To Explain or Portray?

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What Goethe said of his pioneering morphological research is often repeated of Goethean science as a whole: "its intention is to portray rather than explain" (Goethe 1995, p. 57). Difficult words. The idea seems to be that description—or at least description of the right sort—leads by itself to scientific understanding. This is implied more strongly in another of his oft-repeated koans: "everything in the realm of fact is already theory .... Let us not seek for something behind the phenomena—they themselves are the theory" (p. 307).

Surely, however, there is nothing special about the terms "portray" and "explain." Both words have a wide range of meanings, and what Goethe means by portrayal could easily be construed as a type of explanation. In other words, Goethe is contrasting a particular sort of portrayal with a particular sort of explanation, and is suggesting that the portrayal is a fuller, more adequate form of explanation. What I would like to do is to sketch briefly, as I see it, the contrast between Goethean portrayal and the constricted sort of explanation that continues to be honored as the ideal of hard science.

Explaining the Elephant's Leg

The search for explanation typically propels us upon a search for causes—precise, unambiguous, absolutely determining causes. We want to be able to say, "*x* causes *y*—all other things being equal." We gain our precision by quantifying these causes and effects and putting them into the form of a mathematical law.

Unfortunately, all other things never are in fact equal. Problems arise because of what physicist David Bohm calls "the universal connection of things." Every formulation of law "inevitably leaves out some aspect of what is happening in broader contexts."

> Thus, there is no real case known of a set of *perfect* one-to-one causal relationships that could in principle make possible predictions of *unlimited* precision, without the need to take into account qualitatively new sets of causal factors existing outside the system of interest or at other levels. (Bohm 1957, pp. 143, 20)

Contexts, that is, are never mutually exclusive. They blend into each other. Nothing is *absolutely* cut off from anything else. This proves particularly troubling for the notion of strict, unidirectional cause and effect, since the "effect" is all too likely to influence the "cause," thereby reversing and sabotaging the supposedly unambiguous causal relationship. This is true even in particle physics.

For example, while "the effect of the atomic motions on the laws of the large-scale level is much more important than the effects of the large-scale level on the laws of atomic motions," nevertheless, "there is a small but ... real reciprocal influence of the large-scale level on the laws of the atomic level" (Bohm 1957, p. 145).

Yet, as Bohm makes clear, we have no choice but to seek *relatively* isolated contexts and the *relatively* precise laws that derive from them. The alternative would be to try explaining everything at once, which is hardly thinkable. An organism is one example of a relatively isolated context. We speak of it as a "whole" and a "unity." But where does this unity leave off and everything else begin? As Craig Holdrege has pointed out with respect to the sloth, giraffe and other mammals, the animal does not end neatly at its own skin, but rather extends outward into the environment it shapes to itself, just as the environment penetrates into and shapes the animal (Holdrege 1999; 2000). In studying the organism we necessarily spend part of our time with a very narrow focus (for example, on tissue, organ, cell, gene), but we falsify our subject if we do not also let our gaze sweep widely over an ever-expanding context.

Against this backdrop, I think we can say: to prefer portrayal over explanation is to reject the *one-sided* (and never fully achievable) drive to isolate restricted contexts and precisely definable causes or laws. It is to refuse to lose sight of the interconnections of things, even while accepting the necessity for narrowly focused excursions. For example Craig tells me that in studying the leg of the elephant he resorts to all the most specialized data—morphological, physiological, behavioral, mechanical, and otherwise. But he never allows this data to stand alone. Rather, he continually brings every piece of information back into relation with the larger picture he forming of the elephant.

So when he hears (as he often does) that the long legs of the elephant owe their exceptional straightness to the great weight of the animal, which is most easily supported on "vertical pillars," Craig is not content to say, "Ah, *there's* the explanation." The problem with explanations is that they cut short the quest for understanding, which *always* needs to go further.

It is true enough that the elephant's straight legs serve well to support its weight. But the hippopotamus, too, is massively heavy, yet its weight is carried on very short legs bent at the "elbow." Our explanation of the elephant's legs tells us nothing about this difference, and therefore does not fully explain even the elephant's legs.

Moreover, the quality of verticality evident in the leg of the elephant manifests itself as a quality of the animal as a whole—as in the extraordinary vertical extension of the skull. There is no neatly formulable law enabling one to grasp the play of such qualities throughout an organism. It requires something of the artist's skill at portrayal in order to sketch a revelatory picture. And yet such a picture brings genuine scientific understanding.

An explanation is something we can *have*, and easily becomes a dead weight upon further inquiry. A portrayal—whether we are sketching the portrait ourselves or entering into someone else's portrayal—requires a stronger inner activity on our part in order to hold everything together and grasp its coherence; the portraying is something we must *do*.

Different Approaches

What I have said so far hardly suggests the radical contrast between explaining (in the narrow sense) and portraying. But we are now in a position to look more closely at some of the differing tendencies at work in the two styles of understanding. Be aware, however, that my description of explanation here, if taken as an adequate portrayal of scientific practice, would be a terrible caricature. No science of *mere* explanation is possible. Nevertheless, *gross imbalance*, with all its dangers, is a reality in many disciplines. While scientists always rely on portrayal to one degree or another in their work, this fact finds little recognition in the official doctrines of science, and acknowledgment of it would prove repugnant to many researchers.

Here, then, are some contrasts between explanation and portrayal:

****** The desire for unambiguous, yes-or-no explanation ("There! I've got it!") has led historically to a strong emphasis on quantification and to an explicit disregard of qualities. A science of portrayal, on the other hand, is irreducibly qualitative. This gives it a certain depth of meaning, and also an open-endedness: we can never say of the elephant, "There! I've got its quality of verticality!" in quite the same way we can "get" a set of mathematical relationships. Everything else I say here will amount to an elaboration of the distinction between a quantitative and qualitative science.

An immediate caveat is necessary, however. The open-endedness of any qualitative portrayal points less to a necessary lack of rigor in such a portrayal than to the depth of significance in what is being portrayed. The rigor required in order to penetrate this depth is at least as great as the rigor demanded of the mathematician, and has some of the same character. The well-calculated observations of the qualitative researcher, Goethe wrote, must align with each other and constitute a demonstrated unity in the same compelling way as the steps in a mathematical proof:

> From the mathematician we must learn the meticulous care required to connect things in unbroken succession, or rather, to derive things step by step. Even where we do not venture to apply mathematics we must always work as though we had to satisfy the strictest of geometricians. (Goethe 1995, p. 16)

****** The quantitative preoccupations of the explainer lead to a one-sided focus on measurable *things*. The portrayer, by contrast, may attend to such fixed data, but in doing so always returns to pattern, movement, and significant gesture. He or she is concerned with relations; attention is not so much *on* things as *between* them. The shape of a leaf at a particular time may be important, but so also is the qualitative form of its overall growth. The growth of a single leaf may be important, but so also is the transformation from leaf to leaf as you move up the stem. And the transformation of leaves within a single plant may be important, but so also is the species' varied manner of expression from one environment to another.

We can legitimately view a thing in its fixed and measurable aspect. But if we *only* do this, we ignore the context of pattern and movement without which the thing would not be. Regarding such expressive movement the question is not only *How much?* but also *What is it like?* The naturalist who can identify and differentiate closely related species at a glance gains this ability by attending (whether consciously or unconsciously) to the second question as well as the first.

****** The drive to apprehend exact, explanatory causes leads the conventional scientist into a single-minded analysis of things into parts. These parts, through their external combinations, are then construed as *explaining* the behavior of the things. This explanation works as causation from below upward (where "below" indicates the realm of most fundamental mechanisms). In portrayal, by contrast, the attempt is to grasp a whole that *informs* the parts "downward" from the whole, through participation. Genes are often taken to explain the organism, but when we recognize, say, the buttercup family of plants, what we recognize is a qualitative character playing through and informing all the specimens of the family. This qualitative character is neither reducible to, nor identifiable with, a particular specimen or any of its parts considered in isolation.

The weaving of parts into a unified whole is necessarily qualitative. Qualities can interpenetrate each other, with one quality playing into, altering, and becoming inseparable from ("qualifying") another. Without such mutual interpenetration, we can have parts existing side by side, but no unity of the whole. In every case of sexual reproduction, we see in the offspring a blending of the qualities of the parents so as to create a new unity. You can say little if anything about this unity by looking at the genes alone, but you can often learn to *see* the unity, and to recognize an expression of each parent within the unity. There is no side-by-side aggregation of separate parental traits here; rather, each parent qualifies the whole.

****** We articulate explanatory causes because we want predictability, which in turn may enable us to manipulate and control things. The physicist, Richard Feynman, wrote: "Knowledge is of no real value if all you can tell me is what happened yesterday. It is necessary to tell what will happen tomorrow if you do something" (Feynman 1998, p. 25).

Surely we want our knowledge to be relevant to the future. But if what we are after is only the most exact mathematical prediction possible, we lose all balance. If I become familiar with the nature and character of a particular species of animal—say, the bluejay—I may not be able to predict exactly what it will do or project its flight as a Newtonian trajectory. But my knowledge is nevertheless real. I will, in appropriate circumstances, be able to say, "Yes, that is just like a bluejay" or "No, that is not at all what one would expect of a bluejay in this situation. There is something missing from the picture." With such knowledge I can learn to interact meaningfully with the bird even though I cannot mechanically predict its behavior. In developing a qualitative portrait, we aim less at exact prediction and control than at understanding and the potentials for working with nature.

It is not often appreciated that predictability—even in the physical sciences—is less a natural feature of the world than an imposition upon the world. We go to great pains—sometimes (as in the case of nuclear reactors) spending hundreds of millions of dollars—in order to assure that transactions within a narrowly circumscribed space and time will proceed as far as possible in a predicted manner. Every reliable achievement of prediction and control involves this circumscription. We thereby shut out (partially—never wholly!) the contingencies that might unpredictably play into the machinery we have erected. We aim for a "closed system," but there never has been and never will be an absolutely closed system.

To make prediction and control the primary goal of science is to alienate ourselves from the fullness of a reality that continually overshadows the restricted, mechanical behavior we seek to elicit from it.

****** If you found your science upon the univocal demands of clear-cut, yes-or-no explanation, you will be able to say of every thing only "yes, in this or that respect it is the same as" or "no, it is different from" some other thing. You will assign things to classes based on what they have in common—on their sameness—and your explanations will apply equally to all the things in a class. That is, your explanations will always deal with what things have in common and will lack particularity (Bortoft 1999). The law of gravity applies in the same way to a leaf as to a stone, based on their measurable masses—this despite their radically different ways of manifesting heaviness. The concept of mass is exactly the same in the two cases, having been abstracted from all the particulars making a stone a stone and a leaf a leaf.

It is quite otherwise with portrayal. Then every detail may count and we seek in each phenomenon its concrete individuality. We are less interested in how laws appear as abstracted, classifiable aspects of a phenomenon than in how it makes a unique and unified expression of itself—that is, how it distinctly constellates all the laws we discover in it. This unique and unified expression is the law of the particular thing—a qualitative law into which all the other laws are caught up. To get at this distinctive character, we will certainly attend to every discernible commonality among members of the relevant classes, but we will bring this understanding back to the full presence of the thing at hand, which is unlike anything else.

Every rainbow is "explained" by the same, straightforward laws of optics, but it was only the endless observation of rainbows and related phenomena in all their differing detail that led Goethe to his widely respected understanding of light and color. More recently, Polaroid Corporation founder, Edwin Land, "concluded that classical color theory was valid only for spots of light observed in totally dark surroundings and that it had only limited relevance to color perception in natural situations involving multiple objects and variable illumination." This limitation of the classical theory was the price paid for Newton's highly generalizing method, with its inattention to the wide range of color phenomena (Ribe and Steinle 2002).

****** When we explain, we minimize the role of the observer in order to remain objective; that is, we rid scientific observation of our own contribution to the greatest extent possible. That's why we're drawn to measurement, which can be carried out *almost* automatically, with little participation in the thing we are measuring. When we portray, on the other hand, we must intensify our own role, for we can bring alive the qualities of a phenomenon only by discovering and vividly experiencing the qualities within ourselves.

But, really, this means that the demand for objectivity falls most heavily upon the qualitative researcher. It is, after all (as Owen Barfield remarks), not so hard to be objective about mere objects—about things assumed to be wholly unconnected to us. In fact, if objects really were *mere* objects, one would have to wonder why scientists make such a song and dance about objectivity. Why should it be so difficult? But since in truth we have to distinguish within ourselves the qualities that are merely our own from those belonging also to the phenomenon under study,

objectivity remains a genuine challenge (Barfield 1977, p. 139). Every pet owner knows how easy it is to project his own wishes, feelings, and thoughts upon another organism.

****** Lastly, explanation relies on facts. We take particular facts and the kinds of things that count as facts as unquestioned givens. In portraying, by contrast, there are no absolutely fixed contours of fact. We are always trying to discover the *way of seeing* that brings a meaningful whole into view, and this way of seeing may constitute afresh what is a fact. When Copernicus succeeded in imagining how the solar system might look from a vantage point on the sun, he changed the meaning of the word "planet," along with the facts it referred to. The earth now had to be understood as a planet, while the sun could *no longer* be understood as a planet. The factual givens and the kinds of explanation now required underwent drastic change as a result of Copernicus' re-visioning.

Not Abstraction, But an Image

In sum: to portray is to sketch a picture; it is an imaginal and qualitative activity. We look for the overall, unifying shape or movement, the coherent expression of a thing—and we may find this expression individualized in any part of the thing, just as we find something of the part permeating the whole. The character of the elephant's leg is not radically separable from the character of its skull. We may be able to say a great deal about this character, and in doing so we necessarily try to be as precise as possible; but our effort is not reducible to the quest for such precision. On the other hand, explanation as a narrow and self-sufficient ideal leads us to analyze and divide, abstracting particular elements from the picture and isolating the simplest possible quantitative relationships between these elements so that we can say a simple "yes" or "no" to the correctness of our formulation of these relationships. Interpenetrating qualities and their transformations fall out of the picture. We avoid saying *what anything is really like* until we arrive at the "fundamental" level of explanation, but there we find that we can say little about what a subatomic particle is like, and therefore it can hardly tell us what anything else is like.

How *do* we learn what something is like? Not by straining to capture and nail down in some direct sense its "inner nature." This leads to abstraction. Goethe labels such an attempt "fruitless," but he also offers an alternative: "we labor in vain to describe a person's character, but when we draw together his actions, his deeds, a picture of his character will emerge" (Goethe 1995, p. 158). This multifaceted portrait, actively entered into and sustained within our imagination, *is* our understanding—an explanation in the fullest sense of the word.

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