much larger whole system of hundreds or thousands of ants. The whole we call an ant is a two-faced whole. It looks in two directions, up and down.

Any whole that is one part of a larger whole is two-faced—looking down it is a whole seeing its parts; looking up toward a larger whole it is a part, a sub–whole.

When an ant looks down, it is a whole made up of lots of parts or sub–wholes: exoskeleton, antennae, eyes, mandible, spiracles, and so forth.

When the ant looks up at the larger whole (or super–whole) of the anthill, the ant is only a part, a sub-whole. It cannot stay alive very long without the colony, so although the ant is itself a whole, it is not an independent whole.

Now let’s take this thinking one step further. We have said that the anthill is a whole. When we looks down we ‘see’ its parts: individual ants, eggs, pupae, queen, tunnels and galleries, and so

forth. When we look up, the anthill itself is one part of a larger whole. What is that larger whole? If you said “forest,” or “field” you’re right.

When we think by leaping from one scale to another, it can be confusing. Most of us have heard the old nursery rhyme:

For want of a nail, the shoe was lost.
For want of a shoe, the horse was lost..
For want of a horse, the rider was lost.
For want of a rider, the battle was lost.
For want of a battle, the kingdom was lost,
And all for the want of a horseshoe nail.

Each time we leap up the scale, we enter a larger context, a wider set of wholes. Have you seen those nesting boxes, or nesting dolls? It’s like that.

You may have seen the video or book, “The Power of Ten.” By magnifying the view ten times (10 X) at each jump up the scale, it brilliantly demonstrates wholes and sub-wholes.

Northern Forest

Now take another thought leap. Let’s look at the Northern Forest as both a whole and as a sub-hole. When the forest looks down it sees all the separate sub–wholes which are its parts: all the trees, insects, flowering plants, fungi, protozoans, bacteria, mammals, birds, and yes, anthills and beehives, lakes and marshes, and so on.

If the forest is itself a sub–whole, what larger whole does it look up toward? What whole is the forest dependent on? There a system of northern forests. Northern forests as a group are called “taiga” (tie–guh).

The taiga is a whole, a globe-circling kind of forest that grows only in northern hemisphere temperate zones such as Canada, Alaska and other parts of the US, and Russia (esp. Siberia).

The taiga is a whole, but it is also a sub–whole of an enormous superwhole we call by several names: Earth, Nature, the Biosphere; Life, Gaia.

Now leap again. Is Planet Earth a sub–whole as well as a whole? Of what whole system is it a part?

When people say, “Well, it’s all a matter of scale,” this kind of thought leaping is what they’re talking about. Most wholes are two-faced, and look both down to their parts, which are often sub–wholes themselves, and look up to the larger system (or whole) that they are one part of. We began with ant, leaped up to hanki you flurrier. I hads anthill, leaped up to forest, leaped up to taiga, leaped up to Earth, leaped up to solar system.

Yourself as a Whole

Now think about yourself this way for a moment. You are a whole, true? You can look both directions—up to your larger wholes and down to your sub–wholes. Look up. What are some of the wholes that you are one part of?

You may have said “my community,” or “my country,” or “my species, humanity.” You may also have said “my congregation,” or “my religion.” These answers may all be true. Or maybe you thought of different kinds of wholes.

Now Look down and name a few of your sub–wholes or sub–systems. Are any of them separate parts? Sure: if organs were not separate sub-wholes, they could not be transplanted. Your bodily organs are grouped together in systems which accomplish various tasks of living. Your digestive system, your circulatory system, your endocrine (hormonal) system, your muscular system. These are all sub–wholes or sub–systems of you. Another is your skeletal system.

Skeletal System Mind Experiment

Each bone in your body is one part of your Skeletal System. But your Skeletal System also includes all the cartilage and ligaments (connective tissue) which fasten the bones together. So if we made a list of all the bones in your body (over 200) and a list of all the connective tissue that holds the bones together, we’d have the whole thing, right? No we wouldn’t. We would still be missing a huge part of the Skeletal System.

Imagine an empty room where you are going to do an experiment. Imagine white walls and a wooden floor, and a large sunny window. Now watch yourself walk into the room with a big cardboard box. The box is labeled Skeletal System Kit. You put the box down on the floor with a little grunt, then you open it. Inside is a pile of human “bones” made of plastic, and on top of the bones is a large roll of duct tape. On top of the duct tape is a sheet of paper labeled Experiment Instructions. It reads:

“Your experiment today is to assemble these 206 bones into a complete human skeleton. Instead of real cartilage and ligaments, you will use strips of duct tape to fasten the bones together. All the parts you need are in the box. “You have one day to complete your skeleton.”

So you go ahead and dump the bones out onto the wood floor. It’s noisy, they clatter and rattle.

You decide to start by trying to lay out the bones on the floor in their correct order. You begin by placing the skull at the top. Then you find the jawbone—easy because of the teeth, and set it where it goes. OK. Now what?

Next you try to figure out which bones belong to the arms. You find the two long upper arm bones (You hope—maybe they’re lower leg bones?), and the four shorter forearm bones. OK, but when you try to figure out the wrists and hands you get stuck and confused—and you worry that you are mixing some toe-bones into the pile of finger-bones. And how do you know left arm from right?

You are beginning to realize that your Experiment Instructions were not so complete after all, because all the parts you need are not in the box. One absolutely essential part of the Skeletal System is missing. Have you figured out the problem? You’re right. You are missing the map, the picture of a skeleton that you must have. All the parts were not in the box.

The missing part is the relationships among all these bones, how they go together, or articulate. You may have heard an old song about this map: “the leg bone’s connected to the knee bone, the knee bone’s connected to the thigh bone, the thigh bone’s connected to the hip bone,” and so on. You have to know what goes where.

But even with the map, we won’t have the whole of the skeletal system. The skeletal system is a sub–whole which looks up to the whole body, right? Then it probably has some job to do in the whole body that we cannot see unless we are looking up, at the context of the entire body.

We can have every bone and every tendon, ligament and cartilage, plus the map, all of that—but we will still not have the fact that the marrow of bone is the organ which creates red blood cells. So our skeletons do much more than hold us up. They make the part of our blood that carries oxygen.

Most sub–wholes in Nature have jobs within their larger wholes we just can't discover from observation.

Emergent Properties

The properties of whole systems cannot be predicted from their parts. For example, the taste of sugar is not present in the carbon and hydrogen atoms which are its parts. The taste of sugar is a property of the system called the sugar molecule. It emerged into existence only when its sub wholes (the atoms) combined into a larger whole (the sugar molecule). Properties or characteristics of systems which emerge into existence as sub-wholes combine to form wholes known as **emergent properties**.

The skeletal system has its own emergent properties. One of them is that bone marrow is the major player in the creation of red blood cells. This emergent property cannot be predicted from looking at the sub-wholes that make up the skeletal system. Effectively, the skeletal system overlaps the circulatory system and cannot be separated from it. In living systems, the emergent properties are often 'tasks' or 'functions' that the sub-system accomplishes in the whole.

To summarize, a whole is made up of:

- all of its parts (which may be sub–wholes themselves);
- the relationships among the parts; the way those parts fit together;
- The relationship between the whole and the super-whole; the way this whole fits into its own larger whole, or the job this sub-whole does in the super-whole—like bone marrow.

Forest Parts

Now back to our northern forest for a moment. In your mind, list the parts of a forest. Your list probably starts with "trees", which is good, but then what? You may have analyzed in this direction:

Trees

trees that keep their leaves—evergreen trees

trees that drop their leaves—deciduous trees

You may have gone farther down that path, like this:

TREES

Evergreen trees	Leaf-dropping trees
aspen	red pine
birch	spruce
maple	balsam fir
basswood	white pine
tamarack	

Or you may have analyzed on a different path:

trees	chickadees
bushes	grouse
plants	mosquitoes
mosses	flies
soil	butterflies
rocks	lakes
deer	ponds
rabbits	marshes
mice	anthills

Now remind yourself what you learned from your previous experiment. What was missing from your skeletal system kit? What is missing from these forest lists? Right—there's no map, there's no instructions that tell you how all these trees and things go together. You are missing the relationships among all the parts of the forest.

For one small example, consider the relationship between aspen trees and the ruffed grouse. The grouse depend on the buds of aspen for food. Where there are lots of aspen buds, there

may be lots of grouse.

For another small example, think about muskrats and cattails. If your forest has marshes, it will probably have cattails, which are popular muskrat food, so your forest probably has muskrats. So it probably has mink too, because muskrats are popular mink food.

One more example: to thrive, red pines must have sandy well-drained soils. The relationship between red pines and soil-type will determine whether a forest contains red pines at all, plus how well they grow.

To figure out relationships, we begin by observing and asking questions. After watching a lake for awhile at dusk, we might ask ourselves, “Would there be fish without insects?” Or we might ask, “Would there be swallows without mosquitoes?”

You are beginning to realize what a complicated thing a forest is—even more complex than your skeleton. Living systems are usually complex and hard to understand. Saying that a forest is a big bunch of trees is like saying that a human being is a big bunch of bones. It may be true, but it is a very partial truth—and we are looking for wholes. Seeing the Whole Forest cannot be done by just looking at the trees.

Our habit as modern people is to think first about parts and only second about wholes.

> **Analysis** is a crucial idea for thinking. Analysis means “The separation of a whole into its parts for individual study.” **When you analyze any whole thing you begin by breaking it into parts.**

Analyze a Word

To practice breaking something into parts, let’s analyze the simple word “parts.”

First, list the parts of the word: p-a-r-t-s. Five letters. OK, we’re done? No, a word is more than letters. It is also sounds. Now say “parts” out loud, slowly. Now list the sounds, like this:

P as in pickle
A as in ?
R as in ?
T as in ?

S as in ?

Are we done yet? Not. Can you think of any other parts of "parts"?

- Look it up in a dictionary. One part, clearly, is the word's meaning (the **semantic** part of the word).

- Another part is where the word came from, its history (the **etymology** of the word)

- Still another part of the word is its "part–of–speech" (it is the *plural* of the *noun* "part.").

- One part we already covered is **how it sounds** (pronunciation).

When we analyze something, even a little word like "parts," we quickly discover that it has more parts than we see at first. We've already named letters, sounds, meaning, origin, and part-of-speech. That's five kinds of parts. Now, again remind yourself of the Skeletal System Experiment. Is our analysis of "parts" missing anything important at this point?

What if I say that the word "parts" has 5 letters, p, a, r, t and s, is that true?

Let's imagine that you have a bunch of cut-out letters and you are on the floor with a little kid. You hand the kid the five letters p-a-r-t- and s, and say now line these letters up to make a word. What will happen? Rapts? Strap? PTRAS?

So what's missing from our analysis of the word "parts"? Right again! What's missing are the relationships among the five letters; what's missing is the map, or the rules about how to assemble the parts in order. First P, then A, then R, then T, finally S. Once you know enough parts and enough about them, you can put the parts back together again.

> **Synthesis** is another important word for thinking. Synthesis means "combining separate elements or substances to form a whole." Synthesis is the opposite of analysis. **Synthesis means putting things together**.

Our society is very good at taking things apart; we know a lot about it.

In the science of Physics, we learned first (1800s) that the smallest part of matter was the atom,

then we said Oops!, Wrong!, and discovered smaller-yet parts of matter called subatomic particles called protons and electrons and neutrons (1932), and we thought that was that. Then the physicists said Oops, Wrong! again and said there is also the muon (1935).

By 1995 we had become so skilled at analysis that we could identify over 200 kinds of elementary particles, including such odd things as quarks, bosons and leptons. So can we build an atom? Can we synthesize an atom? We can take one apart, which makes a big bang, but we are not even close to putting an atom together.

The point is that you can be very good at reducing things to their parts, and still not be any good at putting them back together. After “all the king’s horses and all the king’s men” had done their thing, Humpty was still in a world of trouble.

One way to comprehend the environmental mess we have made over the past century or two is to realize that our technological civilization is just now beginning to see the Earth as a whole; as one system, one unit, one coherent thing.

We (our society) have been re-discovering Earth-as-a-whole ever since we saw photographs taken from the Apollo spacecraft on their travels to and from the moon. We have known intellectually for centuries that Earth was a coherent whole, a unit, but at the same time we have gone about thinking that “seeing is believing.”

Well, since the late 1960s, we have been seeing Earth’s wholeness, and we have been believing. Earth is clearly one beautiful whole.

For many years our society has been so skilled at taking things apart that we have developed a habit of thinking that the way we can fix any problem is to first take it apart. That has turned out to be a bad habit, one that has led us astray.

In the 17th and 18th centuries, scientists were trying to discover what life was exactly; they thought that there was something they called the Life-Essence or the Life-Spark. In their search for that Life Spark they began the practice we now call vivisection, which means cutting up (taking apart) living animals. They thought if they observed carefully enough while doing this, they could actually see the Life Spark. After cutting up God knows how many dogs and cats and horses and whatever else alive was handy, and after listening to what must have been an incredible amount of screaming before death, these “scientists” decided that if there was a Life Spark, they weren’t going to find it like that.

They all claimed to know, by the way, that unlike humans, animals felt no pain, and that if they

cried out in agony it was only a reflex. You still hear people saying that.

Then a few of these early anatomist/biologists decided that they could possibly re-animate (make alive again) dead animals, if they first took them apart very slowly and carefully while they died, and then very carefully sew them back together and try to re-Spark the life by shocking it with electricity or various chemicals. Were these people crazy?

When Mary Shelley published *Frankenstein* in 1818, she invented the first story of the mad scientist who tampers in God's domain. Since then there have been thousands of such stories.

So what's the point here? The point is that if you take apart a living system to analyze it, it's virtually impossible to put it back together again.

It is incredibly arrogant of humans to assume they can discover all of a system's parts and at the same time discover its rules, its map, the relationships among all the parts. As we have seen with the skeleton, the forest, and a word, it is that **set of rules** that is so easy to miss. Yet without them, you can never synthesize that analyzed thing back together again.

You have to know all about Humpty before he fell off the wall.

The study of wholes (rather than parts) is called holism.

Holism is a stance, an attitude, an approach to reality, a way of seeing and thinking. With a holistic way of looking at the world, when you want to understand something, you do not begin by taking it apart.

Instead you begin by seeing it as a system, as a unit. When you recognize a part of the system, your attempt is not to separate it out, but to try to figure out how it connects to the other parts: what its job is in the system.

So you study wholes gently, by leaving them whole. You study wholes by learning to map them, by learning the relationships among all the separable parts. When you study wholes, it makes you humble, because you know that you're never going to see all there is to be seen.

Know This: Synergy

Sometimes 1 + 1 = 2,
but sometimes 1 + 1 + (?) = 3 (more than the sum of parts)

This enhanced effect is called Synergy: The invisible number (?) is the relationship. The relationship is often intangible.

Woman + Man + Love = Something Larger than the Sum of the Parts:

1 Woman + 1 Man + Love = 3 Synergy

Living systems often demonstrate synergy. When the living systems called people cooperate, positive energy happens, and the energy of the cooperative effort is greater than the energy of the individuals added up separately. Have you ever sung in a choir, or played in a band? If you've been lucky, there have been moments when all of the singers or players have joined, become one, and the music was beautiful because of that synergy. Together you had become something larger than the sum of your separate selves. The same thing happens sometimes in sports—there are moments when a team truly becomes a whole, and it can only do things right—that's synergy.

The study of Earth as a whole is Ecology. In other words, ecology is the science of the relationships between organisms and their environments. Ecology is the study of the connections, often synergistic, samong everything on earth.

Some Sources for Thinking in Wholes

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