



“RULES OF RIGHTNESS” AND THE EVOLUTIONARY EMERGENCE OF PURPOSE



Walter Gulick

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ABSTRACT

Michael Polanyi's essay "Rules of Rightness" argues that for living beings, both machine-like embodied processes and informal purposeful operations are guided by standards of proper functioning. This article traces the origins of rules of rightness back to the concomitant rise of life and purpose in the universe. Thereby the deterministic control of all things by the laws of physics and chemistry is broken. Powered by an independent active principle and guided by three inarticulate modes of learning, life takes on increasingly complex expressions of purpose in evolutionary history. Along the way, purposeful informal operations make use of and often create contrivances that further the explosive telic growth of life.

Introduction

Part IV of Michael Polanyi's *Personal Knowledge* offers a complex philosophical rendering of how the distinctive features of life emerged from the previously meaningless world of matter/energy governed by the purposeless but dynamic causal laws of physics and chemistry. Polanyi's 1954 lecture/essay, "Rules of Rightness," attends to a key aspect of this emergence, although this may not be obvious in the essay's opening discussion of formalisms. Polanyi's point is that all formalisms, whether machines, rules of logic, mathematical formulas, or self-made theories, etc., rely on informal judgments if such formalisms are to be applied and function adequately. As he wrote in *Personal Knowledge*, "The legitimate purpose of formalization lies in the reduction of the tacit coefficient to more limited and obvious informal operations; but it is nonsensical to aim at the total elimination of our personal participation" (259). That is, informal commitments and decisions rest on purposes and affiliated reasons not subject to the deterministic control of the laws of physics and chemistry.

The above claims are well-rehearsed views asserted by Polanyi. But what he does not describe in “Rules of Rightness” is the shape of the career of the informal ability that plays such an important role in the lecture. What is its relationship to purpose in the emergence and development of living beings?

Polanyi suggests that the dynamic informal operations he refers to in “Rules of Rightness” are a deeply rooted, embodied feature of life. He traces them back to “the inarticulate levels of intelligence of the animal and the infant. ...Pursuing the roots of this tacit intelligence even further, we recognize an active principle which controls and sustains it. As far down the scale of life as the worms and even perhaps the amoeba, we meet a general alertness of animals” (*PK*, 132). This alertness seems not directed to preexisting goals so much as it is attuned to understand the environment in which it is placed and “achieve intellectual control over the situations confronting it. Here at last, in the logical structure of such exploring—and of visual perception—we found prefigured that combination of the active shaping of knowledge with its acceptance as a token of reality” (*PK*, 132).

Polanyi offers no theory as to how life originated. More significant for our inquiry is not the “how” of origination but rather the “what” of properties and processes the simplest forms of life rely on to enable future growth. This would seem to require speculation since it is extremely unlikely that any concrete evidence might remain. So let us ask this: What must the simplest archaea and prokaryotes, as putatively the earliest forms of life, do in order to survive? Archaea can consume such basic elements and compounds as hydrogen, sulphur, ammonia, and iron, producing in the process the energy to survive as well as producing other basic compounds as waste. How is their existence, then, different from the deposition of crystals around a fumarole? The archaea’s reading and responding is an exemplification of purposeful behavior rather than an externally determined process. Unlike the chemically determined formation of crystals, archaea are able to reproduce themselves because they have the capacity to ingest certain useful compounds for self-maintenance and reproduction as well as the ability to avoid some of the environmental factors that might harm them fatally. In their reading of environmental signs as positive or negative, they fashion the most basic rules of rightness to accomplish these goals.¹ No doubt at the very origins of life, sign reading is of a basic stimulus-response type that may be called pre-intelligent. Yet even then it still functions as a foundational form of inarticulate purpose (*PK*, 71). But note that even at this most primitive level of life, it is possible to discover the distinction between the instinctual actions of parts and the molar purpose of the whole. The material requires some immaterial guidance if it is to function purposefully.

In speaking of learning signs not instinctively known, we come to a key step in the emergence of increasingly more complex life. Mere alertness of the environment would be a dead end of spectatorship unless it was connected to appropriate responsive action. Therefore, alertness must be followed by learning what observable patterns are significant with respect to thriving and surviving. Then a living being must have the ability to act according to that loaded information. In sum, learning significant patterns must be accompanied by acting appropriately. Intended behavior is a step beyond instinctual behavior, but each is an example of telic behavior.

Polanyi describes the origins of intended behavior by proposing three types of learning that even comparatively simple forms of life possess. First, sign learning, we have already seen, is the ability to ascertain the recurring patterns and signals relevant to the being’s survival. Second, latent learning is the capacity to recall these patterns and organize responses. Third, trick learning is the embodied ability to carry out the desired action (*PK*, 71-77).² Polanyi summarizes the abilities each form of learning provides as follows: “We have seen that animals can learn (1) to perform tricks, (2) to read signs, (3) to know their way about. These

activities were taken to prefigure primordially the three faculties of contriving, observing and reasoning, which are elaborated on the articulate level to the three domains of engineering, natural sciences and mathematics” (*PK*, 328).³ Each of the three forms of inarticulate learning seems necessary to work in harmony if a living being is to advance and flourish.⁴

Polanyi applied the ideas he developed in his 1954 lecture to his discussions of “The Logic of Affirmation” and “The Logic of Achievement” in chapters 8 and 11 of *Personal Knowledge*. But he placed his discussion of rules in chapter 11 of *PK* in a somewhat different context than his commentary about formalisms in his earlier “Rules of Rightness.” In *PK*, the rules of rightness are interpreted as what govern the proper functioning of “contrivances.” The ability to discover and use contrivances is gained through the third form of inarticulate learning just discussed, trick learning. “Contrivances are classes of objects which embody a particular operational principle” (*PK*, 328). These are objects by means of which animals learn to manipulate their environment to their advantage. Most likely, their own bodies were the first objects animals used to function as contrivances for finding food, fending off enemies, mating, and so forth. Narrowly defined, contrivances are useful formalisms or devices such as tools or machines. More broadly defined, contrivances can be seen as any objects that function as the means for achieving purposes. In wielding a stick to knock fruit from a high slender branch, an ape is obviously unaware of any formal operational principle. Whether the contrivance is consciously understood or not, it requires personal, informal judgments to be implemented or used.

As a creative contriver, a beaver dams up a stream and constructs a home of sticks that creates an environment, a niche, in which it can flourish. Certain indwelt rules of rightness establish how the dam and home should be constructed. The dam and home are analogous to machines, and with proper construction they can be seen in the lives of beavers to be contrived formalisms manifesting operational principles. Yet storms and droughts come. Predators may lurk in the surroundings, and human activities can affect the quality of water. The beaver must have the ability to adjust to new circumstances with an informal sense of rightness. This higher level is the capacity to regulate affairs in service to the purpose of general welfare. Consequently, two levels of the rules of rightness are called for: those guiding the building and structure of the beaver dam and those guiding its maintenance for overall beaver welfare in the face of changing conditions.

The active principle of alertness that Polanyi identified as the basic force of life is reasonably interpreted as evolving into informal operations of mind capable of following rules of rightness—operations, that is, that cannot be reduced to “nothing but the actions of neurons.” In “Rules of Rightness,” the unformalized semantic operations carried out by the mind as agent are contrasted with formalizations that function as aids to knowing. In *Personal Knowledge*, Polanyi acknowledges that formalizations such as machines, maps, graphs, and theoretical constructs are aptly understood to be contrivances helping humans achieve specific purposes. To be sure, they have to be applied by informal, indeed personal, thought and action. Proper application of formalisms is no arbitrary action. Action in harmony with purpose must follow rules of rightness. Moreover, to be useful the formalisms must themselves operate according to rules of rightness.

In Part IV of *PK*, Polanyi interprets the growing scope of purpose in terms of succeeding levels of evolutionary emergence. A passage from his article “The Logic of Tacit Inference” in *Knowing and Being* most succinctly summarizes this evolutionary sequence.

All living functions rely on the laws of inanimate nature in controlling the boundary conditions left open by these laws; the vegetative functions sustaining life at its lowest levels leave

open, both in plants and animals, the possibilities of growth and also leave open in animals the possibilities of muscular action; the principles governing muscular action leave open their integration to innate patterns of behavior; such patterns are open in their turn to be shaped by intelligence, and the working of intelligence can be made to serve the still higher principles of man's responsible choices (*KB*, 155).

The discussion of rules of rightness, however, is not about the steps or levels of emergence. It is about the structure that prevails at any one of these steps. In an important summary statement, Polanyi makes the following claims about how the rules of rightness are situated in any particular step of emergence:

Living beings function according to two always interwoven principles, namely, as machines and by 'regulation'. Machine-like functions are ideally defined by fixed structures; the ideal case of regulation is an equipotential integration of all parts in a joint performance. Both kinds of performance are defined by rules of rightness and these refer in either case to a comprehensive biotic entity. But there is this difference. Machine-like functions are ideally defined by precise operational principles, while the rightness of a regulative achievement can be expressed only in gestalt-like terms. One's comprehension of a machine is, accordingly, analytical, while one's appraisal of regulation is a purely skillful knowing, a connoisseurship. Yet both kinds of performances have it in common that their rightness cannot be specified in the more impersonal terms of physics and chemistry (*PK*, 342-343).

One might think from this statement that Polanyi is distinguishing at each step between three levels: (1) bodies—with machine-like structures—as things, (2) the rules or operational principles of machines and other formalisms or contrivances, and (3) the free unformalized ability to regulate bodies and formalisms in their changing environments. But this view neglects ascertaining where the contrivances, formalisms, and machine-like structures come from. They are the products—some developed over eons—of the active unformalized operations characteristic of all life. The rules of rightness of machines and other formalisms have been constructed by the energetic force that also has the capacity to regulate affairs. So for Polanyi, living beings seem to have two ontologically distinct levels: (1) bodies, including their many parts seemingly operating according to local rules of rightness, and (2) the active principle—including its expression in higher animals as minds—that discovers or creates contrivance and attends to the proper functioning of the parts and the overall welfare of the body.

The dyadic ontological structure just described may come as a surprise. For how does it differ from the much-criticized Cartesian dualism of matter (body) and mind? Well, it differs in several ways. For one thing, it is based on a study of life in which biology is supplemented by evolutionary and ecological insights. That is, it is based on an understanding of demonstrable world processes, not on a search for certainty that takes the mind's processes as the ontological base and proceeds by a method of doubt. Polanyi effectively demolishes that route of thought. He begins with a fallible scientifically informed grasp of the complex world rather than with the immediacy of consciousness. The latter approach ignores the fact that consciousness is a developmental byproduct of the preexisting rich ontological world. Polanyi does not define mind and matter as fundamentally different substances as Descartes does. By definition substances are self-sufficient islands rather than emergently dependent wholes. Generations of philosophers after Descartes were stymied in their attempts to reintegrate mind and matter.

Polanyi's philosophy includes several dualisms not subject to the problems of Cartesian dualism. When mind is related to matter in the context of emergent development, a two-level ontological difference has a dualistic character not subject to the problems of Descartes's one-level ontology that involves incommensurability. For Polanyi's evolutionary account concerning his stratified universe, "Each pair of levels would present its own dualism, for it would be impossible to account for the operations of any higher level by the laws governing its isolated particulars. The dualism of mind and matter would be but one instance of the dualism prevailing between every pair of successive ontological levels" (*KB*, 155).

But what of the dualism of the whole and its parts, the molar and the molecular, that has been claimed to exist in a living being? Why is this relationship not subject to the problem of Cartesian dualism? Let us return to the notion that concomitant with the rise of life is the advent of purpose in the cosmos as we know it. To become an effective reality not strictly determined by the laws of physics and chemistry, purpose requires a material base as well as an immaterial direction of possible fulfillment. Life is a telic phenomenon from the get-go. Thus, from its origins life has a dualistic character, a purposeful molar and a molecular embodiment. Furthermore, that unformalized regulative quality of life can evoke action if it is to fulfill its purposeful independence in an often-hostile environment. Earlier it was noted that this action at first would be strictly biological and instinctive in character. But with the lure of purposeful development, the three forms of inarticulate learning developed. And in time the active principle took on more and more forms and functions as life evolved.

At this point, I feel compelled to stop and ponder the significance of what has just been asserted. Recapitulation has a place here. The emergence of life and the birth of purpose have been claimed to be conjoint, intertwined phenomena. Without life, there is no evident purpose in the cosmos. Without purpose, no life could exist. The development of life is arguably the greatest, most significant event in the earth's history. Each living thing breaks the chain of total causal control of events by the laws of physics and chemistry. Those laws are relegated to roles that support life, not dominate and control it. Physical laws set constraints within which life must function. In a certain exaggerated sense, each living being can be seen as a world creator. Driven by the primary purpose of surviving, new, more complex purposes develop much as branches grow from the trunk of a tree. And just as branches jointly contribute to the health and survival of a tree, so the developing purposes with their local rules of rightness contribute to the overall welfare of a more complex living being. Polanyi speaks of living beings as having centers of individuality (*PK*, 349), but by that term he does not mean that living things have an executive center which controls all behavior and growth. No, the notion of centered being is Polanyi's way of describing how a living being's coordinated purposes and functions produce an effective autonomy not governed by or simply reducible to physical laws.

The implication of the foregoing claims is that rules of rightness are an inherent aspect of life existing from its very advent. Purposes have a normative dimension. Some things further a purpose; other things block or destroy a purpose. A contemporary version of Darwinism is called for here. The rules of rightness represent the accumulated lessons of surviving and thriving that are selected for. As Polanyi recognized, rules of rightness govern embryology and morphology. Some of the rules are encoded in DNA; some are embedded in repeatable chemical processes; some have evolved into customary practices. In humans, immanent rules of rightness apply to different bodily parts and processes: the heart, lungs, colon, for instance. But they also apply to indwelt functions learned by heart. Cooking a favorite dish, riding a bike, mowing the lawn—these are representative of learned activities that can function as second nature without needing sustained explicit attention but are still guided by rules of rightness. Purpose and rules of rightness function at both

tacit and explicit levels. As Polanyi points out in “Rules of Rightness,” both moral judgments and statements of fact take place within purposeful behavior and differ not in kind but only in degrees of personal involvement.

The rules of rightness apply within human experience to the use of language as a socially transmitted type of contrivance. Use of the right words and proper grammar is basic to the purposes of adequate expression and cogent communication. Language usage is propelled and guided by the active principle in a new guise: reasoning, which Polanyi helpfully contrasts with causality. The active principle of life operates purposefully in many aspects of human life: in the act of attending to some things rather than others (both in perception and thought), at the levels of intention, assessment, and justification, and in the deliberate actions we take.

Ah, how the little, informal sense of significance and curiosity has grown and evolved from its origins through the ages. Aided by skill in observing, organizing, and contriving, rules of rightness have prodded and guided the active principle of living entities through steps of purpose-driven emergence into many-splendored forms of existence. We humans are the fortunate benefactors of this emergence thanks to the constructive work achieved by the passionate active principle as constrained and guided by rules of rightness.

ENDNOTES

¹See *PK*, 348-354, for a discussion of taxonomy as an ability to identify shapes and types via informal judgments influenced by aesthetic considerations.

²I have stretched Polanyi’s description of the three forms of learning a bit to fit the scheme of emergence I am advocating. For instance, Polanyi calls trick learning a form of motoric learning used to fulfill a discovered useful means-ends relation. But such forms of contriving an action presuppose the embodied ability to act in order to achieve a purpose, which I emphasize but he does not explicitly discuss.

³In connecting sign learning with scientific understanding, Polanyi seems to make an unwarranted leap. Animals can learn much about the objects and forces in their environment by reading and interpreting signs. But the discovery of basic scientific laws and processes seems to require inquiry that goes well beyond observation. Surely Polanyi should not want to reduce the processes of scientific discovery, which make use of imagination and intuition, to the second-level status of a machine with operational principles. Similarly, to correlate the organizing ability of latent learning to deductive logic and mathematics as examples of reasoning seems shortsighted. Latent learning seems to be the basis for informal sensitivity and assessment, not rigid deduction.

⁴The following statement by Polanyi might seem to indicate he discredits the notion that the three forms of learning are interdependent in animal existence: “To speak is to *contrive* signs, to *observe* their fitness, and to *interpret* their alternative relations; though the animal possesses each of these three faculties, he cannot combine them [as can humans]” (*PK*, 82). I offer two points in response: (1) Does the human use of language represent an integration of the three forms that is structurally different from animal purposive behavior? Calls, mating dances, and aggressive behavior can be seen as contrivances to effect some purposeful result just as much as language can be used in this way. Language use is an emergent feature of unprecedented power, but I don’t see how its existence disqualifies the interdependence of the three forms of inarticulate learning. (2) Does a human speaker need to contrive signs in order to speak? Perhaps the forming of sentences can be seen as a contrivance, but a speaker uses words known through convention rather than through contrivance.