Polanyi's Enduring Gift to "Theology and Science"

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ABSTRACT Key Words: Michael Polanyi, personal knowledge, theology and science, Ian Barbour, Thomas Torrance, John Polkinghorne, Authur Peacocke, John Haught.
This essay is a brief assessment of the lasting impact of Michael Polanyi's thought on the growing interdisciplinary field of "theology and science." I note representative examples in the writing of Ian Barbour, Thomas Torrance, John Polkinghorne, Arthur Peacocke and John Haught, showing how Polanyi's "personal knowledge," as well as some other Polanyian themes, have been recognized and accepted.

Introduction

I am grateful for the invitation to respond to my mentor and lifelong friend, Durwood Foster, on his superb analysis of the relation between the thought of Michael Polanyi and Paul Tillich at this remarkable joint session of the Polanyi and Tillich Societies. Durwood's erudite and detailed paper focuses to a great extent on the ways their relation is contextualized in the "Berkeley Dialogue" of 1963 and in light of Tillich's 1955 paper, "Participation and Knowledge." However, as I told Durwood in a recent conversation, I need to make what for me is a highly unusual move when invited to respond to another scholar's paper and simply state up front that I can add little to what Durwood has so carefully and astutely written in "Michael and Paulus: A Dynamic Uncoordinated Duo." I hope you will take this as an expression of my esteem for his paper from which I have learned greatly. It seems all the more appropriate in light of the fact that many of the world's leading experts on Polanyi, on Tillich, and on their relation are gathered here today, and I welcome the opportunity to learn from them!

What I will do instead is respond to a second dimension of the invitation given me: namely to offer a brief, initial assessment of the lasting impact of Polanyi's thought on the burgeoning interdisciplinary field of "theology and science."

Themes In Polanyi's Writings That Have Had A Lasting Influence In "Theology And Science"

There are several themes in Polanyi's writings which have had a lasting influence in the "theology and science" literature. I'll first present the theme (actually a complex of themes) which in my awareness has had the most lasting influence: his concept of "personal knowledge." After offering a brief definition drawn from *Personal Knowledge* (*PK*)[1] and touching on four of its most salient subthemes, I'll point to the some of the ways it has had such an effect through the writings of three of the key players in theology and science: Ian G. Barbour, Thomas F. Torrance, and John Polkinghorne. Finally, I'll list several other, related, themes which seem to me to have had less of an effect on theology and science.

A. Personal Knowledge: The theme with the most lasting effect in theology and science

Definition: Of the many places where Polanyi discusses "personal knowledge" the key definition may well be taken from the Preface to Torchbook edition of *PK*:

> Comprehension is neither an arbitrary act nor a passive experience, but a responsible act claiming universal validity. Such knowing is indeed *objective* in the sense of establishing contact with a hidden reality; a contact that is defined as the condition for anticipating an indeterminate range of yet unknown (and perhaps yet inconceivable) true implications. It seems reasonable to describe this fusion of the personal and the objective as Personal Knowledge. Personal knowledge is an intellectual commitment, and as such inherently hazardous. Only affirmations that could be false can be said to convey objective knowledge of this kind...I have shown that into every act of knowing there enters a passionate contribution of the person knowing what is being known, and that this coefficient is no mere imperfection but a vital component of his knowledge (*PK,* pp. xiii-xiv).

Subthemes:

According to Polanyi, personal knowledge involves at least four subthemes:

1. A scientist's knack at *choosing the right hypothesis* to test: it is partly learned from the scientific community and partly an inborn talent of the scientist: "It is of the essence of the scientific method to select for verification hypotheses having a *high* chance of being true. To select good questions for investigation is the mark of scientific talent..." (*PK,* p. 30).

2. The *fiduciary character* of personal knowledge, the role of commitment in personal knowledge, and Polanyi's indebtedness to Augustine.[2] The scientist has "faith" that, — prior to its testing — the chosen hypothesis is right and will prove fruitful, a faith which issues in the scientist's commitment to that hypothesis and which entails a sustained investigating of the hypothesis even if the scientist's reputation is questioned.

> (W)e must now go back to St. Augustine to restore the balance of our cognitive powers. St. Augustine ... taught that all knowledge was a gift of grace, for which we must strive under the guidance of antecedent belief: *nisi credideritis, non intelligitis.* His doctrine ruled the minds of Christian scholars for a thousand years" (*PK*, p. 266).

Of course, such faith must be tested by the evidence, but even here the presuppositions of this faith define the limits and scope of what counts as relevant evidence. "Our fundamental beliefs are continuously reconsidered in the course of such a process, but only within the scope of their own basic premisses"(*PK,* p.267).[3] It also involves a fundamental circularity: "Any enquiry into our ultimate beliefs can be consistent only if it presupposes its own conclusions. It must be intentionally circular" (*PK*, p. 299).

3. The presence of *tacit knowledge* or subsidiary awareness along with explicit knowledge or focal awareness: tacit knowledge provides a background or context in which the focal knowledge is held and interpreted. This insight led Polanyi to his famous aphorism: "we can know more than we can tell" (*TD,* p. 4). Tacit knowledge is often passed on implicitly by apprenticeship (*PK*, p. 53).

4. The structure of commitment entails *universal intent*:

> The enquiring scientist's intimations of a hidden reality are personal. They are his own beliefs,

which — owing to his originality — as yet he alone holds. Yet they are not a subjective state of mind, but convictions held with universal intent, and heavy with arduous projects (*PK*, p. 311).

You can only believe something that might be false... Every act of factual knowing has the structure of a commitment (*PK*, p. 313).

By his own command, which bound him to the quest of reality, he will claim that his results are universally valid. Such is the universal intent of a scientific discovery. I speak not of an *established* universality, but of a universal *intent*, for the scientist cannot know whether his claims will be accepted. They may prove false or, though true, may fail to carry conviction."(*TD*, p. 78)

The Effect of "Personal Knowledge" in Theology and Science: Representatives Examples

1. Ian G. Barbour[4]

a. Methodological "parallels of theology and science," i.e., similarities in methods even with independent content. In comparing scientific and theological methodologies, Barbour stresses that his is not an attempt to derive implications from science for theology but a recognition of rational and empirical attitudes that are shared by scientists and theologians. For example, he draws on the work of Oxford physicist, C. A. Coulson, who speaks about how scientists experience wonder about, reverence towards, and beauty in nature. He points out that science involves presuppositions and moral commitments similar to those in religion; e.g., that the world is lawful and intelligible, that science requires humility and cooperation. In stressing that science involves human factors including the scientist's personal judgment and involvement in the scientific community he cites both Polanyi (*PK*) and Harold Schilling, *Science and Religion* (*ISR*, p. 128n).

b. The essential role of community in science. Here Barbour claims that the progress of science depends essentially on science as community: "a social enterprise (and) a cooperative venture"(*ISR*, p. 152). The scientific community carries with it a set of attitudes which, according to Schilling, include ideals, a characteristic way of life, standards, mores, conventions, signs and symbols, ethics, the authority of the community's consensus, etc. He then quotes Polanyi as writing: "Its members recognize the same set of persons as their masters and derive from this allegiance a common tradition, of which each carries on a particular strand" (*PK*, p. 163, in *ISR* p. 152).

c. Scientific objectivity as intersubjective testability that includes personal involvement. Drawing again on Polanyi, Barbour argues that the evaluation of competing theories is more than a formal process; it involves a personal judgement by the scientist. The scientist is similar to a judge weighing evidence or a doctor making a diagnosis. "Objectivity is not the absence of personal judgment but, as Polanyi puts it, the presence of *universal intent* (*PK*, p. 64f). It is commitment to universality and rationality, not an attempt at impersonal detachment, which prevents such decisions from being purely subjective" (*ISR*, p. 151). Universality, in turn, includes the "conviction that the same structure of nature is open to investigation by other scientists" who constitute the international community of scientists. It involves a transcendence of one's personal preferences and of evidence that challenges one's presuppositions. Finally, universality does not exclude but actually requires personal

involvement shaped by what Polanyi calls "universal intent." Thus science does not require "disinterestedness," a detached attitude without personal involvement; instead scientists may be passionate about their work. Moving into the humanities and especially religion, we still find "the personal involvement of the knower" but here it influences the process of inquiry more so than in science. Thus science and religion lie on a "spectrum with varying forms of personal involvement" rather than an absolute dichotomy between scientific=objective vs. religious=subjective knowledge (*ISR*, pp. 181-185).

2. Thomas F. Torrance[5]

a. God's self-disclosure in the Word of God, the *Logos*, is parallel to our scientific knowledge of nature. This is so because, while the facts of nature are known through our rational experience, these facts do not derive their rationality from our experience, for that would be the end of science. Instead, science presupposes that the rationality of nature "transcends our experience of it" and we therefore let it "subject our formulations and apprehensions to its criticisms and guidance." Torrance cites Polanyi who writes that "this reality beyond sense-experience" gives to science its sense of objectivity. Its reality is warranted by the fact that its scientific implications extend beyond their originating event/experience (*PK* p. 37). Torrance then argues for the formal equivalence of scientific and theological knowledge. "Theological thinking is more like a listening than any other knowledge, a listening for and to a rational Word from beyond anything that we can tell to ourselves and distinct from our rational elaborations of it" (*TS*, p. 29-30).

b. Scientific knowledge is not purely objective, but rather it includes a "personal factor (which) inevitably enters into scientific knowledge ... It is therefore unscientific to pretend that the subjective element is eliminated when it cannot be... In natural science ... the very nature of our inquiry, by which we create certain conditions within which we force nature to disclose itself to us according to our will, affects the content of our knowledge, and gives it an unavoidable ambiguity" (*TS*, pp.93-94, cites *PK*).

c. The role of the scientific community in personal knowledge: "Our thinking presupposes the structure of our active personal inter-relations and takes place within them. Even the activity of natural science is inextricably involved in the structure of science, and would be impossible without a community of empirical subjects in which mutual questioning and criticism and communication provide the necessary condition for verification and progress in knowledge" (*TS*, p. 163, cites *PK*).

d. Theological knowledge can only be verified not by us but by "(God) who alone is capable of justifying them... our knowledge of God must come to us from without from God Himself... (Similarly) in natural science verification requires in the last resort a personal judgement in assessment of the evidence" (*TS*, p. 197, second sentence in footnote #1 where Torrance cites *PK*, pp. 17, 59, 63, 202, 264, 299).

e. Our experience points beyond itself to a universal rationality in nature: "What sustains and fortifies us at this point is the discovery of a rationality in the nature of things that goes far beyond our understanding and that transcends the clues on which we have relied in attaining vision of it" (*TS*, p. 237, cites *PK*, p. 66ff).

f. The terms of theological language must be reformulated and shaped by the nature of their object for then "as we use them they extend our apprehension of the object." He cites what Polanyi called the "indeterminate anticipatory powers of an apposite vocabulary" which arises from its contact with reality (*TS*, pp. 266-267, *PK*, 116).

g. We only know God through God's free self-giving in Grace. Thus the kind of inquiry appropriate to theology is essentially different from that of science. Experimental investigations are inappropriate for theology for we would be investigating an idol, not the Lord God. He cites Polanyi as saying that "It is illogical to attempt the proof of the supernatural by natural tests, for these can only establish the natural aspects of an event and can never represent it as supernatural" (*TS*, pp. 299-300, citing *PK*, p.284).

3. John Polkinghorne[6]

a. In some places , Polkinghorne clearly draws on Polanyi without specifically citing him (although he frequently cites Torrance). Polkinghorne claims that there are "two circularities ... involved in the search for knowledge. One is the hermeneutic circle: we have to believe in order to understand and we have to understand in order to believe...The second circle is the epistemic circle: how we know is controlled by the nature of the object and the nature of the object is revealed through out knowledge of it" (*FP*, p. 32).

b. Elsewhere, he cites both Torrance and Polanyi. For example, Polkinghorne writes that in science "it is possible for understanding to be attained without the possession of a detailed explanation....The ability of understanding to outrun explanation is intimately connected with the religious concept of faith"(*FP*, p. 38). He then draws on Torrance who compares discursive argumentation with intuitive, ontological knowledge where "something utterly new becomes disclosed and our minds cannot but yield conceptual assent to its self-evident reality... Genuine faith in God, for example, was held to involve a conceptual assent of this kind..." (*TS*, p. 74). Thus such a response of faith is "the exercise of those tacit skills which Michael Polanyi rightly diagnosed as indispensable to the scientific enterprise and which give it kinship with all other forms of human rational inquiry" (*FP*, pp. 37-38). And in discussing the open future of the world of becoming and for new horizons of discovery (specifically about "emergent-downward" holistic chaos theory yet to be discovered), and about the difference between executing algorithms and human thinking, Polkinghorne cites Polanyi's aphorism: "We can know more than we can tell." (*FP*, p. 26, note 35, citing *TD*, p. 4).

c. Finally, Polkinghorne offers a succinct and appreciative summary of Polanyi: "Belief that science and theology are intellectual cousins under the skin encourages theological interest in the philosophy of science. It will be apparent that I am considerably influenced by the writings of Michael Polanyi... The emphasis on the exercise of tacit skills of judgement, within a convivial community but employed with universal intent, is both consonant with what goes on in science .. and it has obvious affinities with the procedures of other disciplines — like theology, where it is even harder to tell what we know and why we know it"(*FP*, p. 47).

Additional Themes in Polanyi That Have Had an Influence in "Theology and Science"

1. Conception of a generalized field

Polanyi offers a "generalization of the field concept in a strictly biological sense." "Morphogenesis, operating under the direction of a morphogenetic field, is a somatic process of the same kind [as comprehension], but following *morphological rightness* as its standard of achievement" (*PK*, p. 398). The morphogenetic process is one of "inexhaustible resourcefulness." The success of morphogenesis is defined in terms of the agency of "the morphogenetic field (or its organizer, if there is one)" (*PK*, p. 398).

2. Boundary conditions as irreducible to the laws of nature.

Polanyi argues that the laws of physics, for example, do not determine the boundary conditions which make a particular physical object function the way it does, i.e., as a tool. Hence against reductionism, there are emergent levels in nature in which the boundary conditions arise that supervene on the lower levels (*PK,* p. 401ff).

The effect of these additional themes in theology and science: representative examples.

1. Arthur Peacocke.

Regarding anti-reductionism in Peacocke's early thought (1971)[7]: "For Polanyi's analysis even of what we mean by a machine shows the involvement in mechanisms of new principles of ordering matter, of boundary conditions, which could not have been predicted from a knowledge of the laws governing the constituent parts. So 'mechanism' as a view of biological evolution has to reckon with this logical feature of the relation of higher organisms to less complex (ones)" *(SCE,* p. 131). But where do these 'boundary conditions' come from? Does natural selection answer this question, or "is it necessary to postulate, as Polanyi himself does, the existence of a 'phylogenetic field' that governs the process of evolution and in which the organisms are guided by the potentialities which are open to them, drawn on by an active centre from which such striving is directed?" (*SCE,* p. 131, ref. *PK*, pp. 398-400, 405). Peacocke's response is not to link this field with God's immanent activity in nature as the continuous creator but rather to claim that nature displays a "continuous creative development governed by its own inherent laws" (*SCE*, p.132).

Note: Seven years later, with Peacocke's Bampton lectures, all mention of "morphogenesis," "phylogenetic field," and even Polanyi, are gone. Instead Peacocke turns to the "order out of chaos" scenario as discovered by Nobel laureate Ilya Prigogine in relation to dissipative systems such as found in non-linear, irreversible thermodynamic processes far from equilibrium. Polanyi's name doesn't show up in the index to his Gifford Lectures (1993).[8] Interestingly, though, throughout his writings Peacocke makes extensive use of the idea that boundary conditions affect the particular characteristics of a dynamic system even while they cannot be reduced to the basic laws of nature (what he calls "whole-part constraints") in arguing against epistemic reductionism in favor of emergence and in discussing non-interventionist models of divine action. It is not altogether clear to me how much he drew this from Polanyi and how much he took it from what is really a standard point in mathematical physics with which we are all familiar — i.e., the need to specify boundary conditions and initial conditions when solving the equations for particular physical systems such as the wave motion of sound in a rectangular room or the vibrations of a drumhead.[9]

2. John Haught

In his earlier writings, John Haught makes interesting use of some of Polanyi's ideas, including personal knowledge with its fiduciary character[10] and tacit dimension,[11] and the argument against reductionism via the appeal to what are in effect boundary conditions, namely life and mind as they "indwell" chemical processes and while relying on them they cannot be understood in their terms.[12] Polanyi continues to influence Haught's work in more recent writings, especially in comparison with the thought of Teilhard, Hans Jonas and Whitehead.[13]

Conclusions

It would be quite interesting to undertake an extensive exploration of the theology and science literature to determine just how widespread and lasting is the influence of Polanyi's writings. Perhaps 2008 would be a fitting year for such a project in celebration of the fiftieth year anniversary of the publication of *Personal Knowledge*.[14]

Endnotes

[1]Obviously a more extended paper than this very brief one would include Polanyi's discussion of personal knowledge in his other writings.

[2]Reminiscent, of course, of *fides quaerens intellectum.*

[3]As Norwood Hanson famously remarked, "all data are theory-laden."

[4]These citations are from Ian G. Barbour, *Issues in Science and Religion* (New York: Harper & Row, 1971 [originally published in 1966 by Prentice-Hall]) (*ISR*). Other citations of Polanyi in *ISR* not used here include p. 148n, p. 156, p. 265. Polanyi figures prominently in Barbour's Gifford Lectures, *Religion in an Age of Science*, (San Francisco: Harper & Row, 1990).

[5]References are to Thomas F. Torrance, *Theological Science* (London: Oxford University Press, 1969) cited as *TS.*

[6] John C. Polkinghorne, *The Faith of a Physicist: Reflections of a Bottom-up Thinker* (New Jersey: Princeton University Press, 1994) cited as *FP*.

[7] Arthur Peacocke, *Science and the Christian Experiment*, (OUP, 1971).

[8]Arthur Peacocke, *Theology for a Scientific Age: Being and Becoming —- Natural, Divine and Human*, Enlarged Edition (Minneapolis: Fortress Press, 1993).

[9] Peacocke, *Theology for a Scientific Age*, Ch. 3. See also: "Peacocke considers how to conceive of God's relation to the world in the light of modifications in the scientific concepts of predictability and causality which the phenomena of deterministic chaos and dissipative systems on the one hand, and of 'whole-part constraints' on the other hand, have induced.... Peacocke argues that the notion of 'whole-part constraints' in interconnected and interdependent systems does provide a new conceptual resource for modeling how God might be conceived of as interacting with and influencing events in the world. This is particularly true in conjunction with a prime exemplification of the whole-part constraint in the unitive relation of the 'human brain in the human body' - in fact, this model of personal agency is the biblical and traditional model for God's action in the world. He evokes the notion of a flow of information as illuminating this 'whole-part' interaction of God with the world, which could then be conceived of as a communication by God to that part of the world (namely, humanity) capable of discovering God's meanings." (Excerpted from my summary of Peacocke's "God's Interaction with the World" Robert John Russell, Nancey C. Murphy, and Arthur R. Peacocke, eds., *Chaos and Complexity: Scientific Perspectives on Divine Action*, Scientific Perspectives on Divine Action Series [Vatican City State: Vatican Observatory Publications: Berkeley, California: Center for Theology and the Natural Sciences, 1995]).

[10] John F. Haught, *Science & Religion: From Conflict to Conversion* (New York: Paulist Press, 1995), 23.

[11] Haught, *Science & Religion*, 88.

[12] Haught, *Science & Religion*, 91.

[13] John F. Haught, *God After Darwin: A Theology of Evolution* (Boulder, Colorado: Westview Press, 2000), Ch. 10.

[14]This would certainly include works by Philip Clayton and Joseph Bracken, whom I know use Polanyi

(private communications from Clayton). See also recent *TAD* articles by Clayton ("Emergence, Supervenience, and Personal Knowledge".29:3 (2002-03): 8-19)and Bracken ("Emergent Monism and Final Causality: A Field-Oriented Approach"31:2 (2004-05): 18-26).

WWW Polanyi Resources

The Polanyi Society has a World Wide Web site at http://www.missouriwestern.edu/orgs/polanyi . In addition to information about Polanyi Society membership and meetings, the site contains the following: (1) digital archives containing all issues of *Tradition and Discovery* since 1991; (2) a comprehensive listing of *Tradition and Discovery* authors, reviews and reviewers; (3) the history of Polanyi Society publications, and information on locating early publications not in the archive; (4) information on *Appraisal* and *Polanyiana*, two sister journals with special interest in Polanyi's thought; (5) the "Guide to the Papers of Michael Polanyi," which provides an orientation to archival material housed in the Department of Special Collections of the University of Chicago Library; (6) photographs of Polanyi; (7) links to a number of essays by Polanyi as well as audio files for the McEnerney Lectures (1962) and Polanyi's conversation with Carl Rogers (1966).