Polanyi's Proof

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A. In 1952 Michael Polanyi published a short paper on "The Hypothesis of Cybernetics,"[1] which he presented as *en suite* with six articles by several others on the same subject in the same journal during the preceding 18 months. This group of short papers, starting with one by Karl Popper, may be regarded as part of the first wave of response to Alan Turing's famous paper, "Computing Machinery and Intelligence," in 1950.[2] Polanyi read Turing's paper in draft and discussed it directly with Turing.[3] The polemic as to whether machines can think and the mind's likeness and unlikeness to a machine, has of course never ceased since then and, as Artificial Intelligence develops, is not likely to do so for many long decades. In addition to the traditional battle lines in philosophy over the mind and the brain there are other important lines of thought that disfavor logic as the final arbiter of the great philosophical questions—for example, feminist ontology and cultural theory. Polanyi started from within logic, but his line of thought was not built out of the old philosophical topics nor did he address the matter along either the materialist or the phenomenological developments of the twentieth century. He was concerned with the cybernetic view of the human mind and also with the way the followers of Wittgenstein regarded language and philosophy. These two, the cybernetic and linguistic, are seldom linked; but Polanyi saw a profound link between them and a serious error in the resulting concept of human understanding.

His position in this paper is that "the operations of a formalized deductive system might conceivably be considered equivalent to the operations of the mind....involves a logical fallacy."[4] The paper is a logical operation involving the disproof of a claim and, toward the end, the proof of the contrary claim, concluding that it is logically impossible to comprehend human understanding in

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[1]Michael Polanyi, "The Hypothesis of Cybernetics," in *The British Journal for the Philosophy of Science*, vol. 2, no. 8 (February, 1952), pp. 312-315. Because this dense article consists of just four pages, citations to page number don't seem specific enough. Instead, I have numbered the paragraphs 1 through 13, exclusive of the prefatory note.

[2]Prefatory note, p. 312.

[3]See the article on Alan Turing in the *Stanford Encyclopedia of Philosophy* (online)

[4]Par. 2

terms of formalized propositions. He neither dismisses autonomous reason nor deflates verity. He seeks instead a reason to do neither and yet keep human understanding free of a metastasized state of formal logic, because his further goal was to claim that, because of the nature of the universe and mankind's place in it, it is epistemically impossible for data understood in the terms of rationalist empirical science to account for cognition. He required the logical argument of this paper as the start for the metaphysical goal. The paper reveals, upon close study, that this logical, epistemic, and metaphysical argument against the cybernetic and linguistic identification of the mind with the brain needs an idealist ontology—the inevitability and value of which neither he, nor many of his colleagues then or now, recognize, amidst the desuetude of philosophical idealism.

Polanyi turned to philosophy after a full lifetime's career in inorganic chemistry in consequence of World War II. He left a thriving research laboratory in Berlin for Manchester in 1933. Among those he never saw again were his sister and many friends. He was naive to philosophy and therefore used first of all some of his scientific tools. Yet his task was to develop ideas, conceived before and during the World War, about the nature of knowledge that were at odds with much of contemporary philosophy of science and also at odds with the way in which the tools of rational and empirical thought were understood by the philosophers among whom he found himself. He was familiar enough with Gödel to understand the borderline nature of a reflexive critical project. But he does not seem to have been aware at this time of phenomenology and existentialism. He realized later that he had followed an independent track toward some of the same ends at which the successors of Kierkegaard and Husserl aimed. This short paper of 1952 was among his preparatory work for his first and most important philosophical treatise, his Gifford Lectures of 1951 and 1952, published in 1958 as *Personal Knowledge*.[5] The book launched him into a decade of distinguished lectureships and visiting appointments, during which one finds him mentioning Dilthey and Merleau-Ponty for the first times.[6]

He was unsteady as a philosopher. Even in this short article, he readily mixes metaphors and terms for similar things. Yet during his life-time he was

[5]Michael Polanyi, *Personal Knowledge*: *Toward a Post-Critical Philosophy* (Chicago: University of Chicago Press, 1958 and 1962).

[6]William Scott and Martin Moleski, *Michael Polanyi Scientist and Philosopher* (Oxford:" Oxford University Press, 2005), pp. 232-233 and 257.

accounted a great philosopher of science; he was an actual scientist, wrote intelligently about many sorts of things, and knew other great philosophers. If you look for papers on the philosophical work of Michael Polanyi (1891-1976), you will not find very much from the time of his death until the last few years. Slowly the literature, including a book and a biography,[7]

[7]Recently published papers related to Polanyi's philosophy of science include the following: Jordi Cat, "Switching Gestalts on Gestalt Psychology: On the Relation between Science and Philosophy," in *Perspectives on Science*, vol. 15, no. 2, (Summer 2007), pp. 131-177; Robin A. Hodgkin, "Michael Polanyi on the Activity of Knowing: The Bearing of His Ideas on the Theory of Multiple Intelligences," in *Oxford Review of Education*, vol. 18, no. 3 (1992), pp. 253-267; Phil Mullins, "Peirce's Abduction and Polanyi's Tacit Knowing," in *The Journal of Speculative Philosophy*, n. s. vol. 16, no. 3 (2002), pp. 198-224; John N. Prebble, " The Philosophical Origins of Mitchell's Chemiosmotic Concepts: The Personal Factor in Scientific Theory Formulation," in *Journal of the History of Biology*, vol. 34, no. 3 (Winter, 2001), pp. 433-460; Joseph Rouse, "What Are Cultural Studies of Scientific Knowledge?," in *Configurations*, vol. 1, no. 1 (Winter 1993), pp. 1-22.

has increased, enlarging the view of his influence, Prof. Leiter perceptively included his name among fifty philosophers of science in the second version of his recent poll of opinions as to their influence, having left him out of the first and shorter version. Few voted "for" Polanyi.[8] Perhaps in matters of recent history not being recognized for one's influence by contemporaries is much the same as not having influence among them.

Withdrawal and return of interest in a figure often indicates that those newly interested in the old thought are crossing active fault lines in philosophy. In the contemporary occasion of the paper Polanyi was concerned with the subductive activities of the linguistic turn and of "the cybernetic hypothesis," the formalization of knowledge as furthered by its digitization. His conjoined argument against them shows another fault line active then and now: the idea of personhood. Like many others critical thinkers concerned with the insights and the blindnesses on human life given us by the advances of scientific reason, Polanyi turned to examining personhood as part of but distinct from the empirical *episteme*. Polanyi was the first philosopher of science to take a systematic approach to the matter of personhood within the subject of scientific method, but he has yet to be linked with any of the forms of personalist ontology or ethics developed during the span of his life.[9] Personalism has become better known in the last few years, like Polanyi, and there is good reason to see how he applied a personalist principle in making a proof about proofs as a conjoined critique of his contemporaries.

B. Although the proof in Polanyi's paper is a logical demonstration, it is not strictly organized as such. The mixture is uncanny and confusing, like raindrops on a sunny day. A good way to put it is to say that it has two movements: an *andante* in paragraphs three to seven and an *allegro* in paragraphs eight to thirteen. The latter movement both repeats and expands the former.

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[8]In Prof. Leiter's *Leiter Reports: A Philosophy Blog* (http://leiterreports.typepad.com /blog/) a reader suggests on October 13, 2010 adding Polanyi to the first poll. The results of the second poll are published on October 18, 2010.

[9]An exception should be noted for the form of "Personalism" claimed by some neo-liberal economists. Polanyi, a friend of Hayek's, was indeed a *laissez-faire* economist, but the use of the name "Personalism" by certain groups of economists is a misuse of the word.

In the *andante* Polanyi first makes the plain case that formalized propositions omit unformalized elements. It is obvious that formalized statements exclude all propositions prior in reasoning to the start of the formal chain of reasoning. To the extent that any such statements are included they have already been formalized, but there necessarily always remain supplementary axioms. Just as plainly, the assertoric elements of propositions are excluded from formalization. Polanyi's first major step, taken in the first article of his argument,[10] is to claim a connection between the axiomatic and the assertoric. They are alike in that they both require our belief in our knowing something about these elements that he calls "proper use." "This proper use is a skill of which we declare ourselves possessed." We may readily say that as a general rule each speaker has a quantum of confidence in his or her basic skill or good faith when making formalized statements. In the next paragraph Polanyi, moving to includes formalized statements among the kind of things that require our belief in our skill at using them in order for us to make use of them, replaces his apodeictic "proper use" with the metaphor of satisfaction, apparently something that happens to theorems.[11]

Polanyi does not say whether we must in our assertoric confidence also hold a conviction that the non-formal statements have certain seemingly indispensable logical properties, such as non-contradiction, either because assertoric confidence is unlikely or because it is unthinkable in cases in which the propositions in question lack the conventional logical requirements for making sense.

But although his expression is havering and the thought not complete, the final term of the argument is a piece of this complicated truth, that even the most empirical, not to mention the most rational, operations occur in the indispensable company of discourses fundamentally governed by elements exogenous to logic. Polanyi says that the parts of understanding other than logic are essential to deciding matters of truth. Each and every stated conclusion of reason is certified by an "award of success" that cannot be eliminated from formalized activity though it is itself unformalizable.[12] This one element is the

[10]Par. 4.

[11]Par. 5.

[12]Par. 6.

activity by which confidence generates unasserted operations that in turn generate the symbols of which formal operations consist. In coming to our own conclusions and in evaluating the conclusions made by others, assertoric confidence in formal operations is logically separable from the autonomy of logic but indispensable to it. Unlike any other kind of influence on ourselves that we bring to bear on formalized thought, this one kind is an ineluctable, essential part and parcel of logical thought, fully operational within it but never formalizable by it. It is a heartbeat in an operator that he or she cannot ever catch and hold. Polanyi dubs this element "the 'semantic operations' of the formalized system."[13] It will eventually become "confidence" in *Personal Knowledge* and still later, "the fiduciary philosophy."

The second, or *allegro*, movement includes a formal defense of the truth of the uniqueness and important of this element. Here Polanyi gives us yet more new words for the necessity of semantic operations to formal operations: they are "supplementation"[14] required by the "temporary functions of the mind."[15] He lays out their connection spatially as well as temporally:

> A person can carry out computations with the aid of a machine (or formal system) or without it, but a computing machine cannot be said to operate except within a tripartite system:
>
> *I II III*
> *mind–> machine–>things to which the machine informally refers.*
>
> *Herein lies the difference between mind and machine.*
> *If in this system we replace 'machine' by a mind (mind (2)) we have,*
>
> *I' II' III'*
> *mind (1)–>mind (2)–>things to which mind (2) informally refers,*
>
> *where the unformalised functions III' are those of mind (1), while the experimentally observed mind (2) functions as a formalised instrument of mind (1).*[16]

[13]Par. 7

[14]Par. 9.

[15]Par. 11.

[16]Par.s 9-10.

One wonders if both semantic and formal operations are temporary, do the semantic require the formal just as the formal require the semantic? If the semantic supplements the formal, can it exist without it just as well as a human can live without ever consciously using deduction or logical operators? Or does anyone in fact do so? The dance requires two dancers.

Polanyi's answer is that the relation between semantic and formal is not itself a formal relation—it is not choreographed, it is not a dance. The human person using such instruments of thought as deduction and induction[17] does not require "logical completion," or "satisfaction," or "supplementation." This answer is epistemic, rather than logical; this necessarily implies an ontological view. But Polanyi has promised his readers a logical argument that finds a logical fallacy. The purpose of the article is to do so, but his way of putting the matter is in terms of philosophy of mind at some points and in ontological terms at others. This polyvalence expresses not only its author's struggle but the struggle with logic and mind faced by idealism, phenomenology, and even existentialism.

Nonetheless, Polanyi's article does use the claim of fact to show logical fault. If it is the case that our minds are "not fully determined by the instrument"[18] of logic that we use, then mental operations cannot be fully described by the formal operations of which they are a part. Formal operations cannot explain our "responsible judgment."[19] Any operation formally described depends on operations not formally describable. No matter how deep the formalization is extended or how many times it is repeated, these unformalizable operations stand both inside of and outside of formal operations, ever separated from them by infinite regress. Thus the cybernetic hypothesis mistakes the whole sphere of formal operations both for one of its parts and for another whole of which it is but a part. This is the fallacy of composition.

The critic of this conclusion may argue either that formalization is in fact the occurrent process in all human operations, which is an extravagant claim; or that we cannot understand any mental operation without formalizing it because

[17]Par.s 9 and 13.

[18]Par. 9

[19]Par. 11.

reality cannot be self-contradictory, which is to beg the question. The better thing the critic may say is that the true issue is whether universal formalization is possible in principle and that a narrative account of the human mental operations does not suffice to disprove the possibility of universal formalization, whether we desire it or advise it or not.[20] This third objection is a capacious repetition of the cybernetic hypothesis itself: it can include both the facts of the advance of digitization and the argument *ex principio*. However, whatever composition of the sphere subject to formalization one advances, the critic has omitted either a temporal cause or a logical condition, or both, in composing the whole object of formal operations, for he or she has assigned a symbol to things, conceived an abstraction, and therefore performed a semantic operation. Polanyi's ultimate logical defense of his charge of the fallacy of composition is the infinite regress from semantic operations in principle and in fact. This is a delicate point, because he must claim as a true fact for actual human mental processes that process which he claims limits formalizability because formal operation cannot in principle perform infinite regressions. But it is precisely in principle that they can do so. Artificial Intelligence will wait out the humanists; or perhaps they will not, because in order to do so they must not merely wait out their own patience but try to do without something without which they cannot do. That Polanyi can invoke the fallacy of composition freely, frequently, and forever, just as the cybernetic hypothesist always can invoke conceivability in principle shows that, since move is sempiternally matched by move, Polanyi is correct in this matter: formal operations can never settle the question of whether they themselves are expansive over all rational thought.

C. Is a standoff as good as a win or a draw as good as a loss? In games this depends on the rules, but in life it depends on what is at stake. To all stable moments come causes and consequences, obvious or unforeseen, that change the state of affairs. In life we do not really know the difference between lucky

[20]Robert Causey's "Polanyi on Structure and Reduction," in *Synthese* vol. 20, no. 2 ("Methodological Problems in Biology") (August, 1969), pp. 230-237, makes this argument against Polanyi's proof with regard to the reducibility of biological processes to evolution and genetics in the form of physical chemistry. "Suppose we have a fabulously detailed theory of evolution," Causey writes (p. 236), then we can show the empirical possibility of specific forms of life through feasible histories of their development even if we cannot reduce their existence to physical terms. The principle of exhaustive physical explanation entirely suffices for a theoretical understanding of reality. He says, in effect, that Polanyi argues claims exhaustive specification of the historical development of a thing does not fully account for the existence of the thing. I've enlarged Causey;s terms here to light up his ontology, to which Polanyi would be vulnerable had he not implied another ontology, as I explain below, in this essay. Furthermore, there is nothing in Polanyi's view of empirical cognition to limit its inquisitive reach or capacity for truth.

occurrence and fated occurrence, but in thought we know that there always must be, in the nature of things, some deeper determination. One can claim that Polanyi's proof is dispositive, but the proof disposes of this dispositivity of formal proof at this level. So there is yet another thread, and another set of terms, to tease out of the thousand or so words in his paper. Polanyi considers another side of the entire matter, the ontological part of it.

> The concept of the observed mind presupposes the observing mind but the reverse is not true....
> Only observing minds (minds (I)) can be supposed to communicate with each other. Inter-personal dealings like listening to or addressing a person exclude the observing of one person's mental operations by the other in the sense in which mind (I) experimentally observes mind (2).
> A machine is an interpretation of an observed mind ('mind (2)') and not of an observing mind ('mind (I)'). You can see the difference for example in the process of reaching an inductive inference. Mind (I) can reach an inductive inference and a machine can be used by it as an instrument in the process, but the inference represents its own conviction.[21]

At first glance the point made here is one from the philosophy of mind, but this again is due to an inexactitude in Polanyi's manner of expression. The point relevant to philosophy of mind is this: that the proper distinction between observing mind and observing mind is fatal to the cybernetic hypothesis. But the ontological point to which Polanyi's argument must point is this: having shown that not only can the cybernetic hypothesis not be made sense of without that distinction which is fatal to it, there is properly no such distinction. It is just one mind that assigns symbols and uses them, that invents calculatory instruments and calculates by them, that performs both semantic and logical operations, and that thinks abstractly and lives in a world provocative of feelings and drives. To maintain conceivable universal formalization requires an observing mind always semantically at work on material other than itself. When we posit such an entity calculating apart from the non-formalized world, we have already something that cannot be formalized and therefore contradicts the premise on which the account of conceivable universal formalizability is built. It might sound as if Polanyi defends unformalized operations against the necessity and sufficiency of

[21]Par.s 11, 12, and 13.

formalization by claiming they must be associated with an observer who never is the observed. But in fact his argument must be, or ought to be, that the moment the distinction is floated, as the cybernetic hypothesis must do, it sinks. *Eo instante* it whooshes down into itself.

For the purpose of establishing formal operations in the manner the cybernetic hypothesis aims at, it is necessary to hold that human consciousness is divided between the observing mind and the observed mind. But this division is confounded by the basic puzzle of epistemology since the *Meno*: how can the strictly formal operation get around to things without going through an unformalizable process of understanding them? Therefore human consciousness and the world cannot be divided as between observer and observed. This concept of the undivided consciousness points towards an ontological claim.

D. It might indicate a standard Cartesian substance dualism, for Descartes was concerned to distinguish performative consciousness from other mental activities as both the basis for these other activities and as a volition free of the necessities of the physical world. Indeed Polanyi never thought that any of this affected our ability to know the objective truth about the external world, and about other things as well. He was a rationalist scientist through and through.[22]

It might also indicate something like what we now call social constructivism if we emphasize the "tacit" side of his epistemology, that "semantic operations" are to be taken in larger terms, as Polanyi later did, as "knowing how" to gain knowledge, so that the individual mind causally contributes to the construction of gathered knowledge from its peculiar construction, which in turn is affected by the tacit knowledge of those from whom he or she has learned as well as installing itself in those whom he or she teaches. There is some truth in this as a reading of Polanyi, especially in regard to ethical philosophy, but he certainly never abandoned a belief that the individual human being has a basal and private personhood not reducible to social constructs any more than to biochemical constructs. The living human being "can exist only if sustained by an intelligent personal effort of an integrating mind."[23]

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[22]He believed in an external univocally true reality (Polanyi, *Personal Knowledge*, p. 316).

[23]As quoted by Scott and Moleski, *Op. cit.*, p. 221.

The third possibility is some version of an idealist ontology. In *Personal Knowledge* he states that

> ...the meaning of a formalism lies in our subsidiary awareness of it within a conceptual focus sustained in terms of this formalism....[24]

Our tacit knowledge is necessary to formal knowledge. Formal knowledge is subsidiary to another kind of knowledge, to "meaning." It is sustained by meaning in one sense, but also it sustains meaning in another sense, a sense something like that of being a useful mechanical tool for more subtle understanding. This is Cartesian, but the concept also emphasizes the unity in consciousness to which other knowledge is subsidiary. If the relationship of being subsidiary is defined with sufficient strength, all knowledge becomes an attribute or quality of meaning and the object of all other knowledge become nothing other than the truths mentally known by the dominant aspect of the mind. Formal knowledge is a way of extending the control of tacit knowledge rather than a contrary and altering force.[25] This is the line of thought that led Polanyi in his later writing to talk about the "indwelling" of man in the world and to adopt some existentialist language.[26] Polanyi's proof might have proven too much: that idealism is a necessary result of the centrality of tacit knowledge. In 1958, in *Personal Knowledge*, he retains the 1952 proof without dwelling on it, softening the corners of bits of it to make them fit where they are useful to him.[27] If formalized cognitive operation is inadequate, one must go further than to gloss its insufficiency. If the method of reason does not exhaust the mind, it can hardly be employed to prove the limits of the mind's grip on reality or to circumscribe its place in the apparent or inapparent universe.

Creating an armament against the digitization model of the human mind, and all that might be implied by it, is not the only reason to open up the possibility of such metaphysics. Polanyi is indicating that formal operations cannot cancel that to which they are subsidiary. There is a great deal of real life,

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[24]*Ibid.*, p. 221.

[25]*Ibid.*, p. 103.

[26]Scott and Moleski, *Op. cit.*, pp. 248 *et pass*.

[27]Polanyi, *Ibid.*, pp. 159 and 261-262.

such as morality, that by some logical discourse, call it ontology or call it analogy, which philosophers must discuss. Though it is we humans who do the explaining of the external world, we are not wholly comprised of the outward expressions of this explaining. If it is true that there is no reason without language, it is not equally true where there is no language there can be no reason. We can more hastily exhaust reason than we can exhaust language, and we must never be as certain that we do not have the words for what we are thinking of as that we do not have its form. For we have the will to inquire and the volition to communicate our thoughts. Will is plastered onto everything we do—the whole world of will onto the entirety of what we understand and what we do not understand. The most precisely choreographed (and videographed) dance shifts in the body of each who dances it; each invents dance from the personality at hand; this is a failing art, reborn through each failure. Voice too comes from deep inside the singer and the speaker, its mysterious force rising out of the cavity we are shy to say is merely hollow. The work of a person doing formal mental operations is little different. Within the work is the person willing it. Neither the form of symbols nor the form of facts is without it nor can any forms exhaust it. This was what Polanyi meant by tacit knowledge, and this notion in turn means a great deal more than cheerful help when we will symbols into movement.

This is a nice thought. But we challenge it every time we check a mobile phone while sitting among the passengers on a train or walking in the street. For that moment we might not believe this nice thought. From enough of these moments we forget this nice though as a practical matter. But we still know it and must act from principles we have forgotten, unwillingly stranded on top of will.