CAN WE LEARN TO THINK LIKE A PLANT?
Toward a New, Qualitative Science (Part 2)

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Perhaps never in the history of the world has so vast a project yielded such overwhelming benefits at such a terrible cost. The technological products of our massively institutionalized science are such visible and effective instruments of power that few would question the essential rightness of this science as an inquiry into the nature of the world. And yet, thanks to this same science we find ourselves increasingly alienated from the world and bereft of any sense of human understanding. What understanding we are offered derives primarily from instruments and, as data, passes straight from the instruments to computational machines fitter than we to cope with it.

The technological benefits of this science hardly need defending. On the other hand, we find no clarity, no consensus, and in fact precious little discussion about what it might mean to *understand* the world. The crucial notion of scientific or causal explanation is almost nothing but confusion. My aim in this and subsequent essays will be to clarify some of this confusion as best I can.

Where Does Unity Reveal Itself?

We must start somewhere, so consider the field buttercup (*Ranunculus acris*), whose leaves are shown below in Figure 1. Here I will draw heavily upon a discussion offered by the late philosopher, Ronald Brady

(1987). Brady was a leading expositer of what is often called "Goethean science" (and what I prefer to call "qualitative science").

Figure 2. Two buttercup leaves.

If you had seen only these at the beginning, you might well have assumed they came from entirely different plants. But after you have worked through the sequence, both forward and backward, bringing it into continuous movement in your imagination, you can see these two leaves within the context of that movement, and they will no longer seem unlike. They will, as Brady remarks, "bear a distinct resemblance to each other, and bear it so strongly ... that the impression arises that they are somehow *the same form*. Here is the intuited 'single form' of the series, but it cannot be equated with anything static".

The Primacy of Movement

We need to press our consideration of the buttercup just a little further.

As we have seen, no individual form in the leaf series can give us the difference between forms or the character of the overall transformation. Brady comments that "The movement is not itself a product of the forms from which it is detected, but rather [it is] the unity of those forms, from which unity any form belonging to the series can be generated. Individual forms are in this sense 'governed' by the movement of the series in which they are found".

So there are two, very different ways we can think of a leaf in the series. One is as a given "thing" -- a fixed form considered as an isolated, static, and material end-product. Seen in this

conventional light, the leaf cannot serve as a revelation of the movement or unity we have recognized. The isolated leaf, so far as its given form is concerned, could just as well be part of a different sequence, entirely unlike the buttercup.

In other words, there is no necessity, implicit in a static end-product, for a generative movement of a particular sort. The only necessity we find in our leaf sequence is an expression of the movement itself, which is capable of generating particular forms out of its own nature. When we think of the leaf in this second way -- in the context of a transformative movement with a power to generate particular forms of a particular imaginal character -- then we no longer have the leaf as a mere thing. The image of the single leaf, Brady writes, "becomes transparent to the whole 'gesture' -- which it now seems to express". As we saw when we looked at just two leaves isolated from the sequence, they can appear either unrelated or as expressions of a unity, depending on whether we see them as mere objects or as momentarily frozen gestures of a continuous movement. In the latter case,

> The individual leaf now appears to be "coming from" something as well as "passing to" something, and by so doing *represents* to our mind, more than itself -- it can no longer be separated from its before and after. Indeed, its only distinction from these moments lies in the conditions of arrest -- that is, we see it "caught in the act" of becoming something else .... Each visible form now emerges as *partial*, and becomes a disclosure of another sort of

form.

Or, as he also puts it, each leaf "is becoming other in order to remain itself". It *has* to be becoming other; given that it is in fact a manifestation of a movement, it can retain its identity only so far as it is itself seen to be in movement. Every leaf is now representative of all the others in the series because each is born of the same movement. This is how the two forms of Figure 2 manage to look alike.

This means that the difference between two leaf-forms is *required* if we are to see the kind of unity at issue here. If in Figure 2 we had two identical forms, we would be able to say nothing about any unity or generative movement. Mere sameness is not unity, and it cannot give us movement. This is why a science based on abstraction, whereby we abstract from things their sameness -- what they have in common -- cannot deal with the various sorts of dynamic unity we find in the world's phenomena.

Finally, *pattern* and *Gestalt* have become popular terms today in some branches of science, but we need to distinguish these terms, as they are general employed, from the "movement" or "gesture" we have been considering here. Goethe summarizes the matter this way:

> The German has the word *Gestalt* for the complex of existence of an actual being. He abstracts, with this expression, from the moving, and assumes a congruous whole to be determined, completed, and fixed in its character.
>
> But if we consider *Gestalts* generally, especially organic ones, we find that independence, rest, or termination nowhere

appear, but
everything fluctuates rather in continuous motion. Our speech is
therefore accustomed to use the word *Bildung* pertaining to both what
has been brought forth and the process of bringing-forth.

If we would introduce a morphology, we ought not to speak of the
Gestalt, or if we do use the word, should think thereby only of an
abstraction -- a notion of something held fast in experience but for an
instant. (Quoted in Brady 1987, p. 274)

What has been formed is immediately transformed again, and if we would
succeed, to some degree, to a living view of Nature, we must attempt to
remain as active and as plastic as the example she sets for us.

The Explanatory Power of the Whole

All this lands us in territory both familiar and strange to science.
Everyone, with some inner, imaginative work, can recognize the coherent
movement, or shaping potential, that engenders and unifies the leaf
sequence. This is hardly esoteric stuff. But what sort of reality can
be claimed for a movement or shaping potential we can recognize only
between material leaf forms, and what do we mean when we say the
movement *governs* the individual forms? Can we say in any legitimate
sense that the movement accounts for or *explains* the forms -- or that it
brings us scientific *understanding* of the buttercup?

To say any of this is to appeal to principles of understanding and
explanation that stand behind or precede the phenomenal

appearances they apply to. Brady is indeed invoking such principles when he speaks of "a law by which the plant produces its multiplicity of forms", and also of a "whole which designs its own parts". Contrary to our analytic habits, he says, we must learn to think from the whole to the parts. However, so far as we remain stuck in those usual habits, we can scarcely imagine the kind of immaterial unity at issue, and therefore we may object to the "obscurity" of all references to it.

The objection rings hollow. There is nothing particularly obscure about the structure of our cognitive activity in grasping the unity of the buttercup, as outlined above. We "see" this unity beyond any doubting, and it is dangerous to the health of science when we ignore what is right in front of us. Moreover, we have already noted (Talbott 2005) that the recognition of such unity is a routine, if underappreciated, experience of the scientist. For example, every biologist and every naturalist relies upon this irreducibly qualitative experience when identifying and classifying species.

Such recognition of unities that cannot be equated with any particular collection of physical things must be acknowledged by anyone who is not already shut off from the testimony of his own senses. A qualitative science does not posit some mystical and unknown source of insight. It simply refuses to ignore the routine powers of cognition prerequisite to all scientific analysis. After all, we cannot meaningfully analyze and divide unless we are first given a significant unity to analyze. If there is obscurantism here, it lies in the refusal to take a

critical,
investigative stance toward the starting place for all our scientific
work. It lies in the willingness to build this work upon a kind of
cognitive blank.

If we prefer to fill in this blank, we need to reckon with, among other
things, the explanatory power of the dynamic unity observed in the leaf
series. In a sense, the matter is so simple as to preclude argument. We
see an overall gesture in the temporal unfolding of leaves on a plant.
This gesture cannot be equated to any tangible object, and it clearly
gives us a much fuller picture of the reality of the plant than any
collection of tangible objects alone could possibly give us. The gesture
expresses something of the character and unity of the plant that we can
grasp no other way. It gives us the life and the becoming of the plant
rather than isolated, frozen snapshots taken from that life. Do we really
need to debate which approach captures more of the world's reality -- the
snapshot or the underlying gesture that engenders and lives in all such
snapshots?

The problem is that we have carried over from the nineteenth century an
outmoded desire for explanation in terms of the impact of particle upon
particle, gear upon gear, object upon object. More recently, as we saw in
"The Vanishing World-Machine" (Talbott 2003), explanation has shifted
toward the formalisms of logic, rule, equation, and algorithm. These two
modes of explanation have tended to combine, so that we feel most securely
possessed of understanding when we can picture machine-like objects whose
"gears" and "levers" seem to be little more than

condensations of logic --
when, in other words, we can picture the world in the way we picture a
computer.

By comparison, the unity we observe in the leaves of the buttercup may
suffer from all the vagueness and insubstantiality we associate with
consciousness. It seems to be a a mere image held in our minds. It is
more pictorial and imaginative than logical and computational. It does
not readily lend itself to the action of gears or levers or transistors.
To equate it with any particular physical object is, in fact, to lose it.
Can such a pictorial idea manifesting in our consciousness contribute to a
genuine understanding of the world?

But, crucially, the idea does not manifest *only* in our consciousness.
After all, we recognized it in a series of leaves. It is the kind of idea
botanists routinely encounter in the phenomena they deal with, and is
required in order to make these phenomena intelligible. Where is the idea
if not in the phenomena that demand it from any understanding mind?

Many scientists, of course, will stumble over the notion that what occurs
to *us* as imaginative idea may occur in the world as well, where it acts as
a kind of shaping power. "How", they will ask, "does a mere idea gain
power to mold the physical world?"

Actually, our science of laws and causes points us toward nothing but such
shaping power. I certainly do not wish to equate the lawfulness of
gravity with the lawfulness of leaf transformation; they are very
different sorts of lawfulness. But if the governing unity of the leaf

series is not a physical thing, neither are the equations we identify with
the law of gravity. The principles of order in both cases are neither
more nor less than articulations of our conscious activity.

But the whole point of articulating these principles in our minds is to
elucidate the phenomena we encounter. These principles either do or do
not make the phenomena intelligible, and if they do, then they undeniably
belong to the phenomena. And they cannot belong to the phenomena while
residing solely in our heads.

Yes, the notion that imaginative contents have a power to shape the world
is alien to modern sensibilities. But to find ourselves continually
forced to draw, not only upon mathematics, but also upon dynamic *images*
in our attempt to understand the world, and then to deny that, not only a
mathematical shaping power, but also an imaginal shaping power is what we
see at work in the world -- this requires a human being who is at war with
himself. The only thing I know of that could drive one into this
self-contradiction is the materialist's urgent need to avoid recognizing
anything of an inner, living character in the objective world around us.

But you cannot really even have gravity except as (among other things) an
imaginal power. It manifests itself in the characteristic forms of
physical movement -- as when you throw a ball -- but makes use of no gears
or transistors in playing its role. If you stop and think about it, you
will find you have no more reason to ascribe explanatory power to the
physicist's formulation of the gravitational law than to the governing

gesture of the buttercup. This remains true despite the drastically different kinds of form evident in the two cases.

Intelligibility Comes from Within

A great deal needs to be said to enflesh these brief suggestions. For the moment I will conclude my comments with the barest sketch of some of the territory we will need to survey more fully, especially when we come to the epistemological underpinnings of a qualitative science.

What conventional science has done with the law of gravity is to make it so thin and abstract, so bloodless, so empty of content, that we can easily forget its true nature. But, however much we have emptied them of all but quantitative content, our gravitational equations remain nothing if not expressions of our mentality. Numbers and formal relations are not physical things. Ironically, the materialist who more and more sees the world in terms of equation, rule, and algorithm -- and who, like the philosopher Daniel Dennett, can say, for example, that evolution just *is* an algorithm -- has become a kind of airy idealist. His "physical" world is almost *nothing but* mentality -- and mentality of the most insubstantial sort.

But whether you consider this science of abstraction to be materialism or idealism, it remains largely vacuous for the simple reason that high abstractions have almost no content. I said a moment ago that we have no more reason to ascribe explanatory power to the usual formulation of the law of gravity than to the governing gesture of the

buttercup. Actually, we have *less* reason to consider the gravitational law, in its usual formulation, explanatory. The problem is that we have no meaningful law of *gravity* so long as we take Newton's (or any later) equation in its strictly abstract and quantitative aspect. We have to have qualitative concepts of mass and force as well. Without these concepts, we might see objects moving along certain mathematically describable trajectories, but we would have no sense at all that each object was *attracting* or *pulling* the other.

Where do we get a concept of force? You will struggle in vain to find any origin for it other than in your own inner experience -- for example, the experience of exerting your will to move your muscles, and the experience of being drawn or compelled by the force of someone's personality. In such experience we find the prerequisites for our scientific thoughts about force even if we tend to ignore the experience while working with our equations. If Eddington had reckoned with this source of our scientific insight and had been able to integrate it into his science, he would not have had to say, as we heard in "Do Physical Laws Make Things Happen?" (Talbott 2004):

> [Our knowledge of physics] is only an empty shell -- a form of symbols.
> It is knowledge of structural form, and not knowledge of content. All
> through the physical world runs that unknown content.... (1920, p.
> 200)

The only way to gain the unknown content is to cease neglecting the only content we are given, which is the inner content of our

own experience.
This experience is the primal source of any science, any knowledge of the
world, we could possibly have. Eddington could find only empty structure
because his science refused to acknowledge its reliance upon human
experience or to recognize the human being as by far the most perfect
"instrument" for perceiving the world -- the only one of our instruments
capable of supplying the *content* from which all data is abstracted.

Returning the data to its original, qualitative context is, obviously
enough, the only way it can become meaningful. And wrenching the data
away from its context is, obviously enough, a formula for denaturing the
world, and for reconstructing it in the image of a badly compromised human
instrument -- compromised because abandoned from the neck down, leaving
only our ability to emulate a computer.

Our choice, then, is not between remaining respectable, hard-headed
materialists or else projecting fanciful, immaterial ideas upon the
physical world. Rather, it is between projecting a drastically
inadequate, anemic, abstract mentality upon the world (while forgetting
that this is nevertheless a content of our own consciousness), or else
discovering in ourselves the imaginative, muscular, aesthetically felt
contents that can render the world more fully intelligible.

Why should we employ less than our full range of our conscious awarenesses
when we try consciously to understand the world? Where does the world
impose upon us the rule, "ignore everything but your capacity for
measurement when you contemplate nature"? How can we

forget that
measurements mean nothing except so far as we know *what* we are measuring?
And there is no *what* given except the quality. (Go ahead: try to
describe any *what* you wish without resorting to qualities.)

We have seen with the buttercup a little bit of what it means to apprehend
the qualities of things. A certain quality of the buttercup (we could
also say: a certain meaning of the buttercup) is expressed in the
gesturing of its leaves. To capture this gesturing we had to do inner
work, bringing the gesture to life within ourselves. Our imagination had
to be brought willfully into movement.

This effort of will, as a conscious work, is what we usually lack when
thinking much too easily about gravity -- that is, when manipulating
well-defined equations while forgetting that these equations are about a
power of movement. We can scarcely hope to understand this without our
own *experience* of the power of movement. The problem with science today
is that it stops short of knowing the physical world -- as opposed to the
self-contained domain of logic and mathematics -- because it ignores the
many-faceted inner realm where we experience the world as much more than
measure and quantity.

Ideas or laws in the qualitative, imaginal sense I have been speaking of
are nothing other than the phenomena themselves in their transparency to
understanding, in their expressiveness, in their different ways of being.
Expressing this or that character is *what physical phenomena do*. It is
what gives them content. It is the life by which they exist. Phenomena

would be nothing to us if they were not intelligible expressions. In some ways the last few hundred years of science have amounted to the insane project of mapping reality according to a schema of intelligibility while denying intelligibility to reality.

Within human consciousness we discover a language for understanding the world (Rozentuller and Talbott 2005). If this were not so, we could only stare blankly at our surroundings. What scientists need to realize is that our conscious (and unconscious) interior is vastly richer than the contentless abstractions playing over the convoluted surface of our brains. We are creatures of imagination, of heart-felt feeling, and of will raying out through our muscles and bones. And to the degree we must call on the full powers of this inner language in order to comprehend, for example, the leaves successively gestured forth along the stem of a buttercup -- to the degree this language makes the world intelligible -- we must acknowledge that the language speaks truly. That is, it *reveals* the world, which is to say that what speaks in us speaks also in the world.

Or, as the ancients might have put it: the same *logos* shines through both the world and the human being. How could it be otherwise?

Much more remains to be said.

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