

Tradition & Discovery

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Preface

The Polanyi biography was published a little more than a year ago. At the last annual meeting, there was a robust discussion of this book. For this issue, several people who knew Polanyi and/or who early recognized the importance of his work have been invited to respond to the biography. The essays by Lee Congdon, Paul Craig Roberts, Ruel Tyson and Richard Gelwick should be regarded as comments on *Michael Polanyi: Scientist and Philosopher* rather than full-scale reviews. But this is a particularly interesting set of commentators and I think you will find a particularly interesting set of comments. Marty Moleski kindly agreed to respond to these commentators. Also you will find in this issue an essay by Zhenhua Yu, as well as three reviews. Additionally, there is information about the new Polanyi Society Travel Fund and the procedure for applying for a grant. The program for the annual meeting is included and there are bibliographic notes and other interesting matters in News and Notes.

Please remember that the Polanyi Society now publishes a web edition of each issue of the journal that is identical to the printed copy. All issues back to 1991 are archived. You can access this without a password at the Polanyi Society web site (<http://www.missouriwestern.edu/orgs/polanyi/>). One of the objectives of web publishing is to avoid the expense and increasing difficulty in dealing with the U.S. Post Office. These days almost all professional societies either turn journal publishing over to a major publisher (and the journal becomes very expensive) or shift to web publishing. But web publishing does offer new opportunities. As long as enough Polanyi Society members continue to pay our minimal annual dues so that we can meet the Society's minimal expenses (and we are doing that), we can expand our electronic mailing list. If you know someone who might like to try the journal, please send me an e-mail address and I will add them to the growing list of folk who are notified when a new issue of *TAD* is available on the web site.

Phil Mullins

Tradition and Discovery is indexed selectively in *The Philosopher's Index* and *Religious and Theological Abstracts* and is included in the EBSCO online database of academic and research journals.

NEWS AND NOTES

Carlo Vinti has recently been notified he will receive support from the Templeton Foundation to translate *Science, Faith and Society* into Italian.

Mark Mitchell's new introduction to Polanyi's thought, titled *Michael Polanyi: The Art of Knowing*, is due out in August. The book is a component of the Library of Modern Thinkers for ISI Books (<http://www.isi.org/books/titles.aspx?SBY=Forthcoming>). Mitchell's essay "Personal Participation: Michael Polanyi, Eric Voegelin, and the Indispensability of Faith" appeared in *Journal of Religious Ethics*, 33:1: 65-89.

Aaron Milavec's "How Acts of Discovery Transform Our Tacit Knowing Powers in Both Scientific and Religious Inquiry" appears in *Zygon*, 41:2: 465-486.

Some of the material in the William T. Scott Papers at the Library of the University of Nevada, Reno is now being processed. Eventually, a great body of materials, including many things that Bill Scott gathered for the Polanyi biography (including an early draft of the biography), is to be available in Reno. You can see what is apparently the library's plan for the material at <http://www.library.unr.edu/specoll/mss/99-26.html>.

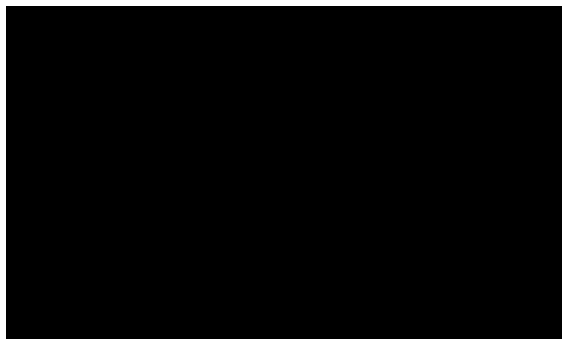
Personal Knowledge is now available as an e-book for \$27.17 in a Microsoft Reader format. See <http://www.ebookmall.com/ebook/82216-ebook.htm>.

As in most recent summers, the Society web site will be updated and somewhat restructured in the summer of 2006. Among other things, at least one additional Polanyi essay will be added to the site which already has links to 14 Polanyi articles.

The 2007 SPCPS Annual Conference is set for March 30 and 31, at Nightingale Hall, Nottingham. Proposals for papers are invited. For additional information, contact Richard Allen (rt.allen@ntlworld.com).

Struan Jacobs and Phil Mullins recently published papers written for a 1944 meeting of the Moot by T.S. Eliot, Karl Mannheim and Michael Polanyi along with a lengthy introduction ("T.S. Eliot's Idea of the Clerisy, and its Discussion by Karl Mannheim and Michael Polanyi in the Context of J. H. Oldham's Moot") in *Journal of Classical Sociology*, Vol. 6 (2): 147-176.

Struan Jacobs' essay "Two Sources of Michael Polanyi's Prototypal Notion of Incommensurability" appeared in *History of the Human Sciences*, Vol. 16 (2) (2003): 57-76.



Support Welcomed For Polanyi Society Travel Fund

The assumptions and paradigms that Michael Polanyi brilliantly challenged in the middle of the twentieth century still, sadly, dominate much of academic thinking to this day. Nearly half a century after the publication of his major epistemological and social works, it is not at all unusual to receive blank stares from philosophers, social scientists, and physical scientists—even in major colleges and universities—at the mention of Polanyi’s name.

For several decades the Polanyi Society has devoted its efforts, through its journal and its annual meetings, and – more recently – through its internet discussions and website, to the dissemination and further development of Polanyi’s seminal ideas. Many of those who have taken a lead in these efforts find themselves in the ranks of graying emeriti and are acutely aware of the urgency of reaching out to more young people – undergraduates, graduates, and post-graduates – to assure the perpetuation of Polanyi’s rich legacy.

To promote this effort, the Society has established a modest Travel Fund to assist those young people who have an interest in attending its annual meetings but whose financial conditions make this difficult. Recently, as we have attempted to spread the word regarding the availability of this fund, an unprecedented number of prospective beneficiaries of this assistance have been brought to our attention.

This is a most encouraging development in terms of the Society’s central objective of furthering Polanyi’s influence within academia and the larger society. However, it appears that we may end up this year with considerably more eligible candidates than available funds. We can think of few projects more worthy and in-line with our common purpose than the expansion of the resources of this fund.

Any contributions, however modest, that Polanyi Society members would care to make to this fund will be welcomed. They are fully tax-deductible. Checks for this purpose should be made out to the “Polanyi Society Travel Fund” and sent to Walter Mead, the coordinator of this fund, at the address below, for deposit in the Society’s fund account. If you wish to consolidate a contribution to the Travel Fund with a check for annual dues or a general contribution to the Society, be sure that you clearly identify your intentions. Questions can be addressed to Walter Mead by regular mail (4 Kenyon Court, Bloomington, IL 61701) or e-mail (wbmead@ilstu.edu).

Procedure For Applying For A Polanyi Society Travel Grant

The purpose of the Polanyi Society Travel Fund is to assist those with a strong interest in Michael Polanyi—especially undergraduate, graduate, and post-graduate students—who have an interest in attending the Society's annual meeting in November but whose financial conditions make this difficult.

Although the Society is interested in providing funding sufficient to make attendance at its annual meeting possible for eligible candidates, because of the modest amount of funds available, the Society must be selective in awarding a limited number of travel grants. The decision to award a grant and the amount of that grant will depend upon an evaluation of the following information to be provided by the applicant:

- (1) the applicant's institutional affiliation, mailing address, e-mail address, and phone number (in each case, alternate summer addresses and phone numbers should also be supplied);
- (2) the estimated cost for traveling to and from the Polanyi meeting by the most cost-efficient means (perhaps a shared automobile, where distances are short);
- (3) the most affordable housing for one night's lodging between the two days of Society meetings;
- (4) the degree to which the applicant and/or the applicant's institution can contribute to these costs; and
- (5) a brief statement (300-500 words) indicating (a) the applicant's program of studies and/or research, (b) any background of reading or courses relating to Michael Polanyi's ideas, (c) the particular interest the applicant has in attending the program of meetings, and (d) the applicant's present or future career plans.

In addition, the applicant should request someone acquainted with his or her interests and qualifications to provide *directly* to the Fund Coordinator, by e-mail, a brief letter of reference. The writer should indicate that his or her assessment of the applicant has not been shared with the applicant. All materials will be held confidentially by the Polanyi Society Board of Directors.

Applicants are encouraged to submit their requests as early as possible in order to be able to secure the most economical travel and overnight accommodations and to assure the availability of funds. Deadlines for application for the following November annual meeting are: March 1 (results to be announced by April 1) and, given the further availability of funds, August 1 (results to be announced by September 1) and, again, given the availability of funds, October 1 (results to be announced by October 15).

The Board of Directors of the Polanyi Society will collectively decide on the awarding of grants. Some applicants for either the March 1st or the August 1st deadlines may be designated as "stand-bys" for consideration in the following round of evaluations.

The above information, including letter of reference, should be received by e-mail no later than the intended application deadline. All materials (and any questions) should be e-mailed to (Fund Coordinator) Walter B. Mead (wbmead@ilstu.edu).

2006 Polanyi Society Annual Meeting Program

The program for the 2006 annual meeting of the Polanyi Society is printed below; this year's sessions will be in Washington D.C. on November 17 and 18, 2006. As in recent years, a final rendition of the program (listing hotel meeting rooms, etc.) will be posted on the Polanyi Society web page (<http://www.missouriwestern.edu/orgs/polanyi/>) in the late summer or early fall (as soon as they become available) and included in the next TAD issue, TAD 33:2. The papers listed below should be available for downloading in late October.

The Polanyi Society annual meeting will again this year will be an "Additional Meeting" held in conjunction with the annual meetings of the American Academy of Religion and the Society for Biblical Literature. For information about the AAR/SBL meetings, go to the AAR/SBL web site: <http://www.aarweb.org/annualmeet/default.asp>. It is not necessary to register for the AAR/SBL meetings in order to attend the Polanyi Society annual meeting.

Friday, November 17, 2006

9:00 pm-11:00 pm

- 9:00 Walter Mead, Illinois State University
"A Polanyian Resolution of the Age-old Conflict between Faith and Reason"
- 10:00 Tony Clark, University of St Andrews
"Torrance, Polanyi, and Imaginative Vision"

Saturday, November 18, 2006

9:00 am-11:30 am

- 9:00 Chair: Jere Moorman, Polanyi Society
- Blythe Clinchy, Wellesley College
"Epistemological Development as the Aim of Education: A Polanyian Perspective"
- Respondents:
Dale Cannon, Western Oregon University
Esther Meek, Geneva College
Zhenhua Yu, East China Normal University
- 11:15 Business Meeting
Walter Gulick Presiding

Submissions for Publication

Articles, meeting notices and notes likely to be of interest to persons interested in the thought of Michael Polanyi are welcomed. Review suggestions and book reviews should be sent to Walter Gulick (see addresses listed below). Manuscripts, notices and notes should be sent to Phil Mullins. Manuscripts should be double-spaced type with notes at the end; writers are encouraged to employ simple citations within the text when possible. MLA or APA style are preferred. Because the journal serves English writers across the world, we do not require anybody's "standard English." Abbreviate frequently cited book titles, particularly books by Polanyi (e.g., *Personal Knowledge* becomes *PK*). Shorter articles (10-15 pages) are preferred, although longer manuscripts (20-24 pages) will be considered. Consistency and clear writing are expected. Manuscripts normally will be sent out for blind review. Authors are expected to provide an electronic copy as an e-mail attachment.

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Michael Polanyi, Scientist and Philosopher: **The Making of the Biography**

Phil Mullins

ABSTRACT Key Words: William T. Scott, Martin X. Moleski, Michael Polanyi biography
This short essay describes the long process of producing the 2005 biography of Michael Polanyi.

In May of 2005, Oxford University Press published the long-awaited Polanyi biography, *Michael Polanyi, Scientist and Philosopher*, by the late William T. Scott and Martin X. Moleski, S. J. For scholars interested in Polanyi's thought, this work now provides a standard reference point for Polanyi's career. Present and future generations of scholars will rely upon this new biography to help them understand the historical context that provided opportunities Polanyi turned into solid contributions in science, economics, and philosophy. This work fittingly reflects Polanyi as a multi-talented and energetic person deeply committed to understanding and addressing the cultural malaise of his time. It richly portrays Polanyi as a person who accepted his calling. Readers see the trajectory of a life here.

Like a few others in the Polanyi Society, I have been reading versions of this book for 15 years; my primary response to its completion was a combination of relief and gratitude that a great project arrived at a successful, public conclusion. To celebrate the biography's publication, a session of the 2005 annual meeting that included Ann Scott and Marty Moleski was devoted to discussion of the book. Most of this issue of *Tradition and Discovery* is also devoted to comments on *Michael Polanyi, Scientist and Philosopher* by a set of people who worked with Polanyi and/or early recognized the importance of his writing. Lee Congdon, Paul Craig Roberts, Ruel Tyson, and Richard Gelwick are recognized scholars, and some of these folk play a role in the biography. Marty Moleski kindly agreed to respond to their comments on *Michael Polanyi, Scientist and Philosopher*. As a prelude to this discussion, I have gathered below several important facts about the biography project.

The Book Project

Bill Scott began work on *Michael Polanyi, Scientist and Philosopher* in 1977, the year after Michael Polanyi died. Magda Polanyi asked Scott to write the biography because she was concerned to find someone competent to treat not only Polanyi's philosophical ideas but also his scientific achievements.¹ Bill Scott, of course, since he was a physicist, was well suited to digest the roughly two hundred scientific publications by Polanyi as well as the large body of philosophical writing, and he started in earnest on this project right away.

By the time Polanyi died, Bill had already been interested in Polanyi's thought for a bit more than sixteen years. He first met Polanyi on November 24, 1959, when he was on sabbatical at Yale and came to a faculty dinner for Polanyi. He was pressed into service as an available scientist able to converse with Polanyi over breakfast the next morning. Polanyi came to Yale to deliver "Beyond Nihilism" in an American practice run for the Eddington Lecture delivery of this material at Cambridge in February of 1960. Scott acknowledged that

in his first encounter with Polanyi he did not much understand Polanyi's philosophical ideas; he had only been able to do a quick reading of *The Study of Man*. After the meeting, however, Scott dug in and worked seriously through *Personal Knowledge*. Scott later wrote an important 1962 review of the book, one that Polanyi appreciated and which led to their friendship in the last phase of Polanyi's life.²

In remarks in an early draft of the biography, here is how Scott came to describe his appreciation for Polanyi:³

... I was excited to discover a scholar who profoundly addressed contemporary issues of belief and value, speaking from a formidable background in physical science and providing a new understanding of the knowing process throughout the wide range of human experience. Polanyi presented an analysis of our situation as persons who have lost the ability to justify our beliefs, beliefs which we do indeed hold but hesitate to admit into our rational discourse. Dealing with an extraordinary variety of subject matter, he gave an insightful view of the causes of our loss and showed the way to the rational holding of our fundamental beliefs.

Scott acknowledged that he found particularly helpful Polanyi's ideas about boundary conditions and the hierarchical levels of reality: "By coupling the ideas of boundary conditions and hierarchical levels of reality, Polanyi creates a new and fruitful way to relate the intricacies of science to the life of the human spirit." Scott regarded Polanyi's account of tacit knowing as an account that rehabilitated, in the scientific and philosophical traditions, a commonsensical and human-centered understanding of inquiry:

Thus tacit knowledge gives a respectable status to intuitive processes, which are commonly treated as being secondary or inferior, and provides a basis for trust in our own perceptions and in the perceptions of others. By demonstrating the ubiquitous personal element in the entire knowing process, Polanyi puts the person back into the scientific world view from which he has been removed from the time of Descartes.

Bill Scott, along with his wife Ann, visited Polanyi on several occasions late in Polanyi's life and Polanyi also went to Reno, where Bill was a professor of physics at the University of Nevada. After Polanyi died and Scott was asked to undertake the biography, Bill began an extraordinarily careful and thorough review of all written materials, scientific, philosophical, economic and personal (i.e., family collections), that he could find. As the Acknowledgments in *Michael Polanyi, Scientist and Philosopher* make clear, Scott interviewed more than 150 people who knew Polanyi and wrote another 150 persons. After the University of Chicago archive was set up, he poured over the material that he had not seen in the many boxes; he looked also at materials held in other libraries. At the very beginning of his research in 1977, Scott recruited Monika Tobin, the spouse of a University of Nevada colleague, who helped him organize what he gathered. Without doubt, the completion of the biography project owes much to Monika's skills and perseverance, not to mention the skills and hard work of Ann Scott and Mary Kliwer of the Physics Department. Monika helped not only Bill Scott, but also Marty Moleski when he took up the work after Bill's death. Bill's university and many other institutions interested in seeing that a Polanyi biography was completed also supported the biography project.

Of course, many Polanyi scholars were curious and somewhat impatient about the biography project after Bill had been working on it for a decade or more. It was a big project and Bill was meticulous and, as we

now know, drawing together all the many elements he had gathered was very likely impeded by the early stages of Bill's Parkinson's disease, which was not diagnosed until the nineties. Based on his work on the biography, Bill did produce a captivating address on Polanyi's early life delivered at the Kent State Centennial Conference (April 12, 1991). This was later published in *Tradition and Discovery* (25:3, pp. 10-25) in slightly revised form, including an interesting chart on Polanyi's work from 1958-1971. Ann and Bill formed an advisory committee in 1991 comprised of several members of the Polanyi Society (Richard Gelwick, Walter Gulick, the late Charles McCoy and Phil Mullins) and we took up the charge to look at manuscript materials and provide advice. Monika and Ann completed the first draft of the full manuscript in 1994. It had 25 chapters and 293,000 words. This draft and subsequent ones were circulated for comments and there were a number of people who (in addition to the advisory committee) provided thoughtful suggestions. Many of these folk are identified in the biography's prefatory material.

While in California in the summer of 1996, I visited Ann and Bill in Santa Rosa. By this time, it was very clear that Bill's declining health would prevent him from undertaking the revision of the massive first draft of the manuscript. Those of us in the advisory group stepped up our efforts to help Ann find a way the biography project could be brought to a conclusion. Marty Moleski was scheduled for an upcoming sabbatical leave and made known that he would be interested in tackling the biography. After some preliminary negotiations with the Scotts, Marty and I went to California in the summer of 1997 and worked out a formal agreement whereby Marty would take up the biography project as a co-author.

As Marty notes in his Preface to the volume, he came to be interested in Polanyi as an undergraduate, and this interest deepened in his graduate study at The Catholic University of America. Moleski eventually did a dissertation under (now) Cardinal Avery Dulles that explored links between ideas of John Henry Newman and Polanyi.⁴ Marty, of course, has had interests and life experiences quite different than Bill Scott. He is from a different generation; he had no advanced training in science or extended firsthand exposure to scientific research, although he was interested in science and had some basic scientific education. While Bill was a Quaker and a peace activist scientist, Marty is a Jesuit and a systematic theologian. I dwell on these matters of difference only to emphasize the scope of the indwelling necessary for Marty to take up the biography project. He not only had to digest the 293,000 word manuscript and the enormous quantity of research materials that underlay this behemoth; he had also empathetically to understand the man Bill Scott who spent the last twenty-three years of his life consumed by the task of understanding and writing about Michael Polanyi.

Bill Scott died on February 22, 1999. By this time, Marty was already hard at work on the manuscript. Understanding the gathered research and reshaping the draft of the manuscript began on Marty's sabbatical. He finished the first cut and the major reorganization during this period. When he returned to fulltime teaching, Marty had to work on the biography project when he could squeeze in the time. The next two years were devoted to checking references, with Monica's help, and to three or four cycles of informal peer review. The manuscript then began the rounds of review with publishers. The business of reshaping the manuscript and having it reviewed stretched over several years. I think perhaps that some of us doubted that the manuscript could ever be transformed into a concise and tightly ordered artifact that a publisher would accept, hoping for a return on the investment in the book. But Marty did put things in the necessary good order. The final manuscript is about 159,000 words. This is an achievement that ought not to be overlooked as merely an exercise of editing Bill's draft. I suspect that we should take Marty literally when he says,

The book placed before you is not the book that Bill wrote, nor is it the book that I would have written if I had started fresh and worked alone, nor is it the book that would have emerged from a true collaboration between two authors who could fight fairly with each other to achieve a true union of thought (viii).

Surely those interested in Polanyi owe Marty Moleski, as well as Bill Scott, a great debt. Together—yet apart—they have indeed provided “a solid foundation for future investigations of Polanyi’s life and work” (viii).

Endnotes

¹ Scott briefly described his discussion with Mrs. Polanyi in an early draft of the Preface; see Mullins and Moleski’s obituary for Scott, *TAD* 25:3, 5-9. Some of the details noted below come from this obituary and/or early drafts of the biography. Some details, for example, the story of Scott’s first encounter with Polanyi, are included in the published biography (242).

² William T. Scott, “Polanyi’s Theory of Personal Knowledge: a Gestalt Philosophy,” *The Massachusetts Review* 3: 2 (1962): 349-368.

³ All three of the quotations in this paragraph come from an early manuscript of the biography. For a statement similar to the second quotation, see also William T. Scott, “The Gentle Rain: A Search for Understanding,” *Intellect and Hope, Essays in the Thought of Michael Polanyi*, Eds. W. H. Poteat and Thomas Langford (Durham, NC: Duke University Press, 1968), 243.

⁴ Moleski has subsequently published *Personal Catholicism: The Theological Epistemologies of John Henry Newman and Michael Polanyi* (Washington D. C.: The Catholic University of America Press, 2000). There are interesting review articles by John Apczynski and Joseph Kroger as well as a response from Moleski in *TAD* 28: 1.

POLANYI SOCIETY MEMBERSHIP

Tradition and Discovery is distributed to members of the Polanyi Society. An electronic (pdf) version of the current issue as well as past issues back to 1991 are available on the Polanyi Society web site (<http://www.missouriwestern.edu/orgs/polanyi/>). The Polanyi Society has members in thirteen different countries, although most live in North America and the United Kingdom. The Society includes those formerly affiliated with the Polanyi group centered in the United Kingdom which published *Convivium: The United Kingdom Review of Post-critical Thought*. There are three issues of *TAD* each year.

Annual membership in the Polanyi Society is \$25 (\$10 for students). The membership cycle follows the academic year; subscriptions are due November 1 to Phil Mullins, Missouri Western State University, St. Joseph, MO 64507 (fax: 816-271-5680, e-mail: mullins@missouriwestern.edu). Please make checks payable to the Polanyi Society. Dues can be paid by credit card by providing the card holder's name as it appears on the card, the card number and expiration date. Changes of address and inquiries should be sent to Phil Mullins. New members should provide the following subscription information: complete mailing address, telephone (work and home), e-mail address and/or fax number. Institutional members should identify a department to contact for billing. The Polanyi Society attempts to maintain a data base identifying persons interested in or working with Polanyi's philosophical writing. New members can contribute to this effort by writing a short description of their particular interests in Polanyi's work and any publications and/or theses/dissertations related to Polanyi's thought. Please provide complete bibliographic information. Those renewing membership are invited to include information on recent work.

Polanyi and the Sadness of Unbelief

Lee Congdon

ABSTRACT Key Words: Christianity, faith, doubt, the Moot, meaning, Paul Tillich, miracles, worship, nihilism, myth.

Among other important things, William T. Scott and Martin X. Moleski's biography of Michael Polanyi raises questions concerning the scientist-philosopher's religious convictions. Despite his profound respect for Christianity, he suffered from an inability to believe.

Readers of *Tradition and Discovery* need no reminder that Michael Polanyi's work has attracted the attention of theologians and Christians in general. They cannot, therefore, have been surprised to learn that Fr. Martin X. Moleski, member of the Society of Jesus and Professor of Religious Studies at Canisius College, had accepted responsibility for rounding the late Professor William T. Scott's invaluable but rather lengthy and unfinished manuscript into publishable form. The silent collaboration between the two men proved to be fruitful, for Professor Scott, who taught physics at the University of Nevada, Reno, was at his best when writing about Polanyi's scientific achievements. His ability to grasp those achievements and make them comprehensible to laymen made it possible for Fr. Moleski to focus his attention on Polanyi's philosophy, not least as it bears upon the Christian faith.

Like other Christians stirred by some of the implications of Polanyi's work, Fr. Moleski wondered about the philosopher's own beliefs and discovered that they were difficult to pin down. Insofar, he tells us, as religious faith is a form of ultimate concern, "Polanyi was a person of profound religious faith" (p. 287). That may be so, but expressing "ultimate concern" is a far cry from affirming the Nicene Creed—and Polanyi knew it. Fr. Moleski recalls the story of the latter's sorrowful reaction to a question put to him by a kindly priest: "Can you say, Michael, 'I know whom I have believed?'" "If only I could," Polanyi replied (p. 287).

Polanyi was born in Budapest to a family of assimilated Jews. Neither parent seems to have had religious faith of any kind. "Did your father believe in God?" his friend, the sociologist Edward Shils, once asked him. "I don't know," Polanyi replied. "I never asked him."¹ In his youth, we know from an uncharacteristically self-revealing letter to his countryman Karl Mannheim, he was a materialist and disciple of H.G. Wells. As it has for so many, however, a reading of Dostoevsky's *The Brothers Karamazov* changed his mind and heart—in some sense, forever. Yet by 1919, the year in which he was received into the Roman Catholic Church, he had already begun to entertain doubts, if not about the existence of God then surely about the divinity of Christ. In 1921 he married Magda Kemeny, a Catholic, in a civil ceremony.

During his years in Weimar Germany, where he was building an enviable reputation as a physical chemist and beginning a family, Polanyi does not seem to have given Christianity much thought, although as a strong proponent of Jewish assimilation he identified with Christian culture in the broad sense. His wartime association with the Moot, a discussion group organized by the theologian J.H. Oldham and concerned above all with exploring Christian approaches to the problems of modern society, reawakened his interest in religious questions. Most Moot members—T.S. Eliot among them—were Christians of one sort or another, although

Mannheim, who played a pivotal role in the deliberations, made no profession of faith. Polanyi certainly took the work of the Moot seriously, but in a 1948 letter to Oldham he confessed that “our meeting leaves me increasingly with a feeling that I have no right to describe myself as a Christian” (p. 212).

Polanyi never seemed to change his mind about that, but not out of stubborn pride. “A religious belief,” he wrote in *Meaning* (Professor Harry Prosch, his co-author, would not have put these words in his mouth), “cannot be achieved by our deliberate efforts and choice. It is a gift of God and may remain inexplicably denied to some of us.”² These were words of regret, not resistance. And they did not mean that Polanyi had concluded that he had nothing of importance to say about religious faith. The argument that he developed in his Gifford Lectures and later in *Personal Knowledge* hinged on his conviction that faith—the holding of unproven and possibly mistaken beliefs—was necessary to any productive search for truth.

Unlike Descartes, Polanyi believed that to begin with absolute doubt, was to end with it. That did not mean, of course, that religious doubt had to be concealed or completely resolved. In *Personal Knowledge*, Polanyi quoted Paul Tillich, the decidedly heterodox theologian whom he much admired, with approval: “Faith embraces itself and the doubt about itself.”³ Polanyi expressed many doubts concerning orthodox Christianity, particularly with respect to a world beyond this one and to events believed to be miraculous. Christians made a serious mistake, he sagely observed, when they attempted to substantiate the latter by pointing to possible natural explanations; to explain miracles in that way was to explain them away. He himself did not believe that non-natural events occur. Moreover, like Tillich, he refused to assert that God exists—rather the contrary. “He exists,” he insisted, “in the sense that He is to be worshipped and obeyed, but not otherwise.”⁴

As Fr. Moleski says, “For Polanyi, the proper Christian inquiry is worship” (p. 288). Polanyi would therefore have been prepared to answer the question posed by Michael Gelven in his thoughtful philosophical inquiry, *Spirit and Existence*: “Do we worship because we believe that there is a God, or do we wonder about God because we are beings who worship?”⁵ For Polanyi, as for Gelven, worship was a way of being-in-the-world (Heidegger), an indwelling (Polanyi) that gives meaning (lower, not upper, case) to life. It was certainly not by chance that Polanyi entitled his last book *Meaning*. Better than most, he recognized that the specter of nihilism haunted the modern world and he dedicated himself to restoring the belief that life is meaningful, that there is a purpose to our existence. “Men need a purpose which bears on eternity,” he wrote in *The Tacit Dimension*.⁶

And so they do. But they cannot simply live *as if* life were meaningful. In the chapter “The Structure of Myth” in *Meaning*, Polanyi wrote that for Mircea Eliade, the distinguished student of religion, “the prime value of archaic myth lies in showing the world to be full of great meaning.”⁷ That is true, but ancient peoples did not think of their beliefs as “myths”; they believed them to be true. On Polanyi’s view, the factual existence or non-existence of God is beside the point; in the act of worship God exists *for us*.

It is one thing, however, to say, as Polanyi did, that any attempt to prove the existence of God by an appeal to reason must fail, and quite another to suggest that the question is irrelevant. Spiritual pilgrims cannot be content with the assurance that Christianity, understood as a set of profound myths, is existentially meaningful; they want to know whether or not it witnesses to the truth, or rather The Truth. They cannot, as Polanyi could, express wonder at the power and meaning of the Lord’s Prayer but then add “though literally I believe none of [it]” (p. 273).

Richard Allen, who knows Polanyi's work well—and admires it—is right when he observes that the Hungarian thought of Christian belief only with respect to this world. To be sure he posited transcendent ideals such as Truth and Justice, but for him they were projections, idealizations of historical and human contrivances. Allen is right too that while natural and historical facts cannot verify the Christian Faith, “the refutation of those facts of which Christian theology articulates the supernatural meaning, would undermine Christian belief.”⁸

But if orthodox Christians must find it difficult, if not impossible, to accept Polanyi's religious views, they nevertheless owe him a debt of gratitude for recognizing the often nihilistic consequences of unbelief and striving to make belief possible for men and women living in a post-Christian world. If nothing else, he showed that every view of life and the world—not only the Christian—is finally dependent upon an ultimate commitment. If, pushed to the utmost limit, we are forced to state reasons for our truth claims, we will all be obliged to say: “Because I believe it to be true.” And that is so even for the nihilist.

There were many things that Polanyi believed to be true, but the dogmas of historic Christianity were not among them. As this excellent biography testifies, he was saddened by that unbelief. In the book's epilogue, Professor Scott quotes from the moving obituary that *The Times* (London) published on February 23, 1976, the day after Polanyi died: “Those who knew Polanyi well will attest...to a pervading sadness which was none the less at every other moment illuminated by sparkling humour....”⁹

Endnotes

¹ My conversation with Professor Shils; Chicago, 1991.

² Michael Polanyi and Harry Prosch, *Meaning* (Chicago: The University of Chicago Press, 1975), p. 180.

³ Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (New York: Harper Torchbooks, 1964), p. 280.

⁴ *Ibid.*, p. 279.

⁵ Michael Gelven, *Spirit and Existence: A Philosophical Inquiry into the Meaning of Spiritual Existence* (Notre Dame: University of Notre Dame Press, 1990), p. 84.

⁶ Michael Polanyi, *The Tacit Dimension* (Garden City, New York: Anchor Books, 1967), p. 92.

⁷ Polanyi, *Meaning*, pp. 127-28.

⁸ Richard Allen, *Thinkers of Our Time: Polanyi* (London: The Claridge Press, 1990), pp. 75-76.

⁹ “Professor Michael Polanyi, Eminent scientist and philosopher,” *The Times* (London), February 23, 1976, p. 14.

Michael Polanyi: A Man For All Times

Paul Craig Roberts

ABSTRACT Key Words: moral inversion, potential theory of adsorption, epistemology, Sovietology, economics, Karl Marx, Magda Polanyi, paradigm, Tillich chair.

This article is a response to the Scott and Moleski biography of Michael Polanyi by one of Polanyi's last students.

Bill Scott's biography of Michael Polanyi has been a lifetime in coming. When I first met Michael in 1961, I was 22 years old. He was 71. Not then, nor in later years, did Michael ever strike me as being an old man. Michael's intellectual dynamism came from the power of his mind to produce new insights that cast new meaning on so many subjects. Michael was the most exciting person I ever encountered. Now 45 years later and 30 years after his death, I have been asked by *Tradition and Discovery* to provide my views of the long awaited biography.

I approach this task from memory alone. Somewhere I have boxes with copies of Michael's manuscripts and our correspondence. If I had time to go through them, it might sharpen my memory and provide interesting anecdotes of those long ago times. However, I do not believe that it would alter my response to Bill Scott's labors, which were put into final form by Martin Moleski.

It is, perhaps, useful to the reader to know of my association with Michael. In 1961 the Thomas Jefferson Center for Political Economy, a unit of the economics department at the University of Virginia in which I was a graduate student, invited Polanyi to give a seminar to graduate students and the lectures, "History and Hope."

The following year I was a graduate student in economics at the University of California, Berkeley. I discovered that Polanyi was at the Center for Advanced Study in the Behavioral Sciences in Palo Alto. A sympathetic Berkeley political science professor accepted me for a 4-credit hour seminar and released me to Polanyi. The following year I returned to the University of Virginia. The year after that, the University of Virginia economics department released me to Merton College, Oxford, to do my Ph.D. dissertation under Polanyi during the 1964-65 academic year.

My dissertation topic was the theory of economic planning. Whereas I did a tremendous amount of reading in the Bodleian on my subject, I spent my many hours with Michael discussing his philosophy and neglected the dissertation.

In 1966 I was appointed assistant professor of Economics at Virginia Tech. I finally wrote my Ph.D. dissertation and received the degree from the University of Virginia in 1967. That summer found me back in Oxford. I was again in Oxford for the fall and winter terms of 1968-69.

I think 1968 was the year that Michael and I were appointed visiting professors in the chemical engineering department at the University of California, Berkeley, to give a course on his epistemology (Scott says it was 1967). Michael backed out—I think because he felt pressed to get more of his ideas down on paper.

I obtained leave from Virginia Tech and grants from the American Philosophical Society and Earhart Foundation and went back to Oxford. I was invited to give a Special University Lecture on my Soviet economic work, which was beginning to appear in scholarly journals.

Through 1969 I was thoroughly versed with Michael's philosophical work. I read his manuscripts as he developed his thoughts and took his ideas into more fields. Michael was driven to overthrow a misunderstanding of science and an epistemology that he saw as destructive of civilized life.

I saw it also and was moved with the same spirit. Perhaps if we had given the course at Berkeley, I might have found an appointment at a college or university interested in Polanyi's thought, left economics, and taken up his philosophy and projects that he was never able to undertake, such as an explanation of 20th century history in terms of moral inversion.

When the Berkeley opportunity passed, I turned to the task of putting straight Soviet economic experience. My book, *Alienation and the Soviet Economy*, published in 1971, was a fundamental challenge to Sovietology. I explained the Soviet economy as the outcome of a struggle between inordinate aspirations and a refractory reality. The Soviet economy was not centrally planned, but its institutions, such as material supply, reflected the original aspirations to establish a non-commodity mode of production. My work was indebted to Michael's insights, and I dedicated the book to Michael. Two decades later with the collapse of the Soviet Union, my book was republished without a word changed.

In 1973 my book, *Marx's Theory of Exchange, Alienation, and Crisis* (co-authored with M.A. Stephenson) was published. This work established a central thesis of *Alienation and the Soviet Economy*—that Marx's critique of capitalism was due to its commodity character and that the purpose of central planning was to eliminate exchange relationships. The work also showed that Marx regarded violence as the effective force in history and that Marx most certainly was no humanist, thus establishing Michael's disputed contention that Marx left violence alone as the effective force in history.

In 1969 I married an English girl. Our frequent trips to England kept me in touch with Michael and Magda. After Michael died, we continued to visit Magda. Magda loved to be taken to the Trout Inn for lunch. Magda was never one not to speak her mind, and she complained about the lack of progress with the biography, expressing her wish that I had undertaken the task.

There had been some discussion about me doing the biography. Michael thought it would be unwise as it would be difficult for me to establish myself as a scholar in my field on the basis of a biography of a scientist and philosopher.

Reading Scott's biography, I realize it would have been unwise for another reason. Scott has provided what must be a masterful account of Michael's scientific work. All I knew of Michael's work as physical chemist came from reading "My Time with X-Rays and Crystals" and "The Potential Theory of Adsorption" and from stories he told me. All I would have been able to do would have been to connect his experiences as a distinguished scientist with his insights into scientific organization and authority, discovery, and the nature of knowledge. Scott provides a detailed account of Michael's discoveries, research teams, and colleagues that is marvelous.

The only thing I can say about Scott's account of Michael's scientific life is that the potential theory of adsorption played a bigger role in Michael's mind than in the biography. Scott provides a detailed account of Michael's work on his theory and its progress, but Scott's account struck me as a smoother and less controversial experience than I remember from Michael. I received the impression from Michael that his theory was potentially threatening to his career, that he could not get fellow scientists to reconsider it even after he had completely proven it, and that he was not permitted to teach it at Manchester. The impression I received from Michael is that his theory was essentially forgotten until two scientists rediscovered it around 1960. When they published their results, they received a lot of favorable attention until someone declared it to be Polanyi's old error. They stuck up for their work, and the theory was finally accepted. I remember this being the reason the editors of *Science* asked Polanyi to write his account published in 1963 as "The Potential Theory of Adsorption: Authority in Science Has Its Uses and Dangers." Perhaps Polanyi's son, John, could clear up this matter.

Polanyi's potential theory of adsorption is a case that illustrates that science is a belief system in which explanations at odds with reigning paradigms can be rejected even though they are correct. Polanyi's explanation of science has powerful implications for the reliability of information in society. Scientific information is the most reliable as it is subject to evidence and the overlapping competences of authorities of integrity who are committed to finding the truth. Social science, news, and public opinion have weaker factual bases and are subject to emotion, ideology, and propagandistic manipulation. For example, misinformation about weapons of mass destruction was used to manipulate Americans into accepting the invasion of Iraq. According to Paul Krugman (*New York Times*, May 29, 2006), NASA climatologist Dr. James Hansen's early warnings about global warming were misrepresented by academics in the pay of the energy industry. Supply-side economics, an important development in macroeconomic economic theory, was misrepresented as a claim that tax cuts pay for themselves. As Polanyi understood, knowing is a perilous undertaking.

Family history and Michael's work as a scientist comprise most of the biography. As the rigors of my own career pried me away from Michael's philosophy, I was unable to keep track of those who turned to Polanyi or to know the extent of his influence. It has been my impression that Polanyi's influence is mainly among scholars in religious studies. This is hardly surprising as Polanyi's epistemology restores meaning to religion, but wipes out the human capital of academic philosophers. The paradigm change is, perhaps, too massive.

What I find missing in the biography is mention of Michael being offered the "Tillich chair" at Harvard. I don't remember whether Michael was offered the chair or asked about his interest. I do remember that I argued with him to take the chair, as it would give him graduate students to carry on his work. I remember him replying that he was not going to help philosophers get rid of him by accepting an appointment in religion. I don't remember the year that Michael was approached about the chair, but someone besides myself must remember it, perhaps Richard Gelwick.

The last 55 pages of the biography, which covers the period that corresponds with my time with Michael, passes too lightly over Michael's concept of moral inversion. This concept was important to his thought and was a subject to which he intended to return. Michael described moral inversion as the consequence of the incompatibility between the demand for moral progress and the skepticism of morality. This inconsistency restricted moral passions to accusations of immorality and to fierce hatred of accused groups and social institutions. Moral inversion was at the core of Michael's understanding of the violence of the 20th century. He hoped to explain, in insightful outline, 20th century history in terms of moral inversion.

If memory serves, as far as Michael got with this project was his essay, “Why Did We Destroy Europe?” I have always wanted to undertake this task, but at 67 years of age it is an unlikely one for me. If anyone has taken it up, I would be pleased to know of it and to respond to it as best as I can.

Bill Scott and Martin Moleski have done a great service both to scholarship and to those interested in the life, times, work and thought of Michael Polanyi. A polymath presents an enormous challenge to biographers. To deliver so much of Polanyi in 300 pages is a remarkable achievement. The biography’s strength is its detailed chronology of the subjects to which Polanyi turned his attention and the people with whom he worked. What the biography needs is a section on Polanyi’s epistemology, contrasting it with other approaches, and explaining how Polanyi’s explanation of the nature of knowledge came from his experience seeking truth as a physical scientist. Those interested in Polanyi the economist can find my account of Michael’s seminal work as an organizational theorist and as a macroeconomic theorist in *Emotion, Reason and Tradition*, edited by Struan Jacobs and R.T. Allen.

Michael was an idealist without any illusions. The portrait that Scott and Moleski give in the last few pages of the biography is consistent with my own impression of Michael. He believed that it was our duty to find and to defend truth. He understood that thought was a dangerous enterprise and could end in French and Bolshevik revolutions. Michael was uniquely gifted, and he did his best to share his gifts with the rest of us.

In Michael’s time many areas of scholarship were affected by emotionalism resulting from political polarization. Michael’s view of progress as a piecemeal accretion within a cultivated set of beliefs did not satisfy those who believed improvement required more radical change. For Polanyi, even revolution is grounded in a prior set of beliefs.

Scott records the uncharitable response of a Hungarian-born Balliol don to Polanyi’s appointment to Merton. I remember attending this don’s lectures. He had recently served in a ministerial capacity in a Labour government. His lecture began inauspiciously. He turned to the blackboard to write the marginal conditions for economic efficiency, no doubt with a view to an attack upon them, but couldn’t produce the simple equation. After several attempts, he threw down the chalk and said, “Efficiency! Bah! What’s important is people.” People, of course, had not proved to be very important to revolutionary socialist governments.

As a final thought, people responded to Michael’s insights long before he put them clearly on paper. How often has a university changed a professor’s chair from chemistry to social studies, much less before publication of a major work in the new field that would justify such a change? Michael’s problem was that he knew more than he could tell, because he did not know the academic jargon of the fields that he invaded. *Full Employment and Free Trade* is a highly seminal work in economic theory, but it was ignored because it was not written in the economists’ language. His academic friends tried to help him by demanding clarity of language, that is, the academic jargon of their respective fields. Michael needed to address his varied audiences in language that they understood, but there is a clarity in Michael’s writings that conveys information that the literal-minded cannot absorb. Sovietologists and economists did not understand what Michael was talking about, but I and others did. I believe that today philosophers still don’t know what Michael is talking about.

From Salon to Institute: Convivial Spaces in the Intellectual Life of Michael Polanyi

Ruel Tyson

Abstract Keywords: conviviality, practice of knowledge in non-university departments; institutes, centers, salons. Michael Polanyi

From Chapter Two in Science, Faith, and Society, to the central mediating center of the long argument in Personal Knowledge, "Conviviality," Polanyi continued to extend his "post critical inquiry" in his visits to a wide variety of centers and institutes which relate to his earliest intellectual and aesthetic education in the salon of his mother. The concept of conviviality finds its autobiographical correlative in such spaces.

Biographies of significant people in our lives inevitably provoke autobiographical re-visitations. This is case for this reader of *Michael Polanyi: Scientist and Philosopher*, by William Taussig Scott and Martin X. Moleski. It no surprise then that I begin my comments on what I have learned from this useful and comprehensive work with a first time of meeting anecdote. However, my choice of this anecdote reaches beyond its occasion and allows me to introduce a major, if under appreciated, central motif in Polanyi's thought. My appreciation for this recurrent topic has been documented and enlarged by my reading of this biography.

I met Michael Polanyi in late December, 1956, at the Beekman Towers Hotel in New York City. The meeting was arranged by a letter of introduction from my friend and former teacher William Poteat, then assistant professor of philosophy at the University of North Carolina at Chapel Hill. (p. 226). Professor Polanyi was in New York to address the annual meeting of the American Association for the Advancement of Science. The address was published as "Scientific Outlook: Its Sickness and Cure,"¹ (Science 125 March, 15, 1957).

We went up to the cocktail lounge in the penthouse of the hotel which faced south toward the United Nations building on the East River. The mid afternoon sun illuminated the UN Tower, though my attention was only peripherally occupied with that image, His face and his voice offered a double welcome. The face of my host changed from gravity to levity in swift alterations while his voice shifted smoothly from middle to lower registers. As the conversation found its rhythm and gained in confidence and intimacy, the table between us with its white table cloth seemed too wide. I leaned into the conversation wanting to catch every nuance. Polanyi's mastery of the art of conversation invited me to forget this distinguished figure with the F. R. S. behind his name and Professor in front of it. I was freed to attend to words I was hearing for the first time that I would be able to hear many times in the years ahead. In a very short, while the large disparity in our status ceased to matter. What mattered was the conversation. Though it was by no means an equal exchange.

What began to matter was Polanyi's analysis of the Hungarian Revolution of the previous October. I was hearing phrases—accompanied by diagrams on the menu—like "moral inversion," and "dynamic-objective coupling," "moral passions" disguised as "scientific assertions," all terms against the background of Polanyi's report of the refusal of a group of Hungarian intellectuals and writers in a public declaration that they would no longer tell lies. The fiftieth anniversary of this event next October renews and sharpens the memory of that conversation. The readers of this biography will appreciate the attachments Polanyi never ceased to hold for his home city of Budapest, fraught with scenes of his coming of age. While I recalled the concept of "moral

inversion” from the *Logic of Liberty*, Polanyi’s analysis of the events in his home city were new and compelled me to want more instruction in them. Lacking the larger context later provided by the publication of *Personal Knowledge*, I wondered if what I was hearing was political philosophy, or epistemology, or both? I soon realized that prevailing classifications of intellectual work would not work in gaining an understanding of Polanyi’s work.

I eventually learned that he had to provide more than arguments for his work to be understood. He had to provide contexts for its reception. This biography offers major resources for a re-reading of his work since it offers opportunities to locate Polanyi in a much larger network, including family, institutions, and those informal circles of friends and associates that loom so large in this biography. . For example, I did not know of his early relationship with George Lukacs and Karl Mannheim, or, later with Czeslaw Milosz, whose 1953 book, *The Captive Mind*, would make a companion in discussions about the Hungarian Revolt of October, 1956.

In the context of this first meeting, I became acquainted with the work that was to become Chapter 7 of *Personal Knowledge*, already titled “Conviviality” on the galley proofs Polanyi, entirely to my surprise and delight, offered to loan me for my train trip back to New Haven, on condition that I return them the following afternoon. I learned the following year when I was a research student under Professor Polanyi’s supervision in the Faculty of Economic and Social Studies at the University of Manchester that this gesture was an authentic expression of the man. I was amused to learn from this biography that the previous year Polanyi had given Bill Poteat “three or four chapters of what was later to become part of *Personal Knowledge*. Poteat was terrified of losing the manuscript, since he had not had the presence of mind to ask whether another copy existed.” (p. 226). Out of my inexperience and in the after glow of my first conversation, I did not have the presence of mind to think about this possibility!

I was not surprised to read in this biography that when the University of Chicago Press asked Polanyi for a clean copy of *Science, Faith and Society* in preparation for the publication of a new edition, he did not have one. “In his enthusiasm for sharing his ideas, Polanyi had given away all of his own copies of the book.” (p.251). For the many who knew him well, there is agreement that Michael Polanyi embodied in his person many of the salient features of his concept of conviviality. This biography expands our knowledge of his social history and offers a rich and varied background for discovering the coherence among Polanyi’s central ideas, particularly this concept, and many chapters in his personal and professional history.

In what follows, and with the essential help of the co-authors of this biography, I will offer an incomplete inventory of scenes spanning his life time which exemplify autobiographical coefficients of the concept of conviviality. Moving from what he has written about conviviality, which I will not detail here except to note that much of this topic is foreshadowed by second chapter in *Science, Faith and Society*, these notes offer some assistance in understanding features of Polanyi’s practice as a scientist and philosopher that the concept itself does not disclose but surely presupposes. These scenes from his life, early and late, are social contexts and sources for the nourishment of his imagination. It is with forethought that in the introductory anecdote of my first meeting with Polanyi there I stressed his conversation. In all the scenes included in this inventory, conversation among diverse scholars and intellectual is a constant reference across a wide variety of different informal and institutional spaces. Consider the following types: salon, seminar, laboratory, circle, working group, center, institute, committee (for intellectual purposes), among others, omitting lectureships and short term residencies during which Polanyi delivered lectures and papers at dozens of institutions and societies. Polanyi was a fellow at the Center for Advanced Study in the Behavioral Sciences in Palo Alto, California in 1962-1963. Showing himself an ethnographer of the academic ethos as well as a participant, here is what he wrote his compatriot and long term friend Arthur Koestler. Note both critique and generosity, not to speak of his characteristically soft ironies, in the passage that follows:

It is a collection of specialists, a nice collection, occasionally instructive, but still only a replica of the academic mind, or lack of mind. Comprehensive issues cause a dreamy look to come into their eyes. 'It is not something one can get one's teeth into'—not their kind of teeth. I enjoy it, for I am used to the tribe; and at least there is an effort of keeping the conversation going, instead of just ducking behind the screen of expertise and academic routine problems. Yes, I like it very much but doubt you would. (p. 249)

The temptation for commentary is great, but now I want to call attention to another scene, a recurring one, in his young life, at home, in Budapest, to the salon of his mother, Cecile Wohl Polanyi, who was, in the words of Karl Polanyi's widow, Ilona, writing in 1971, "in her later years a focal point of the avant-garde literary and political life of Budapest:"

Clever and amusing in conversation, she loved being with people, drawing out their interests and opinions, as well as discussing what she learned from her extensive reading in literature and social theory." (pp. 6-7) Our biographers continue this description of Michael's mother: "For three decades Cecile's talents were mainly channeled into her weekly literary salons. These had started after her marriage in 1881 with 'jours,' gatherings of a group of women friends, and expanded to include the bright young men and women of the avant garde. Cecile would pick up some challenging thought as a starting point for the conversation. Every new idea from the West was discussed. Here, right at home, was a model for Polanyi's later idea of a society of explorers. . . (p. 7).

While I was in Manchester, 1957-1958, Michael mentioned that as a young boy he slipped downstairs and found a hiding place just out of sight so he could listen in on some of these conversations in his mother's solon. It is not difficult to imagine that in the words he wrote to Koestler about the conversations at the Center in Palo Alto there are echoes of his early experience at home, of the conversations conducted by his mother and her friends. As any attentive reader of this biography soon learns, these conversations introduced Polanyi to a variety of forms of intellectual life, which in a variety of different formats and venues, he participated in the rest of his life. An incomplete list must be the substitute for description: his classes at the Minta Gymnasium "where classes were based on informal interchange between teachers and students, and the learning was achieved through practicing and reasoning rather than by rote memory of material given in formal lectures." (p. 15-16); the Galileo Circle (p. 21-23); the Petofi Circle (p. 228); the Sunday Afternooners, where he first met Karl Mannheim, a relationship renewed when he moved to England from Germany in 1933 (p. 41, p. 194); and The Moot in England which he joined at Mannheim's suggestion. (pp. 196-197).

Polanyi is the best witness to the power of these quiet gatherings. After he and Mannheim commented on a paper by T. S. Eliot, "Clerisy and Clerisies," he wrote to Joseph Oldham, the founder of the Moot, "These things change our lives." (p. 197).

I was for more than twenty years Director of the the Institute for the Arts and Humanities at the University of North Carolina, Chapel Hill. The use of the term "institute" in my title bears two meanings, though I imagine there is a strong analogy between the two. In the first instance this term refers to Polanyi's institutional affiliations as a student of chemistry, and later in Germany as a researcher during the stages of his career in the Karlsruhe, 1919-1920, The Fiber Institute, 1920-1923, and Institute for Physical Chemistry, 1923-1933. In the second instance, this term refers to the institutes and centers, primarily in North America, where Polanyi visited recurrently during his later years at Manchester and Oxford, which the authors aptly term "At the Wheel of the World, 1961-1971," as well as in his "Last Years, 1971-1976."

In the former cases, the note I stress is the distinctively different organizational structure of the German institute in contrast to the North American universities department. However, in the physical sciences there is a common element as well: the laboratory and the lab group. But the differences are decisive. The European institutes are free standing with much lateral exchange among them. The practice of knowledge in these spaces is in the collaborative mode of the lab group, so sharply different from the solo mode of work characteristic of the arts, humanities, and social sciences. Significant changes in the organization of intellectual work in North America began to occur in the 1960's when some American universities began to tolerate, and them support more convivial spaces found in centers and institutes similar to the Center for Advanced Studies on the Sanford campus referred to above. The slow dissolution of the encoded fiction of separate and distinguishable boundaries between areas of research was haltingly acknowledged at the organizational level by the emergence of multi-disciplinary and inter-disciplinary centers and institutes. What mattered most was the opening up of convenient, daily opportunities for serious conversations by scholars and practitioners in a variety of fields in spaces and at times which encouraged convivial exchanges. Polanyi's letter to Arthur Koestler quoted above offers a brief sample in his witty description of the pleasures and frustrations of conversations in such venues.

Like the shifting memberships in his mother's salon, Polanyi was early and late a border crosser. He discovered early that the best locations for finding and testing ideas are at the cross roads, not in the cell, study, library, or what Archbishop Temple in his Gifford Lectures called "Descartes's Stove."

Many students of Polanyi's work recognize the paradigmatic role the organization of science in general and the laboratory in particular played in his arguments for freedom in science and for his arguments against central planning. This biography provides a densely rich set of narratives and descriptions of his life and work which strengthens our understanding of the intimate relationship between the tacit dimension in knowing and the convivial settings where intellectual work is conducted. Now we can expand the notion of the inarticulate dimension in knowing to include a sociological correlative to the epistemological. "Conviviality" is a polyvalent, open textured term that needs an ethnographer with a flexible wrist to mark its dynamics. However, Polanyi has taught us to expect such descriptions to be limited by elusive and inarticulate dimensions. While such putative genealogies cast as much darkness as light, it is a useful heuristic to imagine a conversation—yes, at table or in a lounge in some center or institute (café or kitchen)—among Emile Durkheim, Ludwig Wittgenstein, and Michael Polanyi. Perhaps the performance of such a conversation will be staged as an after dinner exercise at some center or institute.

Lest this seem so grave a matter, I stress that such settings are also spaces where its members are free to don an antic disposition. The water pistols "fights" at the Center for Advanced Studies at Wesleyan University where Polanyi was a fellow in 1965-1966, were mythic in memory if not in fact. The description of the costume parties at the Institute for Physical Chemistry in Berlin (p. 128) held each year during Fasching, the time of carnival just prior to Lent, is a better documented case of antic creativity. Polanyi's lab group translated Schrodinger's wave-mechanical interpretation of quantum mechanics into an allegory in which astronomers came dressed as sun and moon and Max Delbruck came dressed as a hotel boy "Psi Psi Star." (p. 128) Such antics remind us that experimentation and playing in disguise are first cousins. Humor and discovery are founded on "effective surprise." (Jerome Bruner). Conviviality as articulated by Polanyi and as lived by him before he conceptualized it was much more than a sociological or an epistemological concept. An inclusive comprehension of the multiple aspects of conviviality includes festivity as well as dialectic and both require commodious accommodations from salon and circle, working group and conference, center and institute.

The "Society of Explorers" and "The Republic of Science," need seasons of gravity as well as levity. Michael Polanyi's face, as I recall our first meeting now renewed by the generous display of photographs from all seasons of his life in this volume, became for me the lively image of these gestures, now supplemented by the echoes of his conversation whispering between the lines of his biography.

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Notes Toward Understanding The Hungarian Roots of Polanyi's Heuristic Philosophy of Religion

Richard Gelwick

ABSTRACT Key Words: Michael Polanyi, biography, William T. Scott, Martin X. Moleski, Hungary, Georg Polya, heuristics, Reinhold Niebuhr, Pauline scheme of redemption, history and hope.

William T. Scott's and Martin X. Moleski's biography, Michael Polanyi, Scientist and Philosopher helps to show how Polanyi throughout his life developed toward his theory of knowledge that is a heuristic philosophy and leads to a heuristic philosophy of religion.

In my response to the Scott and Moleski biography of Michael Polanyi, I want to limit my remarks to one theme. In 1977 in *The Way of Discovery, An Introduction to the Thought of Michael Polanyi*, I held and still do that heuristic philosophy is so far the best way of naming the central thread of Michael Polanyi's philosophical reform and contribution.¹ Further it is still the key to understanding why Michael Polanyi is important for intellectuals and public leaders from statespersons, politicians, scientists, economists, ministers of religions, literary and visual artists, educators, social planners to all citizens who seek to solve the problems for the survival of our global society.

As our Polanyi Society journal indicates by its title of *Tradition and Discovery*, Polanyi saw that a pivotal issue for the survival and growth of humane and civilized life is to accept the human responsibility of exploring the totality of human knowledge by learning from the traditions of the human record and continuing to renew and to build a problem solving society. By problem solving, I mean a society that is free and open to inquiry and to change by following the truth as it becomes known to us through investigation, practice, discussion and argument.

In learning more about and understanding Polanyi's life, there are three main divisions of what I want to say about the Hungarian roots of Polanyi's heuristic philosophy and understanding of religion. The first is Polanyi's biography points back to clues that led him to his heuristic philosophy. The second is how Polanyi's contribution to heuristics builds on the experience of Polanyi and the work of his Hungarian friend Georg Polya. The third is how Polanyi's heuristic philosophy of religion faces the contradictions of time and eternity met in his Hungarian years and is resolved in his heuristic philosophy of religion.

Before going further, I want to indicate that I am defining heuristic in the sense of solving a problem that goes beyond George Polya's definition.² Polya's valuable work shows methods for solving a problem, particularly in mathematics. Later in his work, Polanyi aptly described this human vocation as a society of explorers.³

The Heuristic Background of Polanyi's Life

Scott's and Moleski's biography of Michael Polanyi indicates the background of intellectual ferment and of historical change occurring at the time of Polanyi's birth and life. The Hungarian and European world of

Polanyi was a time of storm and stress. Polanyi was an intellectual explorer in a context of great persons and revolutionary states. Consider for example these cultural forces. One is the movement of the area of pre-World War I Hungary from the rule of the Hapsburg monarchy toward Hungarian political independence and democratic institutions after a thousand years of monarchical and patrimonial arrangements.

Hungary in the first 27 years of Michael Polanyi's life was still under the Austro-Hungarian monarchy. Prior to World War I, it was a period of peace nationally, but it was also a time of intellectual ferment. The intellectual, social, political and economic forces for liberal reforms were in the air even as the monarchy tried to hold on. Vestiges of privilege for the barons and families of the upper class still remained. There was the growth of industrial capitalism and a commercial middle class. There were also centuries of ethnic and territorial struggle and efforts for political change and independence. These struggles were for both Hungarian independence as well as more liberty for its citizens. As part of the revolutionary movements throughout Europe in 1848, liberal leaders in Hungary seized power from the Hapsburgs and established a short-lived independence. In the next year, 1849, the Austrians subdued the Hungarians and enthroned the Austro-Hungarian Monarchy. This rule was modified in 1867 to have a representative parliament in Budapest, but its authority was mainly for internal Hungarian affairs. The Dual Monarchy lasted until the defeat of Germany and Austria in 1918. By that time Michael Polanyi had already begun his career in physical chemistry.

From the late 18th century onward, the area of Hungary, which would have included parts of Romania, Slovakia, and Croatia, was a place in which thinkers were dissatisfied with their rulers and inspired to seek liberal changes by the examples of the French revolutionary ideals, the British Commonwealth, the Marxist socialist thinkers, and its own history of liberal leaders and poets. The impact of these struggles and changes on Polanyi is indicated in Polanyi's Thomas Jefferson Lectures at the University of Virginia and the McInerney Lectures at Berkeley in 1962 where I first met him. At that time, Polanyi spoke of the history of the world as divided into two parts. One part was before the French Revolution and the other part was after it.⁴ All history until the French Revolution was guided by established practices, customs, and laws. It was at the time of the French Revolution that a new era began with humankind seeking and expecting unlimited social improvement and progress while throwing off all traditional restraints. This thesis is a reflection of the conflicting ideals and forces of Polanyi's childhood that raise the question of "history and hope," how out of a history of repressive control and conflict we can progress toward a better future. His heuristic philosophy later rises to religious grounds as it tries to solve this problem.

This impetus toward seeking solutions to difficult questions was facilitated by the cosmopolitan influences in Hungary. Under the Hapsburg Monarchy, German language, culture, and scientific research were heavily influential among intellectuals. Michael Polanyi and his siblings spoke German with their mother, Cecile, but they were also excellent Hungarian speakers. By age six, Polanyi was multi-lingual, speaking Hungarian, German and French. The Budapest intelligentsia was engaged with the movements in Europe in science, politics, education and the arts. Budapest, while not a rival, had much of the same spirit of intellectual adventure as Berlin and Vienna.

In the formative years of Polanyi's life in Hungary, the relating of beliefs and religious practice to social life and thought were also diverse and pluralistic. Since the time of King Stephen I (1001-38) in the 11th century, the area of Hungary was predominantly Roman Catholic and has remained so to this day. At the same time, there was a tradition of toleration of religious minorities. Jewish synagogues, Reformed churches, Lutherans, Greek Catholics, Eastern Orthodox, and Unitarians developed in Hungary as part of its multi-ethnic and multi-cultural

population. This ethnic pluralism included Finns, Estonians, Slovaks, Croats, Romanians, Germans, and Gypsies along with the dominant Magyars or Hungarians.

Besides the general national environment that created a thrust for solutions to problems, the family, social, and school life of Polanyi provided an array of influences encouraging a heuristic spirit. The following are some representative experiences that nurtured and fertilized Polanyi's heuristic philosophy.

One is the liberal Rabbi Andreas Wohl, father of Polanyi's mother, Cecile, who put no pressure on his daughter or her marriage and family to follow strict Jewish practice. Rabbi Wohl's progressive Judaism is seen in the title of two of his essays, "The Significance of the Talmud for Christianity" and "The Post Biblical History of the Hebrews from the Babylonian Captivity into the Time of Mahomed." Rabbi Wohl lived at the Polanyi home due to illness from Michael Polanyi's ninth to fourteenth years before he died. The Polanyis were culturally Jewish but not strictly religious. Both Karl Polanyi and Michael Polanyi held to the values of Jewish ethical ideals and were especially concerned for societal improvement.⁵ They felt also free to embrace Christian expressions of their concerns.⁶

A second influence toward Polanyi's heuristic philosophy was his secondary education at The Minta, an experimental school meant to be a model for better education and training of future professors.⁷ It provided a strong foundation in humanities, physics and mathematics. Both students and faculty in this school were in an *avant garde* program that in some ways anticipates John Dewey's philosophy of having students learn by doing rather than rote learning. Minta graduates of Polanyi's generation are illustrious persons such as Georg von Hevesy – Nobel Laureate in medicine, Edward Teller – co-creator of the hydrogen bomb, Eugene Wigner – Nobel Laureate in Physics, Leo Szilard (with Einstein persuaded President Roosevelt to develop the atomic bomb), and John von Neumann (one of the founders of the mathematical foundations for modern computers). All of these out of a student body of about 30 members!

A third group of influences on Polanyi toward his heuristic philosophy were intellectual societies showing Polanyi and his early associates as serious young adults meeting for the development of their thought and its relevance to science, society, and religion. This inquiring practice began in Polanyi's home where his very progressive and intellectual mother created a salon of many of the leading minds of Budapest for conversations ranging over literary, social and revolutionary ideas of the day. Cecile Polanyi expected her children to be like her with an interest in the life of the mind and the improvement of society. She was a feminist before feminism seeking with others to recognize and to find solutions for current social problems.⁸

A second intellectual society leading toward a heuristic outlook was the Galileo Circle, whose first president was Michael's brother Karl, five years older than Michael. The Galileo Circle was founded in 1908 at the University of Budapest, the year that Michael matriculated. The purpose of the society was "the defense and propagation of unbiased science."⁹ The unbiased science was a science not in the service of the established order but a science seeking to overcome the gaps between rich and poor and the rulers and citizens and to continuing a liberal and creative society. It had over 250 members. Some members were radical reformers described by a contemporary as "the spirit of revolutionary Russia, rationalism driven to its mystic extreme."¹⁰ In this association, one of the primary problems of Polanyi's life-long thought was at the center of the discussion, namely, how to relate the role of tradition that sustains us and at the same time has to change as we confront new problems. It is notable that as radical as Karl Polanyi was, he never agreed with those who thought that social change should be brought about by violent force.

In 1915, two years after Michael Polanyi's graduation from the University and during his return from the front as an army physician, he was invited to take part in Sunday afternoon discussions in the apartment of Bela Balazs, a poet and dramatist.¹¹ The Sunday Circle was led by Georg Lukacs, who later became one of the leading Marxist theoreticians of the twentieth century, famous for his philosophical explanation of class consciousness. The Sunday Circle also had other budding intellectual leaders such as Karl Mannheim, the founder of the sociology of knowledge, Bela Bartok, pianist, composer, and ethnomusicologist, psychologist Julia Lang, and novelist and philosopher Emma Ritook. The underlying concern of the group was the meaning of the current war, World War I, for understanding human nature and the post-war future. Topics discussed revolved around the philosophy of love.¹² Balzacs had recently converted to Roman Catholicism and had a great admiration for the "church fathers" and Jewish and Christian mystics. Atheism or belief in God was often on the agenda. Particularly engaging for the group were the writings of Kierkegaard and of Dostoyevsky. It is during this time that Polanyi read Dostoyevsky and Tolstoy. He reports years later in a letter to Karl Mannheim that he had at that time a feeling of conversion to Christianity along the lines of Tolstoy.¹³

A different kind of intellectual background and contributing factor to Polanyi's heuristic philosophy in Hungary was Central Europe's fascination with genius in science. This genius factor balances the centers of thought that focused on social forces with another that focused on the workings of the individual person in thought. Tibor Frank has pointed this out in showing how this concern was prevalent among Hungarian intellectuals at the beginning of the twentieth century.¹⁴ At the end of the nineteenth century, central Europe was excited by a new field of study dealing with scientific discovery and problem solving. This interest was leading to studies in the "secrets of the mind and its workings, and the processes of understanding/knowing, intuition/perception, intelligence/intellect."¹⁵ This interest in genius was also a threat to the Marxist materialist's view of the development of thought. V. I. Lenin responded to this movement in 1908 as "the old absurdity of philosophical subjective idealism."¹⁶ Ernst Mach's idea that all knowledge is the conceptual organization of the data of sensory experience was also having significant impact in Vienna with the beginnings of positivism. Mach's views at first were seen to point to the importance of the mind. Polanyi later opposed Mach's theory as inadequate and gave a more creative role for the person's intellect through the workings of tacit knowing. Georg Polya's work on heuristics is also seen as influenced by this interest in genius.¹⁷

Polanyi often remarks on the importance of a culture's prizing and respecting the achievements of its geniuses or superior creative members.¹⁸ What he points to is their heuristic power to reach toward reality that is approaching discovery but is yet to be discovered. These early studies in genius and creativity suggest precedents for Polanyi's theory of knowledge nearly fifty years later with its inclusion of intellectual passion and commitment to things unknown but approaching discovery.

So far we have noticed many elements contributing to Polanyi's heuristic philosophy: the cultural milieu, the elite experimental school, the liberal Jewish outlook, the growth of thought through convivial intellectual societies that dealt with history and hope, social change by revolution or reform, and the interest in the works of genius. One very important thing is still missing: his early experience as a scientist. Later, science would be the leverage that commanded attention for his new theory of knowledge. We have already seen that Polanyi's schooling at the Minta produced a disproportionate number of illustrious scientists and mathematicians. His medical training furthered his scientific interest and skills, too.

One of the important contributions of William Scott to Polanyi's biography is to provide for non-scientists an explanation of Polanyi's work in physical chemistry. The story of how Polanyi became a world

famous physical chemist is itself a lesson in heuristics and tacit knowing. Looking at Polanyi's beginning career, we see in his work as a medical student a number of features. One is Polanyi's strong interest in physics and chemistry during his medical training. Preoccupied with this interest, Polanyi virtually majored in physical chemistry. Part of his ability to do this was the advantage of having a medical school professor, Ferenc Tancz, who encouraged him and obtained a research fellowship for him. Also, Polanyi had acquired at the Minta an appetite for thermodynamics. Paradoxically but heuristically logical, Polanyi had applied to study medicine and not physical chemistry, partly because he had found in his Minta studies that he had difficulty in understanding Nernst's *Treatise on Physical Chemistry*. Yet working later on a problem under Tancz, Polanyi took a suggestion from Lagergren in Nernst's *Treatise* and later combined it with ideas from Max Planck's treatise on thermodynamics and Einstein's concept of quantum energy. Scott and Moleski summarize Polanyi's work this way: "His creative contribution was to see, by an act of imagination, a joint consequence that was not separately obvious in either piece of work."¹⁹

Before this insight could occur several other events took place. One was that Polanyi took the summer of 1912 to study physical chemistry at the Technische Hochschule in Karlsruhe, Germany. There he met a number of promising physical chemists and one of them, Georg Bredig, encouraged Polanyi to pursue his ideas on Nernst's heat theorem. This nudge was crucial in evoking Polanyi's insight that he had earlier avoided. In this story, we see Polanyi's encountering a problem to be solved, going back to Nernst's seemingly difficult work for Polanyi, and getting collegial support and able mentoring that encourage him to dare to try his theory.

Polanyi also learned in this period a difficult but important lesson about the role of personal authority in science. His early version of relations of thermodynamics and quantum theory was so good that Professor Bredig sent Polanyi's work to Einstein, who approved it, and it was published in the *Proceedings of The German Physical Society*. Later Polanyi would have to face the weight of Einstein's authority when he disapproved of Polanyi's work on the potential theory of adsorption. The grand lesson preparing Polanyi's heuristic philosophy here was the importance of following a trajectory of imagination, capable guidance, and personal dedication to a so far unaccepted and valuable insight. The trajectory was much more than a series of neat inductive steps. Still the weight of Einstein's opinion postponed until later recognition of the rightness of Polanyi's theory.

Seen in retrospect, Polanyi's life is heuristic in the way he discerned roots of these problems and formulated solutions. It is his breadth of concerns across the fields of political liberty, free market economy, the role of beliefs in science and a free society, and his high regard for the independence of thought and the pursuit of truth that make his work monumental and relevant to the problems of today. The problems he early attended to are ones that contribute to his major work in a general theory of knowledge.

Polanyi's Contribution to Heuristics

From my brief survey of heuristic influences in Polanyi's life, it is clear that there is not a single genesis of Polanyi's heuristic philosophy. The progress toward his proposal of a post-critical general theory of knowledge in the Gifford Lectures in 1951-52 and in their published form as *Personal Knowledge* is cumulative and developing. When I found and showed him in 1962 his letter on "The Value of the Inexact," (published in 1936 in the British journal *Philosophy of Science*), he admitted that it contained in essence many of the basic ideas that he gave that year for his Terry Lectures at Yale on tacit knowing.²⁰

When we look at Polanyi's literary works, there are five major steps in his developing his theory. First is *Science, Faith and Society*,²¹ his inaugural address as a philosopher. It is his first coherent book length discussion of the central themes of his epistemology. But Polanyi does not yet fully realize that he is starting a new theory of knowledge. Second is *The Logic of Liberty*²² that in some chapters pre-dates *Science, Faith and Society*. It also argues for the fiduciary nature of scientific thought, and it adds extensive examples of how skills, conviviality, and beliefs work in academic freedom, government research, social welfare, and economics. Polanyi is still thinking against the background of World War II in Europe and the rise in Britain of a movement for planning and centralized direction of science for state goals.

With the Gifford Lectures and their six year reworking into *Personal Knowledge*, Polanyi's epistemology directly leads the way "towards a post-critical theory of knowledge." A point here for us to notice is that Polanyi is aiming for more than a new theory for philosophers. Polanyi is aiming for a general theory that will reorient our society so that we may again hold great beliefs that can guide us in the task of human striving for a better world for humankind. At last, his heuristic emphasis in knowing is in full light. Today, Polanyi's desire for recognition of the truth of his theory by philosophers seems less important than the reform itself.

The fourth major step of Polanyi's heuristic philosophy is to clarify and state the essential principles and structure of his theory of knowledge in *The Tacit Dimension*. Here we have the demonstration and the designation of the essential terms of his epistemology. At the same time, he continues to place this theory in its relevance to the issues of faith and the future of humankind. Two things stand out in this book. One is the structure of tacit knowing in all knowing and endeavor. The second is the imperative for a destructive world to regain its way toward a great adventure in knowing the unfolding reality of the universe.

Finally, his last book *Meaning*²³ completed with the late Harry Prosch's help, explicitly extends his heuristic philosophy from science into the world of meanings that sustain, deepen, and guide the human adventure. The fundamentals of discovery in science are now linked with the creative imagination and the spiritual potential of humankind. The personal element is reliably involved in all domains of knowing so that there is no need to doubt the validity of transcendent values that can guide a free society toward progress even though perfection remains unattainable.

Polanyi's heuristic philosophy is much more than mathematical problem solving as made famous by Polya. It is related to Polya's pedagogical sense of helping students learn how to solve mathematical problems. But it is much more. Compared with Polya, Polanyi has discovered the reason why our knowing is a discovery process. In tacit knowing, Polanyi has laid out a comprehensive claim about the structure of all knowing.

The relation of George Polya to Polanyi is based on two things. One is their similar origins in Budapest. The other is their attention to the nature of problem solving itself. Polya was four years older than Michael Polanyi, but they knew each other at the University, in the Galileo Circle, and corresponded throughout their lives. Polanyi uses Polya's work on problem solving in *Personal Knowledge*²⁴ and acknowledges his debt to him in *Meaning*.²⁵ Polya's book *How To Solve It* has sold over a million copies and been translated into many languages. Polya gave guidance that improved the teaching of mathematics, and his principles are far reaching.

Tibor Frank highlights some of the elements of Polya's heuristics. Notice how they fit into Polanyi's epistemology. First Polya's primary concern was to provide and maintain an independence of reasoning during problem solving.²⁶ Here is Polanyi's regard for the power of imagination and thought. Another element was

Polya's respect for luck and not just reason in solving problems.²⁷ Here is Polanyi's regard for the guess or hunch, the willingness to follow an intuition. Third, in teaching mathematics, Polya counseled to "start from something familiar or useful or challenging," "don't be afraid of using colloquial language," "do not enter too early...into the heavy details...give first a general idea," and "realize that the natural way to learn is by stages."²⁸ Here is Polanyi's grasp of how the outline or pattern comes before the details. All of these fit into the ways Polanyi discusses personal knowledge and tacit knowing.

When Polanyi uses Polya's work, he picks out five points.²⁹ One is Polya's view that heuristics attempts to lay down maxims for crossing a logical gap. Polanyi points out however that maxims have to be learned in the practice to which they apply because they are essentially vague. A second of Polya's points is how passionate search for solutions to problems is essential, yet the solutions often come only after deliberate searching followed by rest. Here Polanyi uses Polya as a support for Polanyi's tacit components of discovery. A third point is Polya's advice "to look at the unknown," which Polanyi interprets to mean to look at the known data not in themselves but as clues to, pointers to, parts of an anticipated solution. A fourth point is Polya's analogy of solving a problem is like the building of an arch in which each stone is put in piece by piece but the whole project is held together by the anticipation of the end result. Polanyi agrees that it is more important to look toward the goal rather than the inductive steps themselves. Finally, Polanyi notes the relation of first grasping the whole or seeing the answer and then doing the proof and analysis of how you got there. What is missing in Polya and added by Polanyi is the enormous generalization from heuristics in specific cases to their bearing on the grand social and philosophical problems of our world. Without Polanyi, the grand importance of heuristics is missed.

Polanyi's Heuristic Philosophy of Religion

The role of religion in Polanyi's thought is intrinsic. While he lived in a time when the intellectual challenges to religion from science and philosophy were strong, he was not preoccupied with the debate about atheism or theism. His allegiance to the general ethical ideals of Jewish and Christian faith remain throughout his life. In his years in England and in America, he began writing about his beliefs more in Christian terms, particularly the Augustinian view that faith precedes understanding and the Pauline scheme of redemption in how we face the impossible task of perfection. In both of these ideas, he was making an analogy and then an epistemological claim. His beliefs were not about theological doctrines. They were neither about the creeds of churches nor the differences among religious groups. Moreover his religious identity was more in the broad tradition of Judaism and Christianity, though the Christian aspect is emphasized in his mature years. Part of this emphasis grew through his participation in the Moot whose Christian leader J. H. Oldham and members discussed how to face the problems of England and the continent after the Second World War.³⁰

New inquirers into the thought of Michael Polanyi sometimes miss Polanyi's religious character because they look for his record of church attendance and activities as if that were the only way of being religious. Religion as spiritual and intellectual concern for the human condition and its aspirations are at the heart of Polanyi's work. The basic framework of Jewish and Christian thought that takes the course of history as revealing both human greatness and frailty and also the need for human dedication to good over evil and love over hate is present in all his work. As he says of our need for transcendence, "man needs a purpose bearing on eternity."³¹

Polanyi's philosophy is rich with implications for religion and religions. These implications can go deeply into specific theological issues as represented by T. F. Torrance's works³² on the incarnation, space,

time, and reality and Charles McCoy's work on covenant and world pluralism.³³ They can also go into the philosophies of other religions such as James Stines' comparison of Polanyi and Taoism.³⁴ Polanyi meant to renew the grounds for religion, but he left the tasks of theology to the theologians whose work he did value.

Polanyi's religious and spiritual journey has a heuristic within it. We notice that his family was not ritually religious, but that their activities and concerns were involved with the great questions of liberty, social amelioration, and cultural achievement. There was an expectation of the Polanyi children to do something significant with their lives in this arena. Like his brother Karl, Polanyi was attached to the problems of liberal economic and social-political reform. In this connection, we should note that the name of our corresponding society in Hungary is "The Michael Polanyi Liberal Philosophical Association." Liberal in Hungary meant, and still means, favoring freedom of thought and action, openness to new knowledge, and willingness to reform tradition and change. It is in this very context of how and what change should occur that Polanyi met the problems that led to seeing the relevance of the Pauline scheme of redemption.

Polanyi as a medical student and physical chemist never retreated from thinking about the great questions surrounding him as Hungary fell into a brief democracy, then a briefer period of Communist rule before settling into authoritarian rule under Admiral Horthy. He deliberated and wrote about these problems as the National Socialist Party of Hitler began taking over Germany including its scientific laboratories, as the Soviet Union tried to make science fit the ideology of Leninist Marxism, and as intellectuals in Great Britain yearned for a planned economy and planned science. Faced with these problems and with his experience in problem solving in his scientific work, he made the creative connection between problem solving in science, society and religious ideals. For Polanyi, the importance of religion seems to be its social and cultural impact. It is the way religion provides guidance toward a purpose bearing on eternity.

Moving on, I want to stay with the main theme of heuristics and make two points. One is on the place of faith in life and in religions. The second is on the Pauline scheme of redemption.

First, the place of faith in life and in religions is one of Polanyi's strongest contributions to philosophy of religion. For Polanyi, faith functioned primarily as *fides qua creditur*, the faith by which one believes as contrasted with *fides quae creditor*, the faith that is believed. When one looks at Polanyi's view of the rise of human life, you can see a rudimentary form of faith as trust is a biological component of human life. Polanyi's analysis of the tacit components in the story of life show an increasing gradient of living forms searching for right or fit relation to their environment. This groping and searching is a primitive form of heuristic. All biological active centers live and die by their searching and selection. This activity embodies the tacit knowing principles of relying on and attending to which are analogous to faith as trusting. It is this general architecture of life that makes possible not only survival but also innovations that increase access to the levels of reality in the world. This primitive form of relying on seen in the earliest centered forms of life is a precursory of a fiduciary type of activity that enlarges in animals and human beings who can only function too by the fiduciary network of knowing. The recognition of this inherent role for a faith-like process within the nature of living things themselves is a key to the restoring the role of faith in dealing with human life and responsibility.

One of the problems of Judaism, Christianity and Islam is for them to understand that they are not the only religions of faith. Further, faith is first trust before it is integrated belief. Polanyi's theory of tacit knowing extends his sense of relying on in order to attend to makes the relational nature of life more intelligible. It also shows that faith as trust comes from a general condition of life rather than any particular religion.

In the sense that all knowing is a “relying on and attending to” Polanyi has made the primal faiths by which we live an unavoidable issue for all of us. Once the role of faith as trusting in order to attend to is perceived, the basic questions of what is believed at the presuppositional level becomes open for reflection. The role of the fiduciary foundations of all human knowing leads to the critical questions about the objects of trust presumed or the things upon which we rely in order to evaluate, to prioritize and to guide our behavior. Most of the great choices for personal life, social intercourse, and national relationships depend on our understanding what we are relying on in the sense of valuing and constructing our story. The implications of examining the faiths by which we know, the web of trusts in the matrix of living leads to the importance of philosophers, poets, theologians, natural scientists, social scientists or all the disciplines that enable us to reflect on what we are doing. It also leads to the examination of the faiths operative in education and leadership of societies.

At the same time, we meet with the fact that our analysis of faith cannot be exhaustive. What we rely on in order to attend to cannot be made completely explicit. At the cognitive analytical level, we can only discover morphological features of faith that help us understand the background assumptions of belief.

When all religions are seen as all involving faith as a form of relying on and attending to in tacit knowing, we provide common ground for meeting differences. Instead of looking first at what teachings are believed, the structure of tacit knowing suggests that we look at how we each came to those beliefs on which we rely.

The encounter of all persons or organized groups is ultimately on a faith-to-faith basis even among those who profess no faith. Religions may differ in what they rely on and attend to but they can share the awareness that their beliefs and all others are derived from their history and experience and seek a right way to relate to their sense of reality. In the spectrum of choices on the relation of Christian faith communities to other Christian views or to different religions, there is no logical reason for excluding communication and understanding between them.

A second contribution to philosophy of religion in Polanyi’s heuristic philosophy is his application of the Pauline scheme of redemption to the overwhelming difficulty of historical progress and human frailty. What Polanyi learned in his early years in Hungary was the need to reconcile the desire for universal human improvement with the limits of human nature. Polanyi does not use the language of Reinhold Niebuhr, whom he claims to have met and heard lecture, but he seems to take a similar view of history and hope, time and eternity. Polanyi was concerned for the improvement of society since the days of discussions in his home, the Galileo Circle, the Sunday Afternoon Circle, and the Moot. From the beginning until the end, he opposed radical revolution because of its tendency to serve its own interests in the name of its own view of the good. Thus, he pointed out the problem of moral inversions after the French Revolution, the Russian Revolution, and the Nazis takeover. He wanted to effect change person to person by a change in outlook, especially among the intellectual leaders. Indeed that is the aim of his providing a new epistemology.

The message that Polanyi saw for a world impatient for change and hungering for revolution was to accept that the growth of knowledge and of society is based on trust in the processes of a free society and not on acceptance of a totalitarian or authoritarian one. A society progresses by the convincing and persuasion of its members who share a common goal of the pursuit of truth. For him, the pursuit of truth in any area is progressive but always incomplete due to the unfolding nature of reality itself. There is a sense here of Reinhold Niebuhr’s discussion of the dictum “that we are always equidistant from eternity.”³⁵

In this situation that is relevant to all of humanity’s struggles for progress, the Pauline scheme of

redemption came to him as the way to hold together the human drive for improvement with the impossibility of completely achieving its goal. On the one hand, Polanyi sees in the Pauline scheme with its promise of grace from beyond our control that aids us in the search for finding and doing truth and right. He describes this as the tacit way reality visits our searching. He even says it is a “clue to God.” It is seen in the gift of discovery to the disciplined researcher in science who labors and suffers and is given surprising insight. It is seen in the inquirer who has a hunch but has to take the risk of investing herself in trying it. It is seen in the persistence of pursuing problems that seem insoluble yet someone has a belief that there is a solution though still hidden from view. Finding of solutions is more like a gift than it is of purchasing or seizing control. Progress in science takes a prepared mind, but it also takes a mind willing to trust that there is an intelligible reality that grants to such a mind insights that are a part of the truth of an unfolding reality.

When Polanyi refers to the Pauline scheme of redemption, he realizes that this pattern is a “clue.” His reference to the Pauline scheme of redemption is not pointing to Paul’s explicit faith in Jesus as the Christ. Rather it is in seeing that a person seeking to fulfill a difficult or impossible task may be aided by discovery of reality greater than herself.³⁶ If there is no answer, then this is as it should be. The Pauline scheme is transmuted into a general principle for humans striving to overcome the barriers to knowledge. Service to the pursuit of truth sometimes grants us insight and discovery..

Polanyi does suggest that we continue in solving the puzzles of how we live morally through the comprehensive frameworks of metaphor, ritual, myth and religion. These frameworks are found in the “transnatural” and “self-giving” forms of knowing. They too participate in the progressive enterprise of knowing. The same applies to our history and our hope. The great difference between time and eternity, the finite and the infinite is one that we cannot overcome, but we live with it like an explorer who makes maps but always finds more territory to cover. This approach is truly a heuristic philosophy of religion.

Conclusion

The Scott and Moleski biography has raised Polanyi studies to a new level. We now have a history of Polanyi’s personal, professional, and intellectual quest. It is clear from a reading of this biography that Polanyi’s life was rooted in the process of discovery, not just for himself or for scientific advancement but as the way we learn to follow our ideals while we struggle with their contradictions.

Endnotes

¹ Pp. xv-xvii, Ch. IV, *et passim*, Wipf & Stock Publishers, Eugene, Oregon, 1977 (previously published by Oxford University Press, 1977).

² G. Polya, *How to Solve It, A New Aspect of Mathematical Method*, Doubleday, Garden City, New York, 1957, 2nd edition, pp. v-vii.

³ *The Tacit Dimension*, Doubleday, Garden City, New York, 1966.

⁴ “History and Hope: An Analysis of Our Age,” Lectures Delivered at The Thomas Jefferson Center for Studies in Political Economy, University of Virginia 1961, mimeographed for private circulation, p. 1 and “The Destruction of Reality,” McNerney Lecture I, Pacifica Tape Library, Los Angeles, California, 1962. Polanyi gave me the mimeographed copy edited by Marjorie Grene for work on my dissertation [Ed. note: published in *Society, Economics and Philosophy, Selected Papers of Michael Polanyi*, 79-94].

⁵ See “Paul Knepper, ‘Polanyi, ‘Jewish Problems’ and Zionism,” *Tradition & Discovery*, XXXII, No. 1, 2005-

2006, pp. 6 -19 on how Polanyi transforms Jewish longing for a homeland into a preference for a more open international community.

⁶ See Lee Congdon on Karl Polanyi's 1913 application of Christian ideals in *Exile and Social Thought, Hungarian Intellectuals in Germany and Austria, 1913-1933*, Princeton University Press, Princeton, 1991 p. 223. For an example of Polanyi's early thinking about Christian faith see Scott and Moleski, *op. cit.*, p. 194.

⁷ See Scott and Moleski, *op. cit.*, pp. 15-17.

⁸ *Ibid.*, pp. 6-8.

⁹ *Ibid.*, p. 21.

¹⁰ Paul Ignotus, "The Hungary of Michael Polanyi," *The Logic of Personal Knowledge, Essays Presented To Michael Polanyi On His Seventieth Birthday*, The Free Press, Glencoe, Illinois, 1961, p. 11. The entire article is a contribution to seeing the intellectual and social world shaping the young Michael Polanyi.

¹¹ Congdon, *op. cit.*, pp. 9-11; Scott and Moleski, *op. cit.*, pp. 41-42.

¹² Congdon, *Ibid.*, p. 10

¹³ Scott and Moleski, p. 194. For an excellent discussion of the relation of Polanyi and Mannheim see Phil Mullins and Struan Jacobs, "Michael Polanyi and Karl Mannheim," *Tradition & Discovery*, XXXII, No. 1, 2005-06, pp. 20-43.

¹⁴ "George Polya and the Heuristic Tradition, Fascination with Genius in Central Europe," *Polanyiana*, 6, No. 2, 1997, pp. 22-37.

¹⁵ *Ibid.*, p. 22.

¹⁶ *Ibid.*, p. 23.

¹⁷ Tibor Frank, *op. cit.*

¹⁸ See *Personal Knowledge*, Chicago, University of Chicago Press, 1958, p. 124.

¹⁹ *Op. cit.*, p. 27.

²⁰ The letter was published in *Philosophy of Science*, 3, April, 1936, pp. 233-34.

²¹ Chicago: University of Chicago Press, 1964, with a new introduction not in the 1946 edition.

²² Chicago: University of Chicago Press, 1951.

²³ Michael Polanyi and Harry Prosch, Chicago: University of Chicago Press, 1975.

²⁴ Pp. 125, 127, 128, 131.

²⁵ P. 56.

²⁶ *Op. cit.*, p. 30.

²⁷ *Ibid.*, p. 31.

²⁸ *Ibid.*, p. 33.

²⁹ *Personal Knowledge*, pp. 125, 127, 128, 131.

³⁰ Phil Mullins and Struan Jacobs, "Michael Polanyi and Karl Mannheim," *Tradition & Discovery*, XXXII, 1, pp. 20-42.

³¹ *The Tacit Dimension*, p. 92.

³² Torrance's references to Polanyi are numerous. Some examples are found in: Thomas F. Torrance (ed.), *Belief in Science and in Christian Life, The Relevance of Michael Polanyi's Thought For Christian Faith and Life*, Edinburgh: The Handsel Press, 1980; *Space, Time & Incarnation*, New York: Oxford University Press, 1969; and *Transformation & Convergence in the Frame of Knowledge, Explorations in the Interrelations of Scientific and Theological Enterprise*, Grand Rapids, Michigan: Wm. B. Eerdmans Publishing Company, 1984.

³³ *When gods Change, Hope For Theology*, Nashville: Abingdon Press, 1980.

³⁴ "I Am the Way: Michael Polanyi's Taoism," *Zygon: Journal of Religion and Science*, XX, March, 1985, pp. 59-77.

³⁵ *The Nature and Destiny of Man*, New York, Charles Scribner's Sons, 1955, Vol. II, p. 301 *et passim*.

³⁶ *Personal Knowledge*, p. 324; *Meaning*, p. 157.

The Man Who Fell Among Theologians

Martin X. Moleski, S. J.

ABSTRACT Key words: Polanyi biography; Polanyi's concept of God and Christianity; Polanyi's experience of depression; theological epistemology; heuristic philosophy of religion; moral inversion; conviviality; atheism; intelligent design; tolerance; Protestantism; Enlightenment; freedom of inquiry; fiduciary structure of commitment.

Polanyi's philosophy of science is appealing to theologians because it shows that all acts of commitment to comprehensive interpretative frameworks are similar in fiduciary structure even though their content and focus may be quite different. The recent biography of Polanyi was co-authored by a scientist and a theologian whose different fields of expertise helped them appreciate the full scope of Polanyi's career. Polanyi's commitment to Christianity cannot be neatly categorized. As a large-hearted, open-minded, convivial thinker, he affirmed the Protestant and Enlightenment tradition of responsible, conscientious inquiry in all fields, from physics to religion. Polanyi hoped that a renewed understanding of the tacit and personal dimension of knowing might act as an antidote to the nihilistic philosophies that led to the destruction of Europe in the world wars.

The only interest in Polanyi in Great Britain (and I suspect in the U.S.A. as well) is among those who see him as offering a way back in for religious knowledge as co-equal with scientific knowledge. This amounts, in my opinion, to a perversion of Polanyi's view. For emotional and aesthetic reasons he would love to have been able to equate the two but rationally he could not. The consequence has been that scientists, to whom Polanyi has matter of great significance to impart, regard him as a wild man, a mystic, against whom science must be protected. It is a tragedy for Polanyi's reputation and for the theory of science—he was a good man fallen among theologians!¹

As a Roman Catholic, I am conditioned to begin a communion service by confessing my faults. When I first read Norman Wetherick's lament over Polanyi unhappy alliance with theologians, I said to myself, "*Mea culpa, mea culpa, mea maxima culpa!*" My interest in developing a proof for the existence of God is what led to my first contact with Polanyi's work. I showed a version of my proof to Alan Weinblatt, my academic advisor and later director of my B.A. honors thesis; he replied, "You must read *Personal Knowledge*." I am not a disinterested inquirer. My interest in epistemology has always been shaded and influenced by my theological standpoint. I am not just interested in how we know what we know. I want to understand how we know what we know about God.

By the time I found Wetherick's complaint in Bill Scott's files, I was already well along with the revision of the biography. I had also already met Wetherick in person and spent an enchanting afternoon with him and his wife at their flat in Edinburgh. Neither his atheism nor my theism kept us from enjoying lunch together and ruminating on Polanyi's philosophy. Those who do not know Wetherick should strive to hear the chuckle in his voice and recognize the gentle humor in his jibe.

If either Polanyi or Scott could have been consulted, I doubt that either would have thought that a dogmatic Roman Catholic theologian would be a good choice to revise the biography. My primary qualifications were that I had enough time at the right time (1997-1998) because of a major sabbatical from teaching and that I had enough confidence in my skills as a reader and writer to think that perhaps I could be of service to Polanyians by producing an abridged version of Scott's work. It was not until Phil Mullins questioned me about my training in science after the book appeared that I realized that I, like Polanyi himself, was a "border crosser" (Tyson, 22).² My scientific credentials are (as some scientists are wont to say) "not much different from zero." In high school, I did very well in freshman biology and was given a stack of college textbooks to read on evolution by my teacher. I was in science honors for the next two years, but dropped out of the fourth-year course to concentrate on an Advanced Placement tutorial in calculus. My last science course, of a sort, was "Techno-Scientific Perspectives on Man and His Environment" in my first year of college. I disagreed with my teacher's view of scientific method and remember vividly the disappointment I felt about the grade on my final paper and for the course.

Phil Mullins is right about the difficulties I faced in understanding Scott's overview of Polanyi's scientific career (Mullins, 10). I did the first reorganization and abridgement of Scott's manuscript while living at Campion Hall in Oxford. I went to the Radcliffe Science Library regularly to consult encyclopedias, text books, histories of science, and journals. My immersion in the world of science led to an epiphany one day on my walk from Campion to Radcliffe: I saw in a flash how the universe must look to those who are persuaded (for whatever reason) that there is no God. From that standpoint, the only logical conclusion is that all life and intelligence happened simply by chance. This was a year before the controversy about the Polanyi Center and the arguments about complexity and Intelligent Design. For committed atheists, there is no calculation of improbability that can shake their view that strange and improbable things do happen, no matter how long the odds may be against the event. For them, our existence here today is a tribute to the power of random mutations preserved by natural selection. In the idiom of Douglas N. Adams' *Hitchhiker's Guide to the Galaxy*, the entire universe is an infinite improbability machine.

The primary reason I wanted to read Bill Scott's biography of Polanyi was to find out where he stood on the conflict between theists and atheists. On December 1, 1941, Polanyi returned a book to Professor Willis Jackson in the Department of Electro-Technics at Manchester with the comment, "I do not think the author has been fortunate in stating his faith in God as something capable of complete endorsement by reasoned argument. However, that ambition may be too high for any mortal brain."³ Twenty-five years later, Polanyi mused in an unpublished fragment that "We must love him so that he may exist, not love him because he exist[s]. He can be loved but not observed."⁴ Perhaps this should be called Polanyi's Theological Uncertainty Principle. God meant a great deal to him. As Gelwick shows so well, "Religion as spiritual and intellectual concern for the human condition and its aspirations are at the heart of Polanyi's work. The basic framework of Jewish and Christian thought that takes the course of history as revealing both human greatness and frailty and also the need for human dedication to good over evil and love over hate is present in all his work" (Gelwick, 30).

There is, then, no simple religious category into which Polanyi may be slotted. He was quietly, privately, determinedly non-credal. In a sense, he was non-denominational long before the non-denominational movement began. No particular version of Christianity won his heart. Phil Mullins recently called my attention to "The English and the Continent," an essay written in 1943, which led to Polanyi's involvement in the Moot.⁴ In this essay, Polanyi praises the Protestant foundation of English culture:

Tolerance in England was a religious doctrine, a doctrine for the protection of the joint religious interests of all Protestant sects. It was established as a safeguard against the

Government, against Catholicism, and against Atheism. ... Tolerance, being originally a rule of religious enquiry, excluded Catholics, because the Catholic Church denied freedom to such an enquiry, and it excluded also atheists because they refused to accept the starting point, the heuristic principle, underlying the enquiry (373).

For Polanyi, the Protestant faith rests on “the conception of individual responsibility” (375). He embodied this principle in his own spiritual life, taking responsibility for his concept of God and for the moral implications that flowed from it. He saw the religious foundation of English and European civilization, and wanted to strengthen it through his philosophy of freedom and responsibility: “Nothing will grow from moral unbelief. The bolder our plans for the future, the deeper must they be rooted in the original ideas of our civilization” (381). In his own unique and personal way, he intended to ally himself with “the English attempt to carry on the great Reformation into the modern scientific age” (381).

I am, by birth, taste, temperament, and personal commitment, profoundly sympathetic to Lee Congdon’s assertion that “Spiritual pilgrims cannot be content with the assurance that Christianity, understood as a set of profound myths, is existentially meaningful; they want to know whether or not it witnesses to the truth, or rather The Truth” (Congdon, 13). I believe that Christianity claims to have knowledge of God that can be found nowhere else except by accepting the testimony of the apostles about the person and work of Jesus of Nazareth. But I think it is wrong to excommunicate Polanyi from the assembly of “spiritual pilgrims.” He consciously and consistently identified himself with Christianity even when he, his sister, her husband, and other friends and family members had suffered on account of their Jewish heritage. I am also not sure that Polanyi’s lifelong struggles with depression were specifically related to his inability to accept “the dogmas of historic Christianity” (Congdon, 14). At times, his unhappiness may have been related to a sense of being on the outside of a great Christian feast which he found himself unable to join, but the genesis of his sorrows is more likely to be rooted in the loss of his father early in life and his lifelong struggles with his mother’s turbulent personality.

I think Gelwick’s appraisal of Polanyi’s philosophy of religion is closer to the mark. For the most part, Polanyi was at peace with his own understanding of and commitment to Christianity as a springboard for “economic, social, and political reform” (Gelwick, 31). Gelwick makes an important distinction between Polanyi’s interest in the common structure of all acts of faith by which we make any commitment to any comprehensive interpretative framework (“the faith by which one believes”) and the content of the faith established by that framework (“the faith that is believed”; [Gelwick, 31]). This is where I take issue with Wetherick’s portrait of how theologians use (or misuse) Polanyi. Wetherick understands theologians as “those who see him as offering a way back in for religious knowledge as co-equal with scientific knowledge.” Gelwick makes a much more subtle point and one with which I think Polanyi would agree: religion and science are alike in the fundamental act of trust that each require (Gelwick, 31-32), but they are not and cannot be “co-equal” because the specific claims of religious and scientific faith are about radically different kinds of realities. Polanyi held that “God cannot be observed” (PK, 279); if God could be observed using scientific techniques, He would not be God but merely a part of the universe. I think that for Polanyi, this would be a permanent boundary for his heuristic philosophy of religion. Polanyi had the instincts of a mystic if not the experiences of a mystic. For him, God must always be greater than anything we can say about Him.

Roberts claims that Polanyi’s religious stance led to being offered the Tillich chair at Harvard (Roberts, 17). I found nothing on this in reading the files at the Regenstein nor in doing a quick review of Scott’s files for this essay. The offer must have been made *viva voce* or in some form that has not otherwise been preserved.

It is not the kind of fact that either Scott or I would have suppressed if we had known about it. Tillich moved from Harvard to the University of Chicago in 1962. In October of 1962, Polanyi gave the Terry Lectures at Yale. He met Tillich in February of 1963.⁶ It is possible that someone suggested Polanyi should throw his hat in the ring for the Harvard chair, based on the success of the Gifford Lectures and *Personal Knowledge*, and that Polanyi mentioned this idea to Roberts as if a definite offer had been made.

I very much appreciate Roberts' criticism that the last part of the biography does not give enough weight to Polanyi's recognition of "moral inversion" as the key to a correct understanding of Europe's self-destruction in the two world wars:

The last 55 pages of the biography, which covers the period that corresponds with my time with Michael, passes too lightly over Michael's concept of moral inversion. This concept was important to his thought and was a subject to which he intended to return. ... Moral inversion was at the core of Michael's understanding of the violence of the 20th century. He hoped to explain, in insightful outline, 20th century history in terms of moral inversion. (Roberts, 13)

That this was to be the major theme of Polanyi's proposed final synthesis sounds right. Polanyi tried to enlist the help of Grene, Gelwick, Poteat, Roberts and others to pull this material together (Scott and Moleski, 274-275, 281-282, 285). None of the three letters from Polanyi to Roberts in Scott's files (February 12, 1968; April 2, 1968; June 6, 1968) contain the phrase "moral inversion," but it is clear that it is the right way to epitomize Polanyi's goal of giving "a historical account of the intellectual process leading from the original ideas of the Soviet Revolution and its original conflict with Western thought to their present policies" (February 12, 1968). Polanyi's turn to philosophy came from and was sustained by his belief that ideas matter. If an "intellectual process" could wreak such havoc, it might be hoped that a reform of the intellect might bring equally great blessings. Polanyi wrote Gelwick in February 8, 1964 (in Scott's file):

I was very pleased to read your beautifully formulated account of my ideas in your paper delivered on the occasion of your call. The parallelism with Luther being merely structural, I have no objection to it. I think it does illustrate a dead-end similar to that of the Roman Church in 1500 (see Machiavelli!) and it is not extravagant to suggest that modern [revisionism], of which I form part, strives to recover the innocence of the 18th Century Enlightenment, much as the Reform strove to recover the purity of biblical faith, as rooted in the individual conscience.

It seems clear that to the end of his days, Polanyi strove to rehabilitate the conscience of the West through his philosophy of personal knowledge.

Roberts also suggests that the biography should have "a section on Polanyi's epistemology, contrasting it with other approaches, and explaining how Polanyi's explanation of the nature of knowledge came from his experience seeking truth as a physical scientist" (Roberts, 18). I deliberately chose not to include such analyses in the biography for a number of reasons. I believe that the material for such an overview is in the biography itself. I strove to highlight such connections very briefly where it was clear that something Polanyi learned in the laboratory foreshadowed his later philosophy of science. The book is unevenly weighted toward a discussion of Polanyi's scientific career in part because that is the material that Scott wrote about the most and in part because I thought that it would be the most difficult for humanists to find on their own. Polanyi's philosophy, theology, and aesthetics are relatively well-known and speak for themselves in a way that his scientific writing does not (at least for a non-scientific audience). I made extensive cuts in Scott's summaries

of Polanyi's philosophical writings because I think the originals are better than any commentary he or I could produce. It seems to me that the place for such re-mappings and assessments of Polanyi's contributions is in non-biographical essays or books.

This is one of the decisions that I imagine Scott would object to most strenuously. In his manuscript, he took a thematic approach and tried to consolidate and evaluate all of Polanyi's contributions in each area where he made substantial contributions: the potential theory of adsorption; crystallography; reaction kinetics; economics; social studies; philosophy and epistemology; theology; and aesthetics. One of the readers for Oxford University Press recommended a study of Polanyi's influence in the field of the social sciences and especially in the sociology of knowledge. If he had had the health and vitality, I'm sure Scott would have gladly added that section to the book. In my imaginary argument with Scott over the correct design for the book, I won only because he was incapacitated and could not insist on keeping his original design. After editing his manuscript to make it uniform, I cut it to pieces, reassembled it in relatively strict chronological order, and left out most of his efforts to determine how great an impact Polanyi had in each of these areas. My goal was to tell Polanyi's life story more or less as it happened, with a multitude of different ideas incubating or bearing fruit all through his life. Determining Polanyi's significance on the world stage is for other venues.

I was very pleasantly surprised at the theme Ruel Tyson found in the biography. There is no doubt that Polanyi was a master of "the art of conversation" (Tyson, 19) and that he "embodied in his person many of the salient features of his concept of conviviality" (Tyson, 21). When I read the archives at the Regenstein, I was impressed over and over again at the breadth of Polanyi's correspondence and social contacts. It is clear from many accounts that Polanyi was a charming man in person and that he had a gift of paying attention to people that set them at ease and filled them with delight. Tyson, like Roberts, adds a detail that Scott and I would certainly have included if we had heard of it sooner—the story of the young Polanyi hiding within earshot of his mother's soirees. Polanyi loved to listen to people and he loved being listened to. I hope that the biography will let the conversations continue for many years to come.

Endnotes

¹Norman E. Wetherick to William T. Scott, August 6, 1987. References to other materials in William T. Scott's files are simply identified in the context of the discussion.

²This and subsequent references to essays in this issue of *Tradition and Discovery* are noted in parenthesis by the author's name and the page number.

³Polanyi to Jackson, December 1, 1941, Box 4, Folder 7 in The Papers of Michael Polanyi held by the Department of Special Collections of the University of Chicago Library. This quotation is used with permission of the University of Chicago Library.

⁴William T. Scott and Martin X. Moleski, S. J., *Michael Polanyi, Scientist and Philosopher* (New York: Oxford University Press, 2005): 263. Subsequent citations use Scott and Moleski and page number and, when the context is clear, citations are by page numbers only in parentheses in the text.

⁵"The English and the Continent." *The Political Quarterly* 14 (October-December, 1943): 372-381. Quotations from this essay in this paragraph are simply noted in parenthesis.

⁶See *TAD* 22:1 (1995-1996), a special issue devoted to the Polanyi-Tillich meeting.

Tradition, Authority and Originality in a Post-critical Perspective

Zhenhua Yu

ABSTRACT Key Words: tradition, authority, originality, critical philosophy, post-critical philosophy.

In his post-critical philosophy, Polanyi challenges the intellectual trend in modern Western philosophy which exalted critical reason and denigrated the uncritical elements of knowing, such as belief, tradition and authority. In this paper, the author focuses on Polanyi's thoughts on tradition, authority and originality in a post-critical perspective. On the one hand, Polanyi, against modern critical philosophy, fully acknowledges the important role played by tradition and authority in science, on the other hand, he also tries to show the tension and the deep unity between tradition, authority and originality.

The subtitle of Polanyi's *magnum opus Personal Knowledge*—"Towards a post-critical philosophy," indicates Polanyi's self-understanding of an important aspect of his philosophical goal. The term "post-critical philosophy" contrasts with "critical philosophy." In the history of Western philosophy, the term "critical philosophy" is conventionally understood as denoting Kant's philosophy. However, it is interesting to note that Polanyi expands the extension of this term and uses it in a broader sense, so that it is not just confined to Kant's philosophy, but rather applies to a whole philosophical trend in the modern West which exalted doubt and critical reason on the one hand, and denigrated the uncritical elements of knowing, such as belief, tradition and authority, on the other hand. To Polanyi, Descartes, Hume, Kant, Mill, Russell, and most other modern philosophers are representatives of critical philosophy. Polanyi fully acknowledges the historical significance of critical philosophy:

The critical movement, which seems to be nearing the end of its course today, was perhaps the most fruitful effort ever sustained by the human mind. The past four or five centuries, which have gradually destroyed or overshadowed the whole medieval cosmos, have enriched us mentally and morally to an extent unrivalled by any period of similar duration.¹

Nevertheless, Polanyi argues that critical philosophy's overestimation of critical reason and its blindness to the positive role played by the uncritical elements, such as belief, trust and the acceptance of tradition and authority in the shaping and holding of knowledge is untenable. In his post-critical philosophy, Polanyi 1) attempts to draw our attention to the important role played by the uncritical (even a-critical) elements in the act of knowing, and also 2) attempts to offer a sound account of the relationship between the critical and the uncritical. This can be seen clearly in his fiduciary program. In this paper, however, I will try to illumine the essence of the post-critical philosophy by investigating Polanyi's reflections on tradition, authority and originality in science.

Tradition

As Edward Shils rightly points out, Polanyi was one of those philosophers who first attached great importance to tradition in science.² From the 1940's, he started reflecting on this issue and the theme of scientific tradition ran through his later writings. In order to bring his insights on tradition into sharp relief, I will refer to other authors as well in my presentation of Polanyi's thoughts. In my view, the following five points merit attention.

1. The rehabilitation of tradition

Since the 17th century, especially after the Enlightenment, tradition has been in disrepute. As Edward Shils points out,

Traditionality became associated with a particular kind of society and culture. Traditionality was regarded as the cause or the consequence of ignorance, superstition, clerical dominance, religious intolerance, social hierarchy, inequality in the distribution of wealth, preemption of the best positions in society on grounds of birth, and other states of mind and social institutions which were the objects of rationalistic and progressivistic censure. Traditionality became the ubiquitous enemy to every critic of the ancien regime; it was thought that when traditionality yielded place to reason and to scientific knowledge, all the vices which it sustained would fall away.³

In a word, tradition was depicted as the opposite of reason and freedom by the rationalists and progressivists. While fully acknowledging the historical significance of the Enlightenment's critique of tradition, we cannot but agree with Gadamer who incisively emphasizes that, by setting tradition in opposition to reason and freedom, the Enlightenment failed to capture the essence of tradition. Even Romanticism, a critical reaction to the Enlightenment, fell into the same pitfall by conceiving tradition as an abstract antithesis to freedom and reason. According to Gadamer, tradition does not take shape naturally by means of inertia. It needs to be affirmed, embraced and cultivated. That is to say, preservation is the essence of tradition. "[P]reservation is an act of reason, though an inconspicuous one."⁴ "[P]reservation is as much a freely chosen action as revolution and renewal."⁵ Thus, the unconditional antithesis between tradition, on the one hand, and reason and freedom, on the other, is illusive. To Gadamer, there is no abstract, absolute reason. Reason exists only in concrete, historical terms. Reason is not tradition-free. In order to overcome the Enlightenment's and even Romanticism's conception of tradition, Gadamer proposes a rehabilitation of tradition.

It is not difficult for people to understand that tradition plays a prominent role in arts, literature and even in human sciences. However, when it comes to the natural sciences, people tend to think that they are tradition-free. For instance, Dilthey uses tradition to differentiate the humanities from the natural sciences. Gadamer, at least in *Truth and Method*, though with some reservations, holds that the element of traditionality is only of secondary importance in the natural sciences and mathematics, while in the human sciences it constitutes its real nature and is its distinguishing mark.⁶ However, this conception of science is itself a result of the Scientific Revolution and the Enlightenment, which represents only a superficial observation of the practice of science and does not recognize the crucial role that tradition plays in the progress of science. Michael Polanyi, with his intimate knowledge of the practice of science, advocates something like a rehabilitation of tradition in the natural sciences, similar to what Gadamer does with respect to the human sciences. At this point, philosophy of science and hermeneutics converge.

Polanyi notes that, modern science, in its formative period, championed a violent rebellion against all traditions and authorities, which was echoed by nearly all the prominent scientists and philosophers of the period. The slogan was reasonable at that time; modern science had to fight all traditional authorities, especially the Roman Catholic Church, in order to take shape. However, when the enemies were defeated, this slogan remained and came to imply that science, as a rational and free enterprise, must repudiate all traditions and authorities. This is misleading. In Polanyi's view, scientific research cannot reject all traditions and authorities, because the

existence and development of science is based upon scientific traditions and scientific authorities. I will discuss the issue of authority in the next section, but, for the moment, let me focus on the question of tradition.

2. Why tradition is important in creative endeavours

The importance of tradition lies in the fact that the existence of tradition, or the lack of tradition, will directly affect the creativity of our work in a certain area and the quality of our products. Karl Popper once recalled, when he was in New Zealand, that he got a set of American records of Mozart's "Requiem." Because the musician, according to Popper, under whose directorship the records were made, was untouched by the musical tradition handed down from Mozart, the quality of the music of those records was very poor. Popper told us that the incident made him understand what the lack of a musical tradition means.⁷ The situation is quite similar in science. Polanyi pointed out that modern science originated in Europe; the long-established tradition in this area makes Europe scientifically more competitive and fruitful than elsewhere. He claimed that in some non European countries, even though more money and resources were available for scientific research, research there could hardly make much progress due to the lack of an established tradition.⁸

3. Two dimensions of tradition

In his discussion of the rational, scientific tradition, Edward Shils says:

Each generation of scientists acquires what its predecessors have achieved through their successive experiences and analyses; the fruits of these experiences and analyses are passed onward. Many of these fruits are subjected to severe rational scrutiny and refined articulation. But not all that is presented and received is assimilated into this process. Some of it remains unarticulated, but that too is presented and received. The transmission of the articulated part of the rational, scientific tradition is made effective by the reception and mastery of its unarticulated part. The mind of the recipient is formed by this reception of both the articulated and the unarticulated.⁹

Scientific tradition has an articulated part and an unarticulated part. The articulated part is composed of the established theories, which can be viewed as a body of propositions. The unarticulated part refers to things such as the skill of carrying out research, the sensitivity to important problems, the insight or hunches in scientific discovery, and the ethos of scientific community. These are the "overtones" of a scientific tradition. They can hardly be codified, that is, systematically articulated with strict, formal rules or principles. I suggest that we adopt Polanyi's terminology and simply call the articulated part of a scientific tradition the explicit tradition, and the unarticulated part, the tacit tradition. If we aim at a complete understanding of a scientific tradition, both the explicit tradition and the tacit tradition are equally indispensable.

With the two dimensions of tradition in mind, we will see an important difference between Polanyi and Popper. Both are among the first modern philosophers who took seriously the issue of scientific tradition. But Edward Shils senses the difference between Popper and Polanyi in terms of Polanyi's clear consciousness of the distinction between two parts of the scientific tradition. Shils claims,

Polanyi went further than Popper in the analysis of the tradition of science. With all due respect to Popper, Polanyi's analysis was deeper. Beyond his statements about the existing

states of theoretical knowledge as the tradition to which every scientist has to respond, Popper touched only briefly upon the scientific sensitivity to problems and possibilities in a short passage on the difficulties to establishing a scientific tradition in a society in which there has been none previously. Here Popper showed that he knew that there is more to the scientific tradition than the givenness of theories at any particular point in time. He did not go any further. This Polanyi did.¹⁰

This is, no doubt, an acute comment. Let me try to spell out more clearly and more concretely the difference between Popper and Polanyi in the direction that is pointed out by Shils.

Basically, Popper stresses the importance of tradition in scientific research from the standpoint of critical rationalism. He argues that the growth of science is not, as conceived by empiricists, a result of collecting or accumulating empirical data. It is a result of producing hypotheses and theories, then testing them. The role of observation is not to produce theories, but rather to test and criticize them. Scientific investigation begins with established hypotheses and theories; it cannot start from scratch. We must stand on the shoulders of our predecessors. By way of getting familiar with the established theoretical framework, the young scientist establishes contact with a scientific tradition. Obviously, Popper primarily understands scientific tradition in terms of established scientific hypotheses and theories. Scientific hypotheses and theories can be articulated in principle, and hence fall under the category of explicit tradition. In contrast, Polanyi has a broader vision of the scientific tradition. He does not confine himself to hypotheses and theories in his understanding of the scientific tradition. He often talks about the transmission of the art of scientific research, delving into the tacit dimension of the scientific tradition. His deep insights into tacit knowing make his theory of tradition distinctively profound.

The distinction between two dimensions of tradition is implicit in Polanyi's discussions. Scholars like Edward Shils and Struan Jacobs make it explicit.¹¹ This is an important contribution to Polanyi scholarship. Fully acknowledging their achievement, I, nevertheless, believe that more can be found embedded in Polanyi's thoughts on tradition. In the following, I will try to press this line of thought by showing how the distinction between explicit tradition and tacit tradition can shed light on explicating the locality of tradition and the irretrievability of tradition once it is lost.

4. The locality of tradition

An important feature of tradition is that it often is a local one. This is shown by the fact that many schools of thought are named after a certain place. For instance, the Vienna circle (of logical positivism), the Frankfurt school of critical theory, the Chicago school of economics, the Copenhagen school of quantum theory, the Bergen school of meteorology, Boston Confucianism. The local character of tradition makes it difficult to transplant from one place to another. Popper says: "Certain types of tradition of great importance are local, and cannot easily be transplanted."¹² Scientific tradition is one of them. Talking about his experience in New Zealand, Popper points out that it is important for a country which lags behind in scientific research to establish a scientific research tradition. Polanyi also holds that modern science is based upon a local tradition. As mentioned above, the origin of modern science is in Europe and Polanyi emphasizes the importance of the local European tradition for the spread of science to other places: "Without the opportunity offered to young scientists to serve an apprenticeship in Europe, and without the migration of European scientists to the new countries, research centers overseas could hardly ever have made much headway."¹³

The local character of scientific tradition should lead us to reexamine the widely spread saying: “Science is beyond borders.” The claim is rich in its implications. However, I will leave aside its political and moral implications, and simply focus on its epistemological significance. I believe this claim represents an incomplete understanding of the nature of science in the sense that it applies only to explicit knowledge, but not to tacit knowing which focuses upon the art of research and the task of cultivating insights or hunches leading to discovery. Polanyi remarks, “While *the articulate contents of science* are successfully taught all over the world in hundreds of new universities, *the unspecifiable art of scientific research* has not yet penetrated to many of these.”¹⁴ With this in mind, we can certainly continue to claim that “science is beyond borders,” but we should not forget to add one more sentence which is important: “research is tradition-bound” and very often, as we have seen, the best research is carried out and taught in a local tradition.

Why are traditions often local? Can one account for the local character of tradition from an epistemological perspective? Both Popper and Polanyi see the fact that scientific tradition is a local tradition. However, Popper’s narrow conception of tradition as only the explicit scientific tradition, prevents him from coming up with a satisfactory account for the local character of tradition. Polanyi accomplishes this with his theory of tacit knowing. The difference between the two philosophers is not difficult to understand. As shown above, explicit knowledge can be successfully distributed globally, so what makes scientific tradition local can only be its tacit dimension. Or to put it bluntly, explicit tradition is global. It is tacit tradition that is local.

Polanyi explains the local nature of tradition in the following way: “An art which cannot be specified in detail . . . can be passed on only by example from master to apprentice. This restricts the range of diffusion to that of personal contacts, and we find accordingly that craftsmanship tends to survive in closely circumscribed local traditions.”¹⁵ What is true for art in craftsmanship is also true for art in scientific research. As Polanyi puts it in his early philosophical writing,

[S]cience as a whole is based—in the same way as the practice of any single research school—on a local tradition, consisting of a fund of intuitive approaches and emotional values, which can be transmitted from one generation to the other only through the medium of personal collaboration.¹⁶

As to the transmission of tacit knowing, the personal contact between master and apprentice is crucial. By means of intimate association with, empathy with, and imitation of, the exemplified acts of the master, the apprentice acquires the skill or art of research, the connoisseurship, taste, etc.¹⁷ Thus, on the one hand, the master-apprentice model proves to be an efficient mode for the transmission of tacit knowing, but on the other hand, it is this very model that restricts the transmission of tradition to a limited area and endows tradition with a local character.

In this connection, it might be helpful to take a look at the interesting epistemic fact expressed by a Chinese proverb that says “elite master produces elite apprentice.” In her study of the scientific elites, the Nobel laureates, H. Zuckerman draws our attention to the fact that there is widespread sociological inbreeding within the community of laureates. That is, the master-apprentice relationship obtains among a large number of laureates.¹⁸ A paradigm case in this respect is J.J. Thompson and E. Rutherford at the Cavendish laboratory, where there were altogether 17 laureates apprenticed to them. A widely shared agreement among the Nobel laureates was that the most valuable thing that they learned from their masters was not specific knowledge. So far as the scientific literature concerning a specific problem was concerned, sometimes the apprentice knew even more than the master. An elite master embodies the criteria of excellence of scientific research, shows scientific

taste, and is sensitive to important and deep problems and their elegant solutions. An elite apprentice, following the elite master in his or her socialization into the scientific community, gradually internalizes the criteria of excellence, develops his or her scientific taste and obtains the skills of research. Polanyi gives us a wonderful description of the master-apprentice relationship:

In the great schools of research are fostered the most vital premises of scientific discovery. A master's daily labours will reveal these to the intelligent student and impart to him also some of the master's personal intuitions by which his work is guided. The way he chooses problems, selects a technique, reacts to new clues and to unforeseen difficulties, discusses other scientists' work, and keeps speculating all the time about a hundred possibilities which are never to materialize, may transmit a reflection at least of his essential visions. This is why so often great scientists follow great masters as apprentices.¹⁹

Thus, we may conclude that the basic epistemic fact that “elite master produces elite apprentice” indicates the decisive role played by tacit knowing in knowledge transmission and knowledge innovation. This will become more and more apparent against the background of the rapid development of information technology and the much easier acquisition of explicit knowledge in this age. With a click of mouse, one can have easy access to various data bases, but how to use them for creative purposes, is another story.

To some extent, the locality of tradition is a manifestation of the spatial limitation of tradition. There have been various ways to overcome the limitation so as to advance learning. In ancient China, there was a scholarly practice called “You Xue”, which literally means, learning by traveling. In the modern academic world, we have the institutional arrangement of visiting scholar programs, which enables scholars to get deeply involved in a tradition with which they are not familiar. Norwegian philosopher Gunnar Skirbekk provides us with an interesting description of this process and dubs it an intellectually “deep tourism”:

However, since there are differences in professional background within a discipline, it is particularly useful to travel, to go somewhere else, to experience how qualified colleagues, with another professional background, do their work. Through a process of resocialization one then learns concretely how they handle questions, methods and notions. (There is, in this way, an intellectually “deep tourism”, side by side with superficial tourism.)²⁰

Different from superficial tourism whereby we have a glimpse of some scenic spots, intellectually deep tourism purports to offer an opportunity for a visiting scholar not only to get to know the explicit part of a certain scholarly tradition, but also to dig into the deep, tacit dimension of the tradition, and to assimilate things like the skill, the taste, and the ethos of the practitioners in that tradition.

5. Tradition is irretrievable once lost

Tradition is not only spatially limited, but also temporally limited. Polanyi reminds us that an art, having fallen into disuse for a period of one generation, will be completely lost. Once lost, it is irretrievable. “It is pathetic to watch the endless efforts—equipped with microscopy and chemistry, with mathematics and electronics—to produce a single violin of the kind the half-literate Stradivarius turned out as a matter of routine more than 200 years ago.”²¹ Popper also mentions that some local traditions (including scientific tradition) are precious, and “it is very difficult to restore them once they are lost.”²² In his view, the scientific tradition was

destroyed two thousand years ago in Greece. It did not take root again for a very long time. Like the local character of tradition, the irretrievability of a lost tradition again cannot be accounted for in terms of explicit tradition. It can only be explained in terms of tacit tradition. Tacit knowing grounds personal knowledge; it can be efficiently transmitted only through personal contact. When a tradition is lost, the chain of personal contact is broken and tacit knowing can in no way be passed down. After a period of a generation or so, according to Polanyi, the tacit knowledge of that tradition falls into oblivion. That explains why it is so hard for later generations to restore the lost tradition.

To sum up, I claim that, on the one hand, tradition is essential to science and scholarly work; it is a decisive factor which directly affects the creativity and the quality of our work in a certain field. On the other hand, it is very fragile, and apparently has its spatial and temporal limitations. In an age when innovation has become a sweeping ideology, what is said above is intended to be a reminder that tradition is both precious and fragile, so that we must be very patient to preserve, cherish, foster and cultivate our scientific and scholarly tradition.

Authority

As mentioned above, in the Enlightenment, authority, together with tradition, was denigrated. The very concept of authority was deformed at that time by being construed as implying blind obedience, thus being in diametrical opposition to reason and freedom. However, according to Gadamer, this is not the essence of authority. Authority

is ultimately based not on the subjection and abdication of reason but on an act of acknowledgement and knowledge—the knowledge, namely, that the other is superior to oneself in judgment and insight and that for this reason his judgment takes precedence, i.e., it has priority over one's own. . . . It rests on acknowledgement and hence on an act of reason itself which, aware of its own limitations, trusts to the better insight of others.²³

In short, authority does not imply obedience; rather, it grows out of the recognition of the limitation of one's own understanding and the superiority of other people's judgment, which itself is an act of reason. Thus, authority is not essentially in opposition to reason and freedom.

Polanyi shows great sympathy with modern science in its violent rebellion against the external religious and political authorities during its formative period. However, he argues that the impression, which took shape at that time, that science, as a rational and free enterprise of inquiry, should be free of authority per se is both misleading and detrimental to science itself. In this regard, I think, Polanyi would fully agree with Gadamer's critique of the Enlightenment's view that authority is antithetical to reason and freedom. Again, distinct from Gadamer's hermeneutic perspective, Polanyi develops his thoughts on authority within the philosophy of science. To Polanyi, scientific authority is just as indispensable and constitutive to the practice of science as scientific tradition.

Polanyi distinguishes two kinds of authorities, general authority and specific authority. The difference between them lies in the fact that the former lays down general presuppositions, while the latter imposes specific conclusions. Polanyi claims that any form of specific authority in science will only turn out to be destructive. He invites us to engage in the following thought experiment: Imagine that the President of the Royal Society has

the final power to make decision on every scientific issue and to impose his views on all scientists. The result would be that science would stop right away. Nobody with a love for truth would join any such institution. A general authority assumes that each individual in the scientific community is capable of making genuine contact with reality. Everyone can make original contributions to science. Innovation takes place at numerous growing points throughout the community. Scientific opinion is formed on the basis of the interplay of the individual scientists. A general authority is only a more or less organized expression of scientific opinion. In contrast, a specific authority presupposes that only the official center has authentic contact with reality. All the important innovations are made by the center. It demands not only each individual's devotion to the tenets of a tradition, but also the subordination of everybody's judgment to the official center. In sum, general authority presupposes freedom, while specific authority demands obedience.

Science, as an enterprise of free inquiry, must liberate itself from those specific authorities which are in conflict with it. The authority of the Roman Catholic Church in the formative period of modern science was such a specific authority. However, science cannot operate without any authorities. For science, general authority is indispensable. On the basis of the distinction between general authority and specific authority, Polanyi goes further and provides us with a careful and detailed analysis of three forms of general authorities in science.

1. The authority of the master over the apprentice

According to Polanyi, science is based on some fundamental premises or presuppositions. He argues that these premises are normally not transmitted in the form of explicit precepts. In the master-apprentice relationship, the apprentice, in his personal contact with the master, acquires the methods of scientific research, accepts the standards of scientific values, and grasps the premises and presuppositions of science. The process of the apprentice's assimilation into the premises of science is based on a recognition of the authority of the master and of what the apprentice is going to learn from him. "[N]o one can become a scientist unless he presumes that the scientific doctrine and method are fundamentally sound and that their ultimate premises can be unquestioningly accepted."²⁴ Of course, the teacher will also foster criticism and originality on the part of the student. However, Polanyi emphasizes, "[T]his must remain within proper limits; the process of learning must remain on the acceptance of authority. Where necessary this acceptance must be enforced by discipline."²⁵

As the student reaches intellectual maturity and becomes an independent scientist, the authority of the teacher is eclipsed and he will rely more and more on his own judgment and conscience in the practice of scientific research. However, this does not mean that he will get rid of all authorities. As a member of the scientific community, he has to submit to a new form of authority, namely, the mutual authority between scientists in the form of scientific opinion.

2. The mutual authority between scientists

Admittedly, a contribution to science is assessed according to its professional standards. According to Polanyi, the professional standards of science are composed of the following three items. 1) Sufficient plausibility: a contribution whose results apparently conflict with the current scientific view of the nature of things will be totally discredited by the scientific community. 2) Scientific value: the scientific value of a contribution is determined by three factors, its accuracy, its systematic importance and the intrinsic interest of its subject matter. 3) Originality: the originality of a contribution will arouse intellectual surprise among fellow scientists.

The assessment of scientific research is important, because it directly affects the allocation of resources (like posts, publications, research grants, and laboratories) among different scientific fields. The problem is that every single scientist is only familiar with a small fragment of the entire domain of science. It is difficult to compare the scientific value of the contributions from different branches of science, such as astronomy and medicine, which are remote from each other. This poses an important question: How can we abide by the same professional standards in different scientific branches? How is it possible to assess the contributions from different areas according to the same professional standards of science?

As an answer to this question, Polanyi puts forth the principle of mutual authority or the principle of mutual control:

It consists, in the present case, of the simple fact that scientists keep watch over each other. Each scientist is both subject to criticism by all others and encouraged by their appreciation of him. This is how scientific opinion is formed, which enforces scientific standards and regulates the distribution of professional opportunities. It is clear that only fellow scientists working in closely related fields are competent to exercise direct authority over each other; but their personal fields will form chains of overlapping neighborhoods extending over the entire range of science. It is enough that the standards of plausibility and worthwhileness be equal around every single point to keep them equal over all the sciences. Even those in most widely separated branches of science will then rely on each other's result and support each other against any laymen seriously challenging their authority.²⁶

The direct mutual authority or mutual control in neighboring branches, by the principle of overlapping neighborhoods, extends over the entire domain of science. Scientific opinion is based upon mutual authority between scientists and this makes possible a mediated consensus among scientists. This consensus guarantees the uniformity of professional standards in different scientific branches so that we can make reasonable assessment of contributions from areas which are far remote from each other. It is true that in the scientific community, authority is not equally distributed. The opinions of some distinguished scientists are more valued than those of others. But this does not change the fact that the authority of scientific opinion is essentially mutual. If a contribution by a scientist of high distinction is in sharp conflict with the current scientific opinion about the nature of things, it will equally be turned down. Scientific opinion operates *among* scientists, *not above* them. Scientific opinion is not the opinion of any single mind, it is held by numerous individual scientists. They directly or indirectly exercise authority over each other.

3. The authority of the scientific community over the general public

Scientific opinion is not only the foundation of the autonomy of science, but also the precondition for scientists as a whole to exercise authority over the general public. There are different interpretations about the universe, for instance, magical, mythological/theological, and naturalistic/scientific interpretations. After centuries of struggle, the majority of the general public has chosen science. To them, the naturalistic/scientific interpretation of the world is more convincing than other alternatives. Polanyi considers this a great historical achievement. The general public's acceptance of the authority of science is a prerequisite for science to continue to exist on the modern scale. Only with the support of the public can science get various resources that are necessary for its development. Of course, as it happens sometimes, the scientific authority might be in conflict

with the opinion of the lay public and laymen might challenge the judgment of the experts. Under such circumstances, Polanyi makes it crystal clear that scientists should defend the authority of science by upholding the professional standards of science and remain immune to the interference of the lay public. Using as a case study the Velikovsky affair, Polanyi argues strongly in favour of the authority of science over the general public.²⁷

The above may serve as an outline of Polanyi's understanding of how authority functions in science. Of course, he admits that scientific authority is fallible. When the enforcement of scientific authority is mistaken, valuable or original contributions of science might be ignored or even suppressed. In his scientific life, Polanyi himself has experienced this when his theory of absorption was suppressed for about half a century by the scientific authority which finally turned out to be the wrong.²⁸ However, Polanyi argues, the risk is worth taking. The discipline embodied by scientific authority is indispensable for the healthy development of science. Without the discipline imposed by scientific authority, science cannot be sustained. Polanyi gives us a vivid description of what happens when scientific discipline is lacking:

In parts of the world where no sound and authoritative scientific opinion is established, research stagnates for lack of stimulus, while unsound reputations grow up based upon commonplace achievements or mere empty boasts. Politics and business play havoc with appointments and the granting of subsidies for research; journals are made unreadable by including much trash.²⁹

When missing the constraints of scientific authority, the enterprise of science can hardly be carried on. Under such circumstances, science as an institution will inevitably be trapped in chaos and even collapse.

Originality

We have seen that a contribution to science is assessed according to the professional standards of science. And the professional standards of science, according to Polanyi, consist of sufficient plausibility, scientific value and originality. Originality is no doubt a highly cherished scientific value. Polanyi observes,

Since the Romantic movement originality has become increasingly recognized as a native endowment which alone enables a person to initiate an essential innovation. Universities and industrial research laboratories are founded today on the employment of persons with original minds. Permanent appointments are given to young scientists who are credited with signs of originality, in the expectation that they will continue to produce surprising ideas for the rest of their lives.³⁰

In Polanyi's view, the knowledge of an approaching discovery is the paradigm case of scientific knowledge,³¹ and "originality is the mainspring of scientific discovery."³²

It is evident that, in contrast to originality, the other two elements shaping the standards of science, plausibility and scientific value, emphasize scientific discipline. They require that scientific opinion reject contributions which are not compatible with the present view of science about the nature of things, and which lack sufficient scientific value, so as to maintain the quality of scientific contributions and to guarantee that science will operate with a reasonable standard. Discipline implies authority. And tradition is a form of

authority. Polanyi not only has deep insights about tradition and authority, he also makes brilliant observations on originality, especially scientific originality. Let me try to summarize his thoughts on originality as follows.

According to Polanyi, scientific research in a broad sense is composed of two kinds of work, namely, the heuristic work, such as scientific discovery, and the routine work, such as measurements, calculations, and making maps etc. In his efforts to bring to light the nature of scientific research by differentiating two kinds of scientific work, Polanyi uncovers various aspects of scientific originality.

Original scientific research crosses the logical gap between a problem and its solution. Not every solution of a problem can be accredited as a discovery. Polanyi distinguishes the systematic solution and the heuristic solution of a problem.

By ransacking my flat inch by inch, I may make sure of eventually finding my fountain pen which I know to be somewhere in it. I might solve a chess problem by trying out mechanically all combinations of possible moves and countermoves. Systematic methods apply also to many mathematical problems, though usually they are far too laborious to be carried out in practice. It is clear that any such systematic operations would reach a solution without crossing a logical gap and would not constitute a heuristic act.³³

In contrast to a systematic solution, a heuristic solution crosses a logical gap. Polanyi maintains that only a heuristic solution which crosses the logical gap can be viewed as a scientific discovery, and the width of the logical gap is taken as the measure of the ingenuity that is required to solve the problem.

According to *Personal Knowledge* (120-131), Poincare and Wallas see a discovery as composed of four stages: preparation, incubation, illumination, and verification. Illumination is the most critical stage. It is a leap by which the logical gap is crossed. Illumination displays itself as a process of spontaneous emergence, rather than a deliberate act. Here we see a further distinction between the systematic solution and the heuristic solution of a problem. According to Polanyi, a systematic solution is wholly deliberate, while a heuristic process is a combination of deliberate and spontaneous stages. In the four stages of a scientific discovery, preparation and verification are essentially deliberate, while incubation and illumination are basically spontaneous. In the period of incubation, nothing is done and nothing happens on the level of consciousness; the coming of the period of illumination is the result of earlier efforts, but is not in itself an action of the investigator, it simply happens to him. In a word, by emphasizing the logical gap between a problem and its solution, and by distinguishing the systematic and the heuristic solution of a problem, Polanyi reveals that scientific originality implies an intellectual leap and has the character of emergence.

Because a scientific discovery crosses a logical gap, and changes our interpretive framework, it is logically impossible to arrive at a scientific discovery by applying the existing interpretive framework. Polanyi claims, "The application of existing rules can produce valuable surveys, but does not advance the principles of science."³⁴ Since Francis Bacon formulated a procedure for empirical induction, there has been a popular belief that scientific discovery can be accomplished by applying a set of explicit rules to empirical data. In Polanyi's view, the modern objectivistic, formalistic conception of science is far from adequate to account for what is really going on in science and Bacon's methodology of induction is a travesty of scientific research. It is unable to explain scientific originality.

Polanyi distinguishes two kinds of rules, namely, the strict rules and the vague rules. In scientific work, both kinds of rules are relevant. The manuals of experimentation, measurement, calculation, and map-making fall under the category of strict rules. They will enable us to carry out these operations rapidly and accurately. However, according to Polanyi, carrying out these operations according to strict rules is only the routine work of a scientist. “Only routine progress—such as the production of good maps and charts of all kinds—can be made by rules alone.”³⁵ Scientific discovery is in sharp contrast to the routine work of a scientist. “Admittedly, there are rules which give valuable guidance to scientific discovery, but they are merely *rules of art*. . . . The rules of scientific enquiry leave their own application wide open, to be decided by the scientist’s judgment. This is his major function. It includes the finding of a good problem, and of the surmises to pursue it, and the recognition of a discovery that solves it.”³⁶ Admittedly, there are some vague rules to follow in scientific discovery; however, the application of these rules is decided by scientists’ personal judgment. A great scientist exhibits his genius in such judgment. As a creative activity, scientific discovery involves things that are not exhausted by rules; personal judgment is only one of them. Polanyi also revealingly probes into other elements in scientific heuristic work, such as imagination, intuition, intellectual passions, belief, conscience, and commitment. The secret of scientific originality is hidden in these elements, which cannot be exhaustively described in a set of rules. In sum, scientific discovery, as heuristic work, cannot be reduced to a set of procedures, or a set of rules. By following established procedures and existing rules, we can only do routine work and make routine progress.

The above two features of scientific originality imply that heuristic feats are irreversible, in contrast to the reversibility of more routine scientific work. Inspired by Piaget, Polanyi understands the reversibility of a procedure “in the sense that it could be traced back stepwise to its beginning and repeated at will any number of times, like any arithmetical computation.”³⁷ Polanyi claims, “Intellectual acts of a heuristic kind make an addition to knowledge and are in this sense irreversible, while the ensuing routine performances operate within an existing framework of knowledge and are to this extent reversible.”³⁸ The work to carry out operations according to the previous procedures and existing rules within an established interpretive framework is reversible. This is typical of routine work. In contrast, scientific discovery changes our interpretive framework, and makes us see the world in a different way. In this process, our intellectual personality undergoes an irrevocable transformation. Once we cross the logical gap, the previous heuristic tension disappears, and we will never be puzzled by the previous problems, just as we will never guess what we have known.

With regard to its content, each scientific discovery is a disclosure of new aspects of reality.

The most daring feats of originality are still subject to this law: they must be performed on the assumption that they originate nothing, but merely reveal what is there. And their triumph confirms this assumption, for what has been found bears the mark of reality in being pregnant with yet unforeseeable implications.³⁹

This is where Polanyi’s concept of reality becomes relevant. According to Polanyi, to say that something is real means that “it has the independence and the power for manifesting itself in yet unthought of ways in the future.”⁴⁰ Polanyi is a firm realist. Reality is independent of mind. It is the object of human cognition. He reiterates that scientific truth is a grasp of rationality in nature. It is the result of our contact with reality. He is strongly opposed to the positivistic attempt to substitute the simplicity, symmetry, economy, and fruitfulness of scientific theories for scientific truth. The independence thesis is the common ground of all realists. What makes Polanyi’s conception of reality distinctive is that it is essentially dynamic. According to Polanyi, external reality is to a great

extent hidden. It will manifest itself in unforeseeable ways in the future. Different things have different capacities to manifest themselves. Thus they have different degrees of reality. The goal of original scientific research is to discover new aspects of this dynamic reality.

Original scientific research frequently elicits surprise among fellow scientists. Scientific discoveries are very often unexpected. The more audacious, and ingenious a scientific discovery is, the stronger the surprise it produces. "The originality of a discovery is assessed by the degree of surprise which its communication should arouse among scientists."⁴¹ The features of originality noted above imply this psychological effect. However, one more factor merits attention. Originality will not be achieved by following public paths. Uniqueness, which is inseparably from solitariness, is definitive of originality. As Polanyi points out, originality in science is the gift of a lonely belief in something that no one else at the time will consider profitable to pursue. Established rules of inference offer us public paths for drawing conclusions from existing knowledge, but the original mind tends to deviate from the commonly accepted process of reasoning, and by crossing a logical gap, reaches his own unique conclusions that will surprise his colleagues. What originality points to is the unique insight into the nature of things, not the consensus among members of a scientific community. An original mind finds no one else to rely upon. He or she must find his way out all by himself. Innovators always feel lonely. Originality manifests itself in solitary situations.

"Originality must be passionate."⁴² The objectivistic conception of science claims that scientific research should be carried out soberly and dispassionately. Popper's falsificationism, according to Polanyi, is a paradigm case of the objectivistic conception of science. It holds that scientists are not only indifferent to the outcome of their surmises, but also seek to refute them. Polanyi argues that this view of science is not just contrary to experience, but also logically inconceivable. When a scientist puts forward surmises, what he or she aspires to is success, namely, scientific discovery. He has to risk failure, but never seeks it. The surmises of a scientist embody all his hope. They entangle every fiber of his being. The scientist is passionately committed to his surmises. Intellectual passions are indispensable to scientific research. They are not just psychological by-products, but have a logical function. Scientific originality finds its root in the intellectual passions of a scientist, in his deep love of his work. "You cannot expect that love to be replaced by a sense of duty, as it may perhaps be in marriage; for no one can make discoveries from a sense of duty without creative passion."⁴³ This is the passionate aspect of originality.

In summary, original scientific research crosses the logical gap between a problem and its solution. It takes the form of an intellectual leap and displays itself as a spontaneous process of emergence. One cannot make original progress by applying the existing procedures and rules. Originality is essentially irreversible. It is a disclosure of the new aspects of dynamic reality. Very often, it is accomplished in solitary situations and will produce surprising results. Originality is not rooted in a sense of duty, but in the intellectual passions of a scientist. These ideas recur in Polanyi's writings in different stages. As a well-established scientist himself, Polanyi has a deep understanding of scientific originality.

The Dynamics of Conformity and Dissent

By arguing that scientific tradition and scientific authority are constitutive of science, post-critical philosophy fully acknowledges the role of the uncritical in the pursuit of scientific truth. The emphasis on the importance of originality implies its recognition that being critical is essential to the progress of science, since, as shown above, originality can only be achieved by breaking through the existing intellectual framework. One can easily feel that there is certain tension between tradition and authority, on the one hand, and originality on

the other. The tension is also reflected in the three constituents of the professional standards of science. “Both the criteria of plausibility and of scientific value tend to enforce conformity, while the value attached to originality encourages dissent. This internal tension is essential in guiding and motivating scientific work.”⁴⁴ Evidently, in contrast to originality, which encourages dissent, tradition and authority in science are on the side of enforcing discipline and conformity. What we have discussed so far shows that these two aspects are both indispensable for the healthy development of science. Without originality, scientific progress lacks momentum; without discipline drawn from tradition and authority, scientific research is doomed to anomie. This means that in the practice of science, these two opposing aspects are united and reconciled. Then the issue becomes how this is possible. How can one account for the unity and reconciliation of originality and discipline, conformity and dissent in the practice of science? More specifically, one might ask how, given the indispensability of discipline which implies authority and tradition, to account for the possibility of originality? In Polanyi’s own words, the issue is “how the conformity enforced by current judgments of plausibility can allow the appearance of any true originality.”⁴⁵

As I understand it, Polanyi’s answer to this question can be captured in the form of two arguments. One is an argument based upon his conception of rules. The other might be called a metaphysical argument.

The first argument relates to Polanyi’s understanding of rules. As mentioned above, according to Polanyi, there are two kinds of rules, namely, the strict rules and the vague rules. Rules of art are vague rules.

Being incapable of precise formulation, rules of art can be transmitted only by teaching the practice which embodies them. For major realms of creative thought this involves the passage of a tradition by each generation to the next. Every time this happens there is a possibility that the rule of art be subjected to a significant measure of reinterpretation.⁴⁶

The question becomes how to reinterpret a rule. According to Polanyi, we cannot reinterpret a rule with another rule. The tiers of rules are limited. If we try to interpret rule 1 with rule 2, and interpret rule 2 with rule 3, the regress will soon come to an end. If we assume that all existing rules constitute a code of rules, then such a code cannot contain prescriptions for its own reinterpretation.

What is the point of this argument? In my view, Polanyi’s argument has negative and positive implications. Negatively speaking, it shows that the interpretation of rules of art cannot be accomplished by appealing to existing rules. Positively speaking, it indicates that the interpretation of rules of art always involves an element of innovation. In his words,

[E]very process of reinterpretation introduces elements which are wholly novel; and hence also that a traditional process of creative thought cannot be carried on without wholly new additions being made to existing traditions at every stage of transmission. In other words, it is logically impossible for tradition to operate without the addition of wholly original interpretive judgments at every stage of transmission.⁴⁷

Polanyi illustrates this point by referring to what happens in the major realms of creative thought:

The major principles of science, law and religion, etc., are continuously remoulded by decisions made in borderline cases and by the touch of personal judgment entering into

almost every decision. And apart from this silent revolution steadily remoulding our heritage, there are the massive innovations introduced by the great pioneers. Yet each of these actions forms an essential part of the process of carrying on a tradition.⁴⁸

Here we see that, on the basis of his analysis of the nature of the reinterpretation of vague rules, Polanyi brings to light the dialectics of tradition and innovation: Innovation is inherently demanded by tradition. The emergence of originality is a precondition for tradition to be successfully transmitted and take effect.

The metaphysical argument has to do with Polanyi's concept of reality. As mentioned above, reality, according to Polanyi, is dynamic; it will manifest itself in unforeseeable ways in the future. In parallel, science, which attempts to offer us insight about an aspect of reality, is also conceived as a dynamic process; it will manifest its truth inexhaustibly and often surprisingly in the future. The working scientist sees in the existing body of scientific knowledge an aspect of reality, which is an inexhaustible source of new, promising problems. Polanyi holds that this view of science is a metaphysical belief of working scientists. It is in this belief that they conduct their research, teach their students and exercise their authority. They teach their students to respect the value of the existing body of scientific knowledge, to accept the established intellectual framework. Meanwhile, they grant their students independent grounds and encourage them to make genuine contact with reality on their own, to start their own research and finally to make their own discoveries. These future discoveries are very likely in conflict with, or even in opposition with the existing intellectual framework. Polanyi claims:

This dual function of professional standards in science is but the logical outcome of the belief that scientific truth is an aspect of reality and that the orthodoxy of science is taught as a guide that should enable the novice eventually to make his own contacts with this reality. The authority of scientific standards is thus exercised for the very purpose of providing those guided by it with independent grounds for opposing it. The capacity to renew itself by evoking and assimilating opposition to itself appears to be logically inherent in the sources of the authority wielded by scientific orthodoxy.⁴⁹

This is how Polanyi, on metaphysical grounds, reconciles the two seemingly opposing aspects of professional standards of science, namely, discipline and originality, conformity and dissent. Based upon his dynamic realism, and a dynamic understanding of scientific truth, Polanyi expounds the dialectic of tradition, authority and originality: the existing body of knowledge and the established intellectual framework are guidelines and clues to future discoveries. Put differently, scientific orthodoxy (tradition and authority) inherently contains a challenge to, a revolt against and even a negation of itself. It inherently points to originality. Stimulating innovation is the real purpose of scientific orthodoxy.

Now we see that in Polanyi, the prejudice against tradition and authority since the Scientific Revolution and the Enlightenment is overcome. The apparent opposition between originality and discipline is sublated. They are reconciled in the actual process of scientific development. Polanyi's two arguments, one based upon his understanding of rules, and the other on his concept of reality and scientific truth, converge at this point.

To sum up, on the one hand, Polanyi acknowledges the tension between tradition, authority and originality, while on the other, he uncovers the deep unity that reconciles them. With this dialectic between tradition, authority and originality, post-critical philosophy demonstrates the dynamics of the critical and the uncritical in the act of knowing in a new perspective.

Endnotes

¹ Michael Polanyi, *Personal Knowledge*, London: Routledge, 1958, pp. 265-266.

² Cf. Edward Shils, *Tradition*, London: Faber and Faber, 1981, p. 101. In note 24 on this page, Professor Shils offers us a list of publications by various authors which treated the issue of tradition in science in a roughly chronicle order. Polanyi's *Science, Faith and Society* occupied the first place in this order. Cf. also Edward Shils, "On the Tradition of Intellectuals: Authority and Antinomianism According to Michael Polanyi" (*TAD* 22:2 [1995-1996]: 11), where Shils claims, "Michael Polanyi was one of the first writers of the twentieth century to call attention to the traditional element in the natural sciences. Polanyi put forward his views on tradition in scientific activity in the Riddell lectures which he delivered at the University of Durham in 1946. A few years later than Polanyi, Karl Popper published his essay."

³ Edward Shils, *Tradition*, London: Faber and Faber, 1981, p. 6.

⁴ Gadamer, *Truth and Method*, second, revised Edition, translation revised by Joel Weinsheimer and Donald G. Marshall, London: Sheed & Ward, 1989, p.281.

⁵ Gadamer, *Truth and Method*, p. 281-282.

⁶ Gadamer, *Truth and Method*, P. 283-285.

⁷ Karl Popper, *Conjectures and Refutations*, fifth edition (revised), London: Routledge, 1989, p.122.

⁸ Polanyi, *Personal Knowledge*, 1958, p. 53.

⁹ Edward Shils, *Tradition*, p. 22.

¹⁰ Edward Shils, "On the Tradition of Intellectuals: Authority and Antinomianism According to Michael Polanyi", *Tradition and Discovery*, Vol 22, No.2, 1995-1996, p. 13.

¹¹ Struan Jacobs recognizes the fact that Polanyi actually operates with two concepts of tradition. He claims that "Polanyi has two distinguishable concepts of tradition. One of these concepts concerns articulate lore or culture; the other concept, to which Polanyi is more inclined to apply the name of tradition, receives its fullest analysis from him with reference to science and it concerns the art of creative practice." See Struan Jacobs, "Polanyi on Tradition in Liberal Modernity", in *Emotion, Reason and Tradition*, eds. Struan Jacobs and R. T. Allen, (Hampshire: Ashgate, 2005): 69. Jacobs further argues that Polanyi's focusing on the art of science makes his study of tradition unusual, and his interest in articulate lore is only secondary. (79)..

¹² Karl Popper, *Conjectures and Refutations*, p. 121.

¹³ Michael Polanyi, *Personal Knowledge*, p. 53.

¹⁴ Michael Polanyi, *Personal Knowledge*, p. 53.

¹⁵ Michael Polanyi, *Personal Knowledge*, p. 53.

¹⁶ Micheal Polanyi, *The Logic of Liberty*, Chicago: University of Chicago Press, 1951, 56-57.

¹⁷ Popper takes imitation as an important aspect of tradition. "[O]ne of the connotations of the term 'tradition' is an allusion to imitation, as being either the origin of the tradition in question, or the way it is handed down." In Popper's view, imitation is an important feature which distinguishes tradition from institution. Cf. *Conjectures and Refutations*, p.134.

¹⁸ Cf. Harriet Zuckerman, *Scientific Elite: Nobel Laureates in the United States*, New York: The Free Press, 1977, chapter 4, pp. 96-143.

¹⁹ Michael Polanyi, *Science, Faith and Society*, Chicago: The University of Chicago Press, 1964, pp. 43-44.

²⁰ Gunnar Skirbekk, "Contextual and Universal Pragmatics: Mutual Criticism of Praxeological and Transcendental Pragmatics", in *Philosophy Beyond Borders*, edited by Ragnar Fjelland, et al., Bergen: SVT Press, 1997, pp. 318-319.

- ²¹ Michael Polanyi, *Personal Knowledge*, p. 53.
- ²² Karl Popper, *Conjectures and Refutations*, p. 121.
- ²³ Gadamer, *Truth and Method*, p. 279.
- ²⁴ Michael Polanyi, *Science, Faith and Society*, p. 45.
- ²⁵ Michael Polanyi, *Science, Faith and Society*, p.46.
- ²⁶ Michael Polanyi, *The Tacit Dimension*, Gloucester, Mass.: Peter Smith, 1983, p. 72.
- ²⁷ Cf. Michael Polanyi, *Knowing and Being*, edited by Marjorie Grene, London: Routledge, 1969, pp.

73-85.

- ²⁸ Cf. Michael Polanyi, *Knowing and Being*, pp. 87-95.
- ²⁹ Michael Polanyi, *Knowing and Being*, p. 57.
- ³⁰ Michael Polanyi, *Personal Knowledge*, p. 123.
- ³¹ Michael Polanyi, *The Tacit Dimension*, p. 25.
- ³² Michael Polanyi, *The Logic of Liberty*, p. 10.
- ³³ Michael Polanyi, *Personal Knowledge*, p. 126.
- ³⁴ Michael Polanyi, *Personal Knowledge*, p. 143.
- ³⁵ Michael Polanyi, *Science, Faith and Society*, p. 33.
- ³⁶ Michael Polanyi, *Science, Faith and Society*, pp. 14-15.
- ³⁷ Michael Polanyi, *Personal Knowledge*, p. 123.
- ³⁸ Michael Polanyi, *Personal Knowledge*, p. 77.
- ³⁹ Michael Polanyi, *Personal Knowledge*, p. 130.
- ⁴⁰ Michael Polanyi, *The Tacit Dimension*, p. 32.
- ⁴¹ Michael Polanyi, *Knowing and Being*, p. 54.
- ⁴² Micheal Polanyi, *Personal Knowledge*, p. 143.
- ⁴³ Michael Polanyi, *The Logic of Liberty*, p. 43.
- ⁴⁴ Michael Polanyi, *Knowing and Being*, p. 54.
- ⁴⁵ Michael Polanyi, *The Tacit Dimension*, p. 67.
- ⁴⁶ Michael Polanyi, *Science, Faith and Society*, p. 58.
- ⁴⁷ Michael Polanyi, *Science, Faith and Society*, p. 58.
- ⁴⁸ Michael Polanyi, *Science, Faith and Society*, pp. 58-9.
- ⁴⁹ Michael Polanyi, *Knowing and Being*, p. 55.

REVIEWS

M. Elizabeth Sargent and Cornelia C. Paraskevas. *Conversations about Writing: Eavesdropping, Inkshedding, and Joining In*. Ontario: Nelson, 2005. Pp. xv+111+459. ISBN: 0-17-541498-3. \$56.95 (CAD) or, for schools, \$5.00 (CAD)

Conversations about Writing mentions Michael Polanyi only occasionally (203, 313, 331); from his son John, it includes a mere two brief pieces (313-4), both of them after-dinner talks. The nomenclature of Polanyian epistemology is absent from its pages. Still, this book is a significant contribution to Polanyi studies.

On first glance the book is merely another rhetoric/reader, one among myriads compiled for consumption in first-year composition courses. Such books (and courses) usually have the modest aim of manufacturing quasi-respectable academic essays and other papers. This book has the customary contents and apparatus – a “Quick Reference” on punctuation and another on clausal relationships, addresses of supportive web sites, contents in eight chapters (or “Conversations”) of the two authors’ writing advice and assignments, as well as their commentaries bracketing a wide variety of published essays by established writers (with a few sample student essays thrown in). Such fare typically is intended to give composition students well-intentioned guidance on writing and topics to write in their own essays. As a typical textbook, this one invites a few trivial quibbles: I wish the essays had a type face a bit different from the authors’ contexts; it can be difficult to tell which is which. To signal an ellipsis, what might be the difference between “*” and “***”? The epigraphs which open each Conversation as well as in-text citations are included in the bibliography, but I wish they were in the index as well.

Such quibbles aside, this is an important book,

and no initial glance can begin to do it justice. The very title hints the book’s significance, as does its subtitle, “Eavesdropping, Inkshedding, and Joining In.” Beginning with an OED-informed “Riff on Eavesdropping,” readers are invited to become “a bold someone trying to stay dry outside in the cold while listening for useful news or stories or information...” (v) But we are quickly invited to become “inkshedders” also, doing “an informal kind of writing-to-learn, throw-away writing that you do in order to make something happen inside your head or inside the heads of others as you try to figure something out.” (4) And “joining in” is an invitation to us indeed to join in, to join in a conversation *about* writing, especially our own. We hear, remarkably and refreshingly, “*You* are the only true expert on your own writing [though you] may not yet fully and consciously know what you know (or trust it); you may not yet be in full possession of your expertise.” (2, emphasis in original) The subject of this book is not just “writing”; its essays are not merely “about” writing (and language). The intent instead is indeed to engage us in *conversations* whose subject is writing, conversations informed by recent thought and scholarship, conversations whose intent is that we *reflect* on our writing, both its processes and its products, such that we do writing with ever-greater competence and confidence in our own expertise.

In academic circles, serious conversations on writing and writing pedagogy are only some forty years old, as Sargent and Paraskevas rightly indicate. Until recently, the business of writing instruction (one could hardly call it a “field,” much less an academic “discipline”) has been dominated by a view of writing left over from the Enlightenment: writing was essentially if not exclusively “managerial,” a matter of putting into acceptable words and sentences matters whose “truths” had been somehow already established, prior to and independent of writing or any other acts of language. Of writing itself, there was nothing

much to be known. Thus, anyone could teach writing; writing teachers found themselves clinging tenuously to the lowest rungs of the academic ladder, poorly paid gate-keepers to cleanse the academic world of those whose usage might be linguistically embarrassing. (In the early 70's, for instance, I was summoned to a state-wide assemblage of Composition Directors. As a "get acquainted" activity, each of us was asked for the flunk-out rates of our first-year English courses. As quickly became apparent, the guiding assumption was that the *higher* a failure rate, the *better* job that institution must be doing.) As one early scholar of those times lamented in print, first-year composition was the course where students were not taught how to write better, but merely expected to.

Through recent decades, however, among circles of teachers and scholars the conversations on writing have become remarkably insightful, sustained, and important. These contemporary conversations (which also turn out to be ancient conversations, as we learn to read the old Greek and Roman texts with newly-opened eyes) undergird the "writing-across-the-curriculum" (or "writing-to-learn") movement in American higher education. We are learning to re-see writing, not merely as arrangements of scribal marks on a page, but as distinctive and vitally-important human *action*. In the essays it includes, the guidance and the bibliography which its authors provide, *Conversations about Writing* offers practicing and prospective teachers, of whatever disciplines, an efficient and fine way to "eavesdrop" on such important conversations. What's more, the tone is refreshingly Canadian: the book is both more earnestly attentive to the dynamics of actual writing and less arcane or agonistic than similar works in the United States have tended to become. While the book takes its bearings from the work of important recent scholars – among them Janet Emig, Nancy Sommers, Sondra Perl, and especially Peter Elbow – it does not genuflect before most-currently-fashionable of scholarly mavens of the field. (In the United States at least, a field's emerging academic respectability does have its price.) Instead, via the pieces it anthologizes, the book offers its readers an *apprenticeship* from practicing, serious (but never

self-important) writers reflecting on the writing they do.

The primary audience for the book is *students*; its basic intent, to teach them (or, much more accurately, to help them *learn*) to be better writers, taking seriously and building upon their natural abilities as language-using persons. Students are guided through eight chapter-length "Conversations" In each, students are invited to "eavesdrop" by reading pertinent professional (and some student) essays. There are no "questions at the end" to check on students' comprehension. Instead, *preceding* the essays are prompts for pertinent "inksheddings." That is, a vital dimension of each Conversation is to evoke what *students* bring to it, from their own lived experience, expertise, and articulation. Each Conversation ends with "Essay Ideas" pertinent to that section and, more important, "New Practices to Take Forward"; that is, exemplary writing practices that students have now exercised and are invited to make habitual. Throughout the book and without any hint of condescension, the intent is to draw students *into* serious conversations about writing, by listening into (and joining into) written conversations that professionals have been having *about* student writing and by articulating their own experiences with and insights into writing, thereby fashioning their *own* expertise.

The novel and vital presumption is that it is via such conversations, with others whom we meet in print and still others with whom we meet more immediately as members of a community of inquirers and with ourselves, that we learn.

The eight Conversations begin, instructively, with one on "Life Without Language." There among others we hear from Helen Keller (and her teacher Anne Sullivan); from Malcolm X, on his deliberate acquisition of *written* language; from Eva Hoffman, reflecting decades later on her arrival in Canada as a small child speaking only Polish. (In her newly-learned English words "the signifier has become severed from the signified.... 'River' in English is cold – a word without an aura. It has no accumulated associa-

tions for me, and it does not give off the radiating haze of connotation. It does not evoke.... I have no interior language, and without it, interior images, — those images through which we assimilate the external world, through which we take it in, love it, make it our own — become blurred too” [42-3]).

Succeeding Conversations are predictable in their succession of topics, from the writing process, exploratory writing and invention, issues of avowedly academic writing, of grammar, of organization and genre, and finally on distinguishing between revision and proofreading. But each Conversation challenges, asking us to entertain perspectives which will be new to most students and to many instructors. Thus for instance the Conversation on “academic writing” begins by asking, “Do you know what your theory of knowledge is?” It then briefly presents a view of knowledge as socially constructed by arguing *There is no knowledge anywhere that was not shaped, created, or upheld by human beings* (177, emphasis in the original). In doing so, the conversation invites us to consider academic writing as involving us in “a web of social obligations” (179). Similarly, the Conversation on “grammar” cites some of the voluminous research on the futility of isolated grammar exercises in improving student writing, invites us to consider the *innate* grammar each of us has re-invented by virtue of being human, and offers us ways to consider “grammar” as ranges of stylistic and rhetorical *choice* we can exercise with increasing effectiveness. And the Conversation on “Organization and Genre” invites us to think of a writing’s organization in terms of *time* rather than as some spatially-based structure.

I have acknowledged that *Conversations about Writing* barely mentions the name “Polanyi,” yet I have also claimed that the book is a significant contribution to Polanyi studies. That it is, and in two respects. One of this book’s authors, Elizabeth Sargent, in addition to being a thoroughly dedicated teacher and scholar of writing, is also a remarkably able scholar of Michael Polanyi’s thought. (See her article, Elizabeth Wallace *et al.*, “Polanyian Perspectives on the Teaching of Literature and Composition,” *Tradition and*

Discovery, 17 (1990-91), 4-17.) Via the authors’ words and the anthologized essays, informing *Conversations about Writing* throughout are such central Polanyian concepts as indwelling, inquiry, community, and of course, articulation. Though its debts to Michael Polanyi remain tacit, this book is deeply informed with Polanyi’s work.

I well recall the complaint which Polanyi himself voiced at the 1972 Dayton conference: scholars gathered there were spending their efforts attending *to* his work rather than *from* it; he urged them instead to be seeking out his work’s implications and applications in their respective areas of inquiry. *Conversations about Writing* does that; it thoughtfully attends *from* Polanyi’s philosophy. In doing so, *Conversations about Writing* offers readers of this journal an extended pedagogical example which they would find instructive, no matter the field of their own writing and teaching.

This book significantly contributes to Polanyi studies in another arena as well, that of teachers and scholars of writing and writing-across-the-curriculum. Many such readers will find much of this book’s advice familiar; though informed here (tacitly) by Polanyi, it has also been hard-won through recent decades’ teaching, reflecting and, yes, conversing. Their pedagogical — and epistemic — battles remain far from won in the halls of academe. Many of these practitioners are so consumed “in the trenches” of their arduous teaching that they are largely ignorant of their work’s philosophic foundations, and they face opponents who can be quick to claim that there *are* none. *Conversations about Writing* helps give the lie to such presumptions. There *are* important philosophical foundations for much of the best that writing teachers do, and much of those foundations is to be unearthed in the insights of Michael Polanyi.

One of those foundations is, quite simply, conversation. While for over a decade I worked with faculty from across my own university campus, one colleague in particular kept reminding me: what next steps can we take to keep the *conversations* going? That is a key question for all of us; it is a challenging one, one to which *Conversations about Writing* represents a significant contribution.

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Robert B. Laughlin. *A Different Universe: Reinventing Physics from the Bottom Down*. New York: Basic Books, 2005. Pp xviii+254. ISBN 0-465-03828-X. \$26.00, hardback.

A book by the physicist awarded the Nobel Prize for his work on the fractional quantum Hall effect? It sounds like it might be insightful, but also probably dry and daunting. Well, it is extremely insightful and sometimes challenging, but certainly not dry or inaccessible. Laughlin, a Professor of Physics at Stanford, writes much more in the light-hearted spirit of Richard Feynman than in the turgid prose of too many physicists. And like Feynman's books, this is an important work.

One question that Laughlin engages throughout this work is whether physical law emerges from principles of organization, or whether organization is the product of these laws. He mentions discussing this issue with his father-in-law while "working on a couple of gin and tonics in order to escape discussing movies of emotional depth with our wives" (xi). Laughlin recognizes this is a sort of chicken and eggs problem, but he argues passionately and, I think successfully, that empirically observable organization gives us a far more reliable fix on reality than reason relying on laws or an analysis of parts. "Law instead follows from collective behavior, as do things that flow from it, such as logic and mathematics" (209). Laughlin can thus be seen as a highly sophisticated adherent of British and American empiricism in contrast to continental rationalism.

A Different Universe demonstrates that physics need not be reductive in its approach. When we know the laws through which some collective, emergent level works, the laws of the deeper levels upon which the emergent whole depends can be ignored. Laughlin states that "science has now moved from an Age of Reductionism to an Age of Emergence, a time when the search for ultimate causes of things shifts from the behavior of parts to the behavior of the collective" (208).

Well, many have joined Polanyi in trumpeting the importance of emergence, but what makes Laughlin's book stand out is the experimental evidence of many sorts he brings to bear on the issue. For a physicist, he claims, accurate measurement is the key to meaningful insight.

For example, at an accuracy of one part in one hundred thousand, one discovers that the length of a brick is not the same from one day to the next. A check of environmental factors reveals this to be due to variations in temperature, which cause the brick to expand and contract slightly. The brick has become a thermometer. . . . But at an accuracy of one part in one hundred million, the weight of the brick becomes slightly different from one laboratory to the next. The brick is now a gravity meter, for this is an effect of slight variations in the force of gravity due to differing densities of rock immediately below the earth's surface. (11)

Through increased precision, one gains different sorts of insights and exposes falsehood. Such measurements uncover a quite limited number of constants, like the speed of light or the Rydberg constant, "the number characterizing the quantization of light wavelengths emitted from dilute atomic vapors and responsible for the astonishing accuracy of atomic clocks" (15). Laughlin rejects the notion that these constants are basic building blocks of the universe we have to accept simply as primitive facts. He adduces evidence to show that they must be seen as collective effects even if we do not fully understand their components. Collective effects have the property of overcoming all sorts of impurities, and as the sample increases in size, one approaches asymptotically a lawful or structural constant. "Microscopic uncertainty does not matter, because organization will create certainty later on at a higher level" (19).

The continually unfolding history of breaking down matter into ever smaller parts – from atomic and subatomic particles down to quarks – cautions one to the danger of proclaiming any entity to be the ultimate building block from which all is constructed. Laughlin was awarded his Nobel Prize for constructing the first mathematical description of the fractional quantum Hall effect, a discovery revealing that "ostensibly indivisible quanta – in this case the electron charge e – can be broken into pieces through self-organization of phases. The fundamental things, in other words, are not necessarily fundamental" (77).

The chapter on the phases of matter is particularly effective in revealing Laughlin's take on the world. Solids, liquids and vapors are organizational phenomena that generate

many everyday examples of exactness. Liquids have the defining property of not tolerating pressure differences between any points except those due to gravity, which is why hydraulic machinery works (36). But of course the properties of a gas or liquid disappear when one moves from a large collection of molecules to a few or only one molecule. The issue of scale is a serious factor in considering collective phenomena. “One might say that small samples contain elements of all their possible phases – just as a baby contains all the elements of various kinds of adulthood – and that the system’s identity as one phase or the other develops only after some properties are pruned away and others enhanced through growth” (146). The histories of large systems describe emergent simplicities, whereas those of small systems deal with pedantic detail (90).

Laughlin is enchanted by instances of symmetry and simplicity in nature. “In a world with huge numbers of parts the unusual thing is not complexity but its absence. Simplicity in physics is an emergent phenomenon, not a mathematically self-evident state from which any deviation is a worrisome anomaly” (130). As already noted, he argues that things conventionally considered to be fundamental are collective phenomena. A rather startling example of this thesis is that the properties of empty space “show all the signs of being emergent phenomena characteristic of a phase of matter. They are simple, exact, model-insensitive, and universal” (105). The apparent emptiness of space is an emergent phenomenon, but space itself “is more like a piece of window glass than ideal Newtonian emptiness” (121).

How do new entities emerge from systems that have acquired order and simplicity? Laughlin discusses “spontaneous symmetry breaking” as one generator of newness. Symmetry breaking occurs when “matter collectively and spontaneously acquires a property or preference not present in the underlying rules themselves” (44). Matter gets oriented in some specific way on the basis of some otherwise insignificant initial condition or external influence, a notion exploited in complexity theory. Once so oriented, it becomes part of the factuality of the world influencing subsequent orientations. Symmetry breaking demonstrates how nature can become richly complex even though obeying underlying rules that are simple.

Laughlin’s work is replete with richly suggestive ideas. He makes such terms as entanglement, antitheory, the Dark Corollaries, and Barriers of Relevance come alive. But I convey the wrong impression if it is thought that the book’s outcome is to lead the reader to deep and esoteric secrets about the world. Even though honored for his mathematical astuteness, he argues against the notion that we might be able to gain mastery of the universe through mathematics or logic alone. “The world we actually inhabit, as opposed to the happy idealization of modern scientific mythology, is filled with wonderful and important things we have not yet seen because we have not looked, or have not been able to look at due to technical limitations. The great power of science is its ability, through brutal objectivity, to reveal to us truth we did not anticipate” (xvi). In this last sentence we see the similarity between the path followed by Laughlin and the route earlier taken by Polanyi, although of course Laughlin’s path builds upon experimental evidence not available to Polanyi. But one would not be too far off base to see *A Different Universe* as a Polanyian extension.

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Gerald van Koeverden. *The Child’s Secret of Learning*. New York: iUniverse, Inc. Pp. ix + 236. ISBN: 0-595-34615-4. \$19.95, paper.

According to the biographical information given on the back cover, Gerald van Koeverden has “survived 23 years of schooling to work in a range of professions on three continents.” He does not tell us what those professions are, but he has clearly been in conversation with philosophy, the sciences, and some theology. His most extensive conversation partners are Noam Chomsky, from whom he draws in his discussion of language, and Michael Polanyi, from whom he draws most notably the phrase, “dwelling in.” Koeverden writes for “impractical playful” persons who simply enjoy the challenges of working through problems (23) in order to offer clues about and insights into when and how learning can occur (7). Koeverden writes in a style and spirit consistent with this intended audience: his style and the second half of the book touches suggestively on a wide range of intellectual debates.

Koeverden takes as his paradigm of learning that of developing skills such as driving, typing, and speaking (Chs. 1-7). He makes two major claims about the learning of skills. The first is that skills integrate ideas and emotions smoothly and seamlessly, for the most part, so that “the body drives the car with no direct instructions from the thoughtful mind. It is as though the movements of our eyes, hands, and right foot are woven together, smoothly functioning in coordination with their interpretation of the traffic rules and the road situation” (13). Like Polanyi, Koeverden realizes that a slight shift of focus or increased self-consciousness about what one is doing will cause the integration to collapse (e.g., 14, 42-43). His second claim is that such skills, like all learning, emerge in a process marked by a rhythm of leaps and plateaus (e.g., 41-42, 46) and influenced by a mix of both external pressures and internal initiatives (125).

From reflection on the process of learning, Koeverden then turns to reflection on the learner (Chs. 8-10). He characterizes the learner as made up of a quartet of four singers. The first is the artist, who serves as the antennae, sensitive to emotions. The second is the theorist, who translates raw emotions into perceptions. The third member of the quartet is the empiricist, who takes the ideas generated by the theorist and tests them against the evidence. Finally, the fourth member, the idealist, synthesizes emotion, idea, and evidence for the sake of purposive action (see 5-6, 106-114, 143-145, and 212). As Koeverden describes these members of the quartet and the challenges and joys of teaching them to harmonize, he makes three important observations. The first is that they all unite emotion and thought because of how sensory organs are biologically connected to both cognitive and emotional centers in the brain (93-96). The second claim is that creativity permeates the process in the work of each member of the quartet, as well as in the final synthesis (212). Koeverden’s final point is that metaphor is central to all members of the quartet, the theorist as much as the artist (212-215).

In the remaining chapters of the book, Koeverden uses these insights to explore both debates in the sciences and characters in literature. He suggests that harmonious functioning of the quartet can resolve misunderstandings of the nature of the sciences (Ch. 13), as well as a variety of current debates in physics (Ch. 14), about nature vs. nurture (Ch. 15), creation vs. evolution (Ch. 16) and reason vs. emotion (Ch. 17). He

explores the personality dynamics of Othello (Ch. 18) and Don Quixote (Ch. 19), before offering a two-chapter conclusion. Although he does not devote a distinct chapter to the topic, Koeverden also suggests that the division between arts and sciences that can create havoc in contemporary academic culture lies in tensions between members of the quartet (e.g., 4-5, 211).

The book’s playfulness is both its chief strength and its major weakness. The book is an easy read; there is no ponderous prose to drive the reader away. The range of topics addressed prevents the reader from getting bored, partly because the topics are inherently important and interesting and partly because the subject shifts frequently. The playful style also frustrates, however, because it is hard to find clearly-stated conclusions. For example, by the end of the book, one is hard-pressed to articulate what the child’s secret to learning is. The logic is often more impressionistic than rigorous. The insights are often more commonplace than profound. Some could, with good reason, argue that Koeverden claims to do too much in too little space. After all, can one really resolve the debate about nature and nurture in a single, short chapter?

Such criticisms valid as they may be, should not, however, blind readers to the value of the book. After all, Koeverden is honest about what he intends to accomplish. He does not intend to provide detailed, final answers to the secrets of learning—only clues. One such clue is that whatever secret to learning there may be, it is to be found in the integration of a quartet, an integration that comes naturally to the child, but less so for adults. Adults have to achieve it by dwelling in problems, questions, and the perspectives and insights produced by each member of the quartet (e.g., 24, 150). Koeverden also offers suggestions about what makes for successful teachers. At the very least, good teachers never forget the significant questions that drive learning (19-20) and understand that teaching should “initiate an emotional and physical dynamic that excites student effort and aspiration” (91). If one wants to learn how to do all that, Koeverden would respond by encouraging the reader to consult any number of available “how to” books on pedagogy. In the meantime, he calls the reader to wonder, joy, and play.

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