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Preface

In this number, there is more bounty from the seven conferences held during the Polanyi centennial year ending last March. “Faith, Form and Meaning” is a report on the November 1991 United Kingdom centenary conference sponsored by Convivium. Jim Tiles’ essay exploring the relation between John Dewey and Michael Polanyi’s thought, was originally a paper delivered at the April 1991 Kent State conference. Sam Watson’s piece on Polanyi and rhetorical studies is the third and final component of the articles published during the last year under the title “The Tacit Victory and the Unfinished Agenda.” All such articles grew out of presentations on the relevance of Polanyi’s thought to disciplinary developments by long-time Polanyi students at Kent State and at the November 1991 Polanyi Society centenary banquet in Kansas City. Richard Gelwick’s “Michael Polanyi and the Philosophy of Medicine” was originally a contribution to the August 1991 Budapest conference of the Michael Polanyi Liberal Philosophical Association. Also you will find a copy of the remarks made by Nobel Laureate John C. Polanyi at the commemorative conference in Hungary. Certainly, the materials included in this issue suggest the range of interests that Polanyi scholars have.

Inside is information on the upcoming annual meeting of The Polanyi Society which is held in conjunction with the annual meeting of the American Academy of Religion. There were so many good paper proposals that David Rutledge arranged to schedule two sessions, one on the evening of November 20 and a second in the morning of November 21 at the San Francisco Hilton. Instructions on how to order papers are included.

Please notice the form in the back of the issue: it is time to renew memberships in The Polanyi Society. It is possible to publish *TAD* only if most of those on the mailing list actually support the enterprise with hard dollars. Expect to receive humorous but nagging, dunning notices by late Fall if you don’t get a check off to General Coordinator Richard Gelwick. Notice also that the form includes a new blank asking for your electronic mail address. Some of the business of The Polanyi Society is now conducted by e-mail--it is the most economical way these days. Several folks have indicated some interest in setting up a “Polanyi list,” i.e., an electronic address which INTERNET and BITNET users interested in Polanyi can employ to discuss matters related to Polanyi’s thought. Undoubtedly, this may sound strange to those who are unfamiliar with the truly incredible electronic world emerging through INTERNET and BITNET. However, there already are scads of “interest group lists”, including several in philosophy, that are vibrantly functioning. If you think you might be interested in using a “Polanyi list,” write me a note (pmullins@vax1.umkc.edu). It is not certain that we can set up such a list, but, if there is sufficient interest, we will explore possibilities.

Phil Mullins

NEWS AND NOTES

Robin Hodgkin, Oxford, England has an article coming out in the *Oxford Review of Education* in their autumn issue "which attempts to marry Polanyian ideas (`from-to' integration, etc.) and the theory of multiple intelligences espoused by such persons as Howard Gardner and Julian Jaynes." In 1980, **Jerry Gill** wrote about the bicameral mind and tacit knowledge. Hodgkin does not fully agree with Gill.

Walter Gulick, Eastern Montana College, has received a Fulbright Award for lecturing in Hungary at the Technical University of Budapest in 1993. Walter is the book review editor for *Tradition & Discovery*.

Andy Sanders, philosopher of religion in the faculty of theology at the University of Groningen, will be attending Polanyi Society meetings at the American Academy of Religion, Nov. 20-24 in San Francisco. In route, he is willing to speak to groups out of his rich portfolio of topics such as "Religious Belief, Knowledge and the Natural Sciences" and "Tacit Knowing: Between Modernism and Post-Modernism." The Boston Theological Institute through its Faith and Science Exchange forum plans to arrange a lecture. Others may contact him at Aart van der Leeuwlaan 104, 9721 TJ GRONINGEN, The Netherlands. Telephone +31-50-267226; FAX +31-50-636200. Here is a great opportunity to enrich your local program with an able and very English fluent philosopher and Polanyi scholar from the Netherlands.

Raymond Wilken, chief organizer of the centennial program at Kent State has been overwhelmed with additional teaching responsibilities due to austerity conditions in the university budget. He has, however, just submitted the set of plenary lectures there for editorial review for publication. **Phil Mullins**, **Richard Gelwick**, and **Charles McCoy** are working with him toward our goal of publishing them.

David Rutledge, Furman University, is the new Coordinator of Religious Studies for The Polanyi Society and has arranged for an expanded program at the American Academy of Religion meeting in San Francisco. The program as announced in this issue will begin on Friday evening at 7:30.

Paul Nagy, Indiana University, Indianapolis, and **Richard Gelwick** have been invited to be research members of a project developed by The Michael Polanyi Liberal Philosophical Association in Hungary. The project is under the sponsorship of the Central European University of Prague and of Budapest. It will focus on the significance and development of the liberal tradition in Eastern Europe.

Phil Mullins has arranged with The Philosophers Index for the specifically philosophical papers in *Tradition & Discovery* to be reported in their periodic index. More persons will become aware of our work through this major research resource.

Gabriella Ujlakia, Technical University of Budapest, and **Endre Nagy**, ELTE Institute of Sociology, were at the University of Chicago this summer completing their acquisition of copies of the Polanyi papers for The Michael Polanyi Liberal Philosophical Association in Hungary.

Above the word *LIBERAL* occurs several times in reference to the work of the Hungarians. For persons accustomed to thinking of *liberal* in the tradition of John Locke and of John Stuart Mill, we need to be aware that the Hungarians have a different tradition. They conceive of liberty in terms of a free pursuit of truth but guided strongly by the depth of tradition and of community. This difference from Anglo-American individualistic type of liberalism is one of their perspectives on Polanyi that they expect to explore in their research.

If you have things for ***News and Notes***, please send them to my office listed on the inside page of the cover.

Richard Gelwick
General Coordinator

Upcoming Polanyi Society Meeting at the American Academy of Religion

November 20 and 21, 1992
Hilton Hotel
San Francisco, CA

As in earlier years, The Polanyi Society will have a meeting in conjunction with the annual meeting of the American Academy of Religion which, in 1992, meets in San Francisco, California. This year there will be two sessions with papers, one in the evening (7:30-10 p.m.) on Friday, November 20, 1992 and a second session in the morning (9 a.m.-12 noon) Saturday, November 21, 1992. The AAR annual meeting begins in the afternoon of November 21. A Friday evening paper session was added this year because there were many good proposals for papers. Those who regularly attend the session on the opening day of the AAR meeting are encouraged to make travel plans which will allow you to be available for the Friday evening session also.

As in earlier Polanyi Society meetings, participants are encouraged to read papers before the session. Papers can be ordered from David Rutledge (Department of Religion, Furman University, Greenville, SC 29613) for $5 for the set. Please order early; papers will be mailed in mid October.

Both sessions listed below are to be held in the Whitney Room of the San Francisco Hilton on Union Square.

Friday evening, November 20, 1992, 7:30 - 10:00 p.m.

"An Alternative Form of Theological Knowing" - Elizabeth Newman, Saint Mary's College
Respondent: Richard Gelwick, University of New England

"The Fallacy of Misplaced Semantics: Polanyi and Cognitive Science" - Robert Paul Doede, Regent College
Respondent: Andy Sanders, University of Groningen

Saturday morning, November 21, 1992, 9 - 12 a.m.

"Polanyi's Post-Critical Recovery of Truth as Correspondence" - Dale Cannon, Western Oregon State College
Respondent: Mark Hendricks, Spring Arbor College

"Platonic, Polanyian, Post-Polanyian Dialectic" - Walter B. Mead, Illinois State University
Respondent: Barbara Bennett Baumgarten, Santa Paula, CA

Business Session at 11:30 a.m.

Faith, Form and Meaning: A Report on the U.K. Centenary Conference

Robin A. Hodgkin

The United Kingdom Centenary Conference on Michael Polanyi's thought was held at St George's, Windsor Castle, in November, 1991. It was planned as an exploration of certain key ideas from the later chapters of *Personal Knowledge*, and thus to contribute to the current, growing conversation between literature, science and theology in the areas of faith, form and meaning. We were particularly encouraged when three distinguished speakers agreed to come: Professor Stephen Prickett from Glasgow University, Professor Brian Goodwin from the Open University and Professor the Rev'd Dan Hardy from Princeton. Their three lectures, summarised below, sparked off searching and lively discussion in the groups that also met. Important contributions were also made by three Hungarian guests.

I

Stephen Prickett, in a paper entitled, "Ambiguity and Symbol in Living Language," placed Polanyi within a tradition which flows through Coleridge and the Romantic Movement and on to Newman. "Anyone familiar with [Coleridge and Newman] will have little difficulty in recognising in Polanyi one of the twentieth century's most distinguished exponents of that same `fiduciary' tradition. Both share a common epistemology, believing that commitment is an essential part of knowing, and that such knowledge...belongs to and is inescapably a part of a linguistic community."

Prickett then stressed a number of similarities between Newman and Polanyi, but there were differences too: "The most striking... is that whereas Newman finds his linguistic community in `the community of faith,' in other words the Catholic Church itself, standing in contradistinction to the World which surrounds it, Polanyi sees no reason at all to cordon off the life and language of the Church from that of the rest of human existence and seems to imply that all language is of its intrinsic nature `fiduciary,' and ultimately, therefore, pointing towards the existence of God. We need, I think, to recognise how big a leap this is."

It was Nietzsche, rather surprisingly, who first saw that language itself can be proof of God. "I fear we are not getting rid of God," he wrote, "because we still believe in grammar." Prickett sees a tacit understanding of this in Polanyi and speculates as to why he never made it explicit.

There followed a full and fascinating exploration of the openness of language to what is new: "That final inability of living ordinary human language to maintain itself as a totally closed system." This is what Polanyi means by "indeterminacy." At a later stage, Prickett considered both the similarities and the profound dissimilarities between Polanyi's view of "openness" and that of the contemporary deconstructionists in literary theory, Roland Barthes particularly. The difference is that the deconstructionists are concerned with the transparency or absence of the person

in the processes of language; whereas with Polanyi, it is the creative presence of persons which is emphasised in all his work.

Prickett concluded by commenting on recent books by Kevin Hart and George Steiner. The latter's *Real Presences* is a powerful meditation on the above-mentioned theme, the centrality and necessity of creative personal powers. "Steiner is asserting," says Prickett, "with a boldness not hitherto attempted, the confluence of the aesthetic and the religious. All art is ultimately religious art. It is not in grammar, but in poetry that we encounter God."

II

Brian Goodwin spoke to us about the emergence of a new perspective in biology. His title was, "A Science of Qualities," and he, too, spoke of "a presence," something over and above the parts which constitute a new whole. "Clearly, living beings have some property of dynamic order that is elusive, a kind of presence that speaks to us at a deeply intuitive level since we share the condition." He was not suggesting, however, nor, indeed, was Polanyi when he touched on these matters, any return to vitalism.

Goodwin started with a powerful critique of the current "selfish gene" orthodoxy. He showed that this is a kind of essentialism (genes = the essence of life). Like some kinds of religion, this introduces a false dualism: "a part of the organism [the genetic material] is regarded as the source of distinctive qualities and is given powers it does not possess." "This is like the view that the plan for making a house contains all the information required for its construction"--leaving out all the information embodied in the bricks and mortar and all the personal knowledge flowing through the builders' hands. Goodwin presented these ideas as the background to a new, emerging holistic theory in which *form-development* (morphogenesis) rather than inheritance would be at the centre. These ideas are "intimately linked to structuralist thinking as it has developed during this century [in, for example, linguistics or anthropology]. Together, they provide a basis for a holistic science of qualities."

What evolves then, is not genes, though, of course, these play a key role, but whole organisms, dynamic entities, that reproduce and have hereditary properties. "What," asks Goodwin, "is the nature of these entities? They are fields of particular kinds. A field is a domain of relational order in which the state of any part is a defined function of the states of neighbouring parts, (the neighbourhood can be local, or extend over the whole organism)." A simple example of a non-living "natural kind," shaped by a field, would be the spiral pattern of water flowing down a hole.

A spectacular example of this kind of morphogenesis initiated by but vastly transcending the instructions of the genes was demonstrated by the development of giant, single-celled alga - acetabularia. Goodwin and his colleagues have studied the complex, spontaneous development of this organism in detail, using a powerful computer-modelling technique to imitate it.

Such studies which are being carried out by many researchers suggest that we are in sight of a new, "intelligible unification in biology."

> [This will] shift the emphasis from the historical reconstruction of life on earth, Darwin's goal and that of current evolutionary theory, to the construction of the systems of transformations that define the range of biological forms, making a rational taxonomy possible. Evolution [will then be seen as]

> an exploration of this realm-of-the-possible and each species [as] a natural kind rather than as an individual resulting from historical contingency . . . .

Much of Goodwin's subject matter and, indeed, the whole approach, was unfamiliar to many of his audience but his main themes carried familiar Polanyian echoes. "An organism is a dynamic form engaged in process, becoming other in order to remain itself." This also summarises one of Goethe's insights into biological nature. Such non-reductive, holistic understandings are, once again, beginning to be taken seriously. "A science of qualities grows out of a new biology to heal o]d dualisms and alienations and to provide a context of significant action in the creation of a holistic global culture."

III

In Dan Hardy's paper, "Theology and Life's Irreducible Structure," there was a strong sense of the complexity of our "contextuality" -- of the process within which we have to find and sometimes lose our intellectual bearings. Yet the problems we face in such a heuristic field are not merely intellectual but practical. The issues are wide; "more akin to the issue of the place of science and theology in what is sometimes called wisdom, and the place of wisdom in them."

Among the many twisting strands which constitute our experience, the shifting balance between the Hebraic and Platonic traditions has been a major thread. During recent centuries, the swing has been away from the Hebraic strand mainly because "[h]istorical teleology has been supplanted by evolution and experience . . . has lost its transcendent direction and historical continuity." This shift has been the main cause of the widespread sense of alienation and meaninglessness in our culture.

Hardy went on to question the view, not entirely absent from Polanyi's (and his successors') writings, that we can learn the much-needed corrective lessons "from experience," i.e., as autonomous persons working within a tradition. Is this kind of knowledge enough? We were asked to consider the kind of experience-based "moderate realism" of science which has been expounded and developed from Polanyian foundations by Harr and others. Such realism is certainly far richer and more morally responsible than the varieties of positivism which it has largely supplanted. But does it reach out? Is there not a danger of it promoting a kind of person-centred narcissism? And "does the initiation of knowing rest so much with the human person as Polanyi suggests?" This is the central problem about Polanyi today which Hardy posed. He dealt with it, at least in part, by advocating the recovery of Polanyi's "seminal understanding of the person," not as an autonomous monad but as a "multi-dimensional focus of contextual forces."

> The issue is not . . . how the human person learns to know and to speak reality and to do so responsibly before God; for that would simply lead us back to a concentration on the person. It is rather how reality knows, does and speaks itself in and through the human person, and how, as it does so, the transcendent God who is the source, order and energy of both reality and the human person, is present in this. It is only by asking the question in such a form that we can move beyond the privileging of the human person in knowing and doing and speaking reality.

In his concluding "Chairman's Summary," John Puddefoot picked up a theme which united all three speakers, "Are we open--do we open ourselves--to the potentially destructive forces in the world, or do we shelter behind the armour of self-consistency and self-constituting individuality that so easily becomes a shroud?" He pointed out that Dan Hardy "was trying to grope towards an answer . . . by inverting all the traditional conceptual tools and turning, quite literally, inside out the way we think of ourselves and our individuation."

Polanyi himself had not ducked this issue. He demanded a similar courting of danger, a readiness to be proved wrong and to invert many conventional ways of thinking for this very reason; that we might be open to new forms and to new contingencies. This was what made Polanyi's philosophy of science so unpopular. It was dangerous because he had developed, "single-handedly a non-equilibrium philosophy in which open structures . . . are supplied by the operation of human minds acting in concert in a process of spontaneous ordering as they fall, in their knowing and being, under the spell of the real." Puddefoot stressed that "Polanyi's thought, forged in the laboratory, is inherently dynamic and the non-equilibrium character is sustained by the personal." Properly understood, it should not lead to the kind of self-regarding complacency of which Hardy warned. "It is a philosophy of Life of a quite new kind," a philosophy which can transcend self by self-loss.

The Conference would not have been possible without the excellent and sensitive help of Canon Derek Stanesby and the staff at the St George's House Conference Centre at Windsor Castle. We were also fortunate to receive financial support from a number of anonymous individuals. Most of the planning was the responsibility of the Convivium Group which is the European focus of Polanyian study and the editorial link with *Tradition and Discovery*.

On Deafness in the Mind's Ear: John Dewey and Michael Polanyi

J.E. Tiles

My aim here is to propose a diagnosis and aitiology for a professional syndrome which troubles me. For several decades now analytical epistemology and analytical philosophy of science have resisted cogent arguments which conclude that until close attention is paid to the psychological and cultural contexts in which beliefs and theories are justified, efforts to clarify the bases of such justifications will be entirely sterile. My approach to understanding this syndrome is to examine the efforts made by two men, who tried unsuccessfully to influence the agenda of epistemology, John Dewey and Michael Polanyi.

Now the doctrines of these two men are in many important respects quite different. Where Dewey's philosophy grew more secular as he grew older, Polanyi's retained important religious elements. Where Dewey worked to collapse the distinction between science and technology, Polanyi kept the two sharply distinguished. Where Dewey was eager to harness science to social control, Polanyi was profoundly suspicious of anything which threatened the independence of pure scientific research. Polanyi, whose career in philosophy got underway just before Dewey's death, mentioned both Dewey and pragmatism [*PK* 234, 328][2] in dismissive terms, but terms which betrayed a superficial appreciation of both the man and movement.

But for all the differences of doctrine, of outlook and of politics, the general direction taken by the agenda of epistemology would have been much the same, had the influence of either man been properly felt. Others have since exerted pressure in this direction, notably Thomas Kuhn, but in Dewey and Polanyi it is possible to see clearly different forms of what may explain the source of the resistance to having the agenda of epistemology set in the contexts of culture and psychology.

In their treatments of knowledge, both Dewey and Polanyi combine elements of historicism and of psychologism. Historicism is the denial that claims to knowledge and the evaluation of these claims can be made by reference to standards which are timeless, universal and independent of social and cultural (i.e., "historical") context. Psychologism is the affirmation of the need to use general conceptions of mental abilities and activities in the understanding of our epistemological aspirations and achievements -- of the need, in other words, for concepts which belong, albeit at a highly general level to the study of human psychology.[3]

Historicism has in recent times been a congenial habitat for (cultural) relativists. Neither Dewey nor Polanyi subscribed to the doctrine that all scientific outlooks and practices are equally valid, although both tended to be mistaken for relativists. What psychologism, on the other hand, encourages depends on the approach to psychology which one adopts. Introspectionist psychology encourages subjectivism; behaviorist and physiological psychology both encourage a mechanistic outlook. The psychological concepts which Dewey and Polanyi both treat as fundamental do not contribute to any of these approaches, but to an approach, which for lack of a better term we might call "classical," because it is found as far back as

Aristotle. This is the approach which sees human dispositions as fundamental to the understanding of human knowledge.[4]

Polanyi stressed the importance of skills, not only the skills involved in the execution of some action, but the skills involved in observation, in being responsive to features of the environment ("connoisseurship")[*PK* 49-55]. The fundamental insight of Dewey's treatment of the reflex arc concept is preserved in his use of the term "habit."[5] This insight was that the reflex arc is in fact a cycle, which is a co-ordination of receptivities and responses, and which either stabilizes under the influence of routine or expands under the influence of inquiry.[6] In the exemplary illustration which Dewey drew from James' *Psychology*, the once burned, doubly cautious, child stabilizes an expanded reflex cycle (habit) around a new discrimination.[7]

Thus both Polanyi and Dewey call for us to recognize the importance of a vast array of inarticulate organic dispositions, which are continuous with those of other animals, and they call on us to appreciate that speech, by adding to the range of performances which humans carry out, creates pressure to make discriminations that would otherwise be left unmade and to internalize structures which can only be formed around the flexible medium of signs. Language thereby brings about much of our conscious life and lies at the roots of what both men insist is the fundamental structure of consciousness. Polanyi refers to focal and subsidiary awareness [*PK* 55-7]; Dewey accepted the phenomenon which James had referred to using the terms "focus" and "fringe" [*EN* 254][8], and insisted that this structure extended to meaning where there is a difference which he referred to as that between "sense" and "signification" [*EN* 213ff]. Elements at the focus of our awareness of a situation have significance because it is given a sense by what we are (in Polanyi's terms) subsidiarily aware of in the situation.

To understand this one needs to recognize that there are more aspects to which one responds in a situation than those that reach the level of explicit awareness. For example, events which have previously transpired inform present awareness even when they are not consciously remembered. Dewey's discussion of what is required to follow the plot of a play or novel presents an excellent paradigm of this phenomenon [*EN* 248ff]. Unless previous events inform present action and contribute to the sense of the context in which that action transpires, one will not be able to appreciate the significance of what is before one's attention. Polanyi speaks of this on a more general level when he notes that subsidiary awareness of wholes is required in order to focus on parts and that the reverse occurs when wholes are focused upon. Polanyi also links the two kinds (or degrees) of awareness to kinds of meaning. "Representative" or "denotative" meaning is where one thing calls forth a response to another; but the meanings possessed by whole contexts (which Polanyi suggests should be called "existential meanings") do not stand in this relation to something else, "they mean something only in themselves" [*PK* 58].

Now it follows from the psychological framework, which Dewey and Polanyi share, that knowledge is neither completely nor adequately represented as a body of statements held to be true (believed.) A body of statements (what is commonly taken by analytic philosophers to be sufficient to constitute a "theory") is only a salient part of a much larger phenomenon. Even to know what such statements mean one must know how they will be interpreted, how they will guide practice in general, what will be taken to be a concrete instance relevant to strengthening or undermining confidence in their guidance. These additional non-salient features are embodied in the skills and habits which constitute practices of observation, experimentation, interpretation, engineering, etc. The belief that practice is somehow external and not an essential part of knowing is a consequence of an error which Dewey stigmatized as "intellectualism." In his vocabulary the error consists of assuming that all experience is "cognitive," in other words, whatever is really in experience is "known," in the sense of being an object of full conscious awareness. In Polanyi's vocabulary the error consists in recognizing only the explicit components of

knowledge and overlooking the tacit components.[9]

For both men the crucial aspect of the environment in which we acquire the dispositions relevant to knowledge is the social. According to Polanyi, one has to associate with other people to acquire the skills which are necessary to do, e.g., scientific research. Shipping books and instruments of research to some corner of the world will not by itself enable the recipients to start a research enterprise. In addition, they require training which places them in the same relation to an experienced research worker as an apprentice to a master craftsman [*PK* 53-4]. The conclusions about science which Polanyi draws from this are in some respects (openly) "authoritarian" and "elitist." One cannot learn to be a scientist without submitting to the authority of those who possess the skills which one needs to learn [ibid.]. The standards, which one acquires, will be understood and upheld only by those who have undergone the training [*PK* 183].

The social dimension plays an equally important part in Dewey's account of how we acquire the dispositions which constitute our knowledge in general and our science in particular, although Dewey did not, as Polanyi did, stress the need to submit (at crucial stages) to authority; and he held reservations about the autonomy which (pure) scientists demand for their research objectives. Here an issue breaks the surface, which would be high on any agenda set by philosophers who had absorbed the sort of social-psychologistic orientation of Dewey and Polanyi.[10] How should the objectives of those engaged in organized -- and in most cases publicly funded -- practices of inquiry be determined? And closely following, and in many cases pre-empting, the discussion of this question is one regarding the authority of the criteria by which we judge inquiry to have a successful outcome and the authority of the standards of those practices, viz., educational, which preserve what we think of as our successes.

Polanyi's vocabulary partly obscures these issues. What apprentices learn from master craftsmen is more than what we usually associate with the word "skill." Not just "techniques" are learned but standards of precision or rigor, standards of what to be proud of or ashamed of, conceptions of what to aim for, which predispose competent practitioners to accept some innovations as improvements and some as unworthy of the profession, or "not workmanlike." What an apprentice learns from a master has elements of moral appraisal in it when applied to practitioners; and the admiration or contempt which is expressed for the work of such practitioners is not free of this element. Dewey's "habit," particularly if the resonances of the medieval term *habitus* are present, is a better term. What are learned are not only the habits that produce results, but the habits that shape the assessment of the results including the habits which govern what it is one aims for.

If Polanyi's vocabulary does not help clarify the matter, he at least is candid in confronting the central issue. The standards which are set in any seriously undertaken human enterprise are "self-set," and there is an apparent paradox in holding any kind of objective validity for those standards. What could possibly provide a grounding for our "subjective self-confidence in claiming to recognize an objective reality" [*PK* 104]? Dewey's philosophy brings him face to face with this issue, but his response appears to be that of someone trying silently to stare down a hostile animal. Indeterminate[11] situations which call forth inquiry, which are transformed into problems and which are eventually given a satisfactory unity, raise the question, "Satisfactory to whom?"

Now this question should not trouble Dewey any more than it does Polanyi because behind it is an assumption about our cognitive aspirations which both men repudiate. The assumption is that it is only from the perspective of an individual mind that something can be satisfactory. In a move that is thoroughly Kantian (but not recognized or at least not acknowledged to be Kantian), Polanyi rejects the idea that humans can or should aspire to the perspective of the universe. "Any attempt rigorously to eliminate our human perspective from our picture of the world must lead to absurdity" [*PK* 3]. Our knowledge, however refined

and rendered more comprehensive, will always be represented (realized or actualized) in a medium shaped by human limitations and human interests.

But does it not follow, from this repudiation of the ideal of seeing things from the perspective of the standpoint of the universe itself, that what counts as a solution and hence as a contribution to knowledge (to the "continuum of inquiry") for one inquirer (or community of inquirers) is wholly dependent on the situation which generated the inquiry? To explain how he was not sliding hopelessly toward relativism or subjectivism, Dewey appealed to his naturalism and insisted that, as human problems are human phenomena and therefore part of nature, the question of what counts as the resolution of a problem or what counts as the unification of an indeterminate situation, is as objective as any other question about nature. This is certainly a branch to hold onto if one is hoping to stop a slide into relativism, but there remains this doubt about the strength of the branch: It may well be objective that X is satisfactory for A in a situation and a quite different thing Y is satisfactory for B in a closely similar situation. How does one build a common science out of such "objective facts"?[12]

Dewey, in his eagerness to acknowledge the full particularity of the situations which call forth inquiry and to maintain a pluralism about the specific goals which occasion inquiry, finds his tongue tied at this point. To say what his position might very well allow him to say -- viz., that common science is possible because we share common problems and common objectives by virtue of all being human beings -- may have sounded to him like a public relations disaster for his particularism and pluralism. Polanyi, on the other hand, is under less pressure from such allegiances and is able to assert forthrightly that humans are capable of seeking solutions to problems which will not only be satisfactory for them as individuals but which will be compelling for everybody else [*PK* 301].

Moreover, the commitment to advance claims which have universal validity is what for Polanyi distinguishes the "personal" from the "subjective" [p. vii]. Ultimately this commitment to what can be referred to as "a *greater* objectivity" is what for Polanyi distinguishes scientific from non-scientific inquiry. A scientist is committed to advancing solutions which are not tied to the peculiar circumstances of the inquiry and to the expectation "of an indefinite range of possible future confirmations of the theory" [*PK* 4]. The middle way, between the absurd pretense that science can deliver the truth from the perspective of the universe and the anarchical delusion that every perspective is as valid as every other, is found in a *commitment* to rise above the limitations of our perspective, even if we can never transcend those limitations altogether.

To untie Dewey's tongue a little and see to what extent he would agree with this, consider someone who does not see why the resolution he seeks when he inquires should satisfy or be satisfactory to anyone other than himself. Polanyi would say, "Well, that is why you are not a scientist." Dewey would diagnose this person as suffering from an overly narrow conception of "self." That he should not be concerned with satisfying anyone other than himself means that what he takes personal satisfaction in does not include the recognition on the part of other people of his achievement and the satisfaction they might take as users or competent and appreciative critics of the genuineness of his achievement. This is a serious moral failing on his part, a failing which in human interaction generally lies at the root of much that is morally blameworthy in people and in the societies which they form.

We have observed in the sketch of the psychological framework, in which Dewey and Polanyi place knowledge, that the education of a scientist has elements of moral training in it. And we have just observed that to swim between an absolute objectivism and a thorough-going relativism without being dragged by the currents toward either, one has to take one's bearings from an ethical doctrine. Polanyi appeals to what is in effect a categorical imperative, "advance only that which you can reasonably expect all rational creatures

to find fruitful and compelling," and rests the distinction between a scientist and a non-scientist on the former possessing a species of good will. Dewey under the right sort of pressure can be drawn out to the point where he might well rest the same distinction on his idiosyncratic and highly revisionary version of ethics based on "self-fulfillment."

I think this is the key to the reception which both men have received of late in anglophone philosophy. Polanyi at one point diagnoses the conception of science which stood in the way of his own conception as something "stemming from a craving rooted in the very depths of our culture" [*PK* 16]. The phenomena we have been considering here *are* indicative of something that deep, although Polanyi's diagnosis is not accompanied by a sufficiently detailed aitiology. The craving, as Polanyi saw it, was for a conception of natural science based on a sharp distinction between subjective and objective, in which passionate, personal, human appraisals were eliminated from objective science or minimized to "negligible by-play" [*PK* 16]. As Polanyi saw it, it was largely a resistance to acknowledging the role of emotion and aesthetic satisfaction in science. I suggest that the resistance is also to acknowledging the moral element in science.

Behind the resistance to all of these and behind the strong impulse to draw a sharp and deep distinction between subjective and objective, is the way our culture seeks for authority which is impersonal and amoral and insists on confining the moral along with matters of taste and the shaping of people's emotional lives to a personal realm entirely insulated from public criticism. Those who wield authority present themselves as managers who employ objective principles of scientific technology to achieve ends set for them by a public opinion which is nothing more than the sum of private inclinations. No objective principles can be applied to criticize or correct the realm where private impulses, emotions, tastes and moral sensibilities ferment to generate the public opinion which is supposed to dictate ends to those whose authority is supposed to rest on their ability to find the means to those ends.

This way of conceiving the relation between the objective and the subjective is threatened by any suggestion that private/subjective elements of passion, taste or morals contribute to the public/objective sources of technocratic authority. And it is equally threatened by the idea that if those private elements can enter and be subjected to objective standards of criticism in the science that lies behind our technocracy, such standards could well be established and applied to the private/subjective realm.

Dewey's message that our culture takes its bearings on its authority structure by means of a line which has not been drawn in an intellectually defensible place was, thus, not a message which people had the ears to hear. When in the fifties and sixties an independently minded scientist in Britain tried to draw attention to the same incoherency, the same cultural mindset responded to his message with a profound deafness. The irony is that both men accurately discerned the social-psychological mechanisms by which their messages could be soaked up in this way, leaving barely a trace. The habits which constitute our practices, above all our social practices, make us in this way sensitive to some things, deaf and blind to others. The double irony is that part of the message that does not get through is that these mechanisms have to be recognized, if we are to establish an authority[13] structure, both political and cultural, which is intellectually defensible.

ENDNOTES

1 A version of this paper was read at the March 1990 conference of the Society for the Advancement of American Philosophy in Buffalo, New York. My commentator on that occasion, Larry Hickman, observed that although my comparison of Dewey and Polanyi was sound, there are respects (for those who are interested in the American philosophic tradition) in which Polanyi is closer to Peirce and stands to Dewey as Peirce stood to Dewey. I had recognized this as a possible subject for another paper, but my point in this

paper concerns the attitudes taken toward knowledge in general and science in particular in the present and the recent past, and for this purpose the comparison of Dewey and Polanyi is more germane.

2 References to Michael Polanyi *Personal Knowledge*, London, Routledge and Kegan Paul, 1958 (reprinted 1978) will be given in the text *PK* followed by page number.

3. This use of "psychologism" bears affinities to that proposed by Adrian Cussins in "Varieties of Psychologism," *Synthese* 70 (1987), pp. 123-154. "Since I deny that `psychologism' need bear a pejorative sense, I am not happy with the definition of `psychologism' as a doctrine which confuses philosophy and psychology. Instead, I shall adopt an asymmetric definition which holds that a psychologistic doctrine is a doctrine which requires psychology in order to answer a philosophical question. The rejection of psychologism is the rejection of the philosophical relevance of psychology" (p. 126). (Cussins is interested primarily in the relevance of cognitive psychology, whereas Dewey in particular would urge the relevance of social-psychology to philosophy, and thus is an advocate of what could be characterized as social-psychologism.)

4. Aristotle defines both Ýðéóôþ´ìç and ôÝ÷íç as 'Ýîåéò, and 'Ýîåéò is translated into Latin as *habitus*. For Aquinas' treatment of this Aristotelian idea see, *Summa Theologiae*, Vol 22, *Dispositions for Human Action* (Ia2ae 49-54), translated by Anthony Kenny, London, Eyre & Spottiswoode, 1964. (Kenny's introduction to this translation, p. xxx, contains an observation on Aquinas use of *habitus*, which if one bears it in mind will prevent the wrong associations from generating misunderstanding of Dewey's use of "habit." A *habitus*, unlike our usual associations with the word "habit," is not a condition which makes it hard for people not to do something -- e.g., not to smoke -- but rather makes it easy for them to do something -- e.g., hear Freudian slips or forget to watch to prevent the potatoes from boiling dry.) Pragmatists such a Peirce and James also work within this tradition of philosophical psychology.

5. This is observed by Gordon W. Allport in "Dewey's Individual and Social Psychology" in *The Philosophy of John Dewey*, edited by P.A. Schilpp, New York, Tudor Press, 1952 (1939), p. 270.

6. Dewey pays insufficient attention to cases where indeterminate situations are not resolved by inquiry but leave the inquirer with habits which are less integrated and which generally diminish the unity of situations that are encountered in the future. The only discussion of such pathology I can think of occurs in one of the articles on emotion in *The Early Works of John Dewey*, edited by Jo Ann Boydston, Carbondale, Southern Illinois University Press, Vol. 4, pp. 159ff. For the classic treatment of the reflex arc concept see Vol. 5, pp. 96-109.

7. If one keeps in mind the complex of habits which must be co-ordinated for an any reasonably complicated animal to function, one has a framework for integrating the three kinds of learning which Polanyi for his part distinguished: trick learning or invention, sign learning or the amplification of perception, and latent learning or interpretation. The third of these involves the internalization of some pattern or principle of response in such a way that it can manifest itself in indefinitely many and not easily predictable ways [*PK* 74]. This can be identified with the medium- or large-scale re-organization of habits which is on occasion the outcome of the successful completion of what Dewey refers to as "inquiry." For following Dewey's definition of "inquiry," (*Logic, the Theory of Inquiry*, New York, Henry Holt and Company, 1938, pp. 104-5.) the "transformation of the indeterminate situation" is through its constituent distinctions and relations and these are only actualized through the habits of response of the inquirer. The resulting situation is unified only if the patterns of response of the inquirer are unified.

8. References to Dewey's *Experience and Nature* are by page following the letters *EN*, and to the second edition, La Salle, Illinois, Open Court, 1971. At *EN* 244-5 Dewey contrasts the conscious with the subconscious, remarking that "The subconscious of a civilized adult reflects all the habits he has acquired..." This term is perhaps the closest equivalent Dewey has to Polanyi's "tacit dimension." It is important to distinguish sharply the prefix which Dewey uses, "sub" from that commonly used by Freudians, "un;" for this will serve to distinguish the claim which Dewey (and with him Polanyi) is making from that made by Freudians. The subconscious, unlike Freud's unconscious, does not have a structure, which reduplicates and in important respects is isomorphic to that of consciousness, a structure with its own motivations and rules. It is offered instead as a further set of distinctive organs without which trying to understand consciousness is like trying to understand, say, a kidney without reference to the rest of the body. This is the respect in which followers of Chomsky, who have taken over Polanyi's vocabulary of "tacit" knowledge, differ from both Polanyi and Dewey. Like Freudians the "tacit dimension" of the Chomskians is used to explain behavior by reduplicating at a level not directly accessible to consciousness a structure (of motivation in the case of Freud, of rules to be followed in the case of Chomsky) found at the level of consciousness.

9. Neither Dewey nor Polanyi claim that the "non-cognitive" or the `tacit' is inaccessible to "conscious reflection" or to `articulate representation.' Indeed achieving the reflection is for Dewey the "sole agency" of control over non-cognitive experience (*EN* 22) and analysis of experience is for Polanyi an important means by which genuine practices and experiences are validated (*PK* 50-2). What both claim, however is that although one can bring more of the non-cognitive/tacit into the light of reflection/articulation, there remains a need for a framework consisting of the former to bracket any achievement of the latter. Note in comparing the following how Dewey remarks on the need to expand the non-cognitive in the process of expanding the cognitive. Polanyi: "The enormous increase of mental powers derived from the acquisition of formal instruments of thought stands also in a peculiar contrast with the facts collected in the first part of this book which demonstrates the pervasive participation of the knowing person in the act of knowing by virtue of an art which is essentially inarticulate. The two conflicting aspects of formalized intelligence may be reconciled by assuming that articulation always remains incomplete; that our articulate utterances can never altogether supersede but must continue to rely on such mute acts of intelligence..." (*PK* 70) Dewey: "It is not denied that any experienced subject-matter whatever may *become* an object of reflection and cognitive inspection. But the emphasis is upon "become;" the cognitive never *is* all inclusive: that is, when the material of a prior non-cognitive experience is the object of knowledge, it and the act of knowing are themselves included within a new and wider non-cognitive experience -- and *this* situation can never be transcended" (*EN* 23n).

10. Dewey's historicism is given a fairly obvious theoretical foundation through his stress on how human dispositions are shaped by the social environment. (This is what, more than anything, distinguishes Dewey's use of the concept of disposition in philosophical psychology from the use made of that concept by Ryle.) If this is less obviously true of Polanyi, because he is less explicit in crucial places, there is nothing that would prevent motivating his historicist impulses in a similar way.

11. The key word, "indeterminate(ness)," is what for Dewey describes what drives humans to reconstruct situations irreducibly shaped by their interests and limitations and thereby to make cognitive advances. It is not determinate how interests as presently articulated can be pursued under existing resources, and the only way one can keep the indeterminate out of an inventory of the furniture of the universe is by excluding all or part of the situations which generate inquiry from the inventory. This, however, directly contradicts what for Dewey is the essence of epistemological naturalism, viz., the doctrine that human knowledge is a natural

phenomenon. And if human knowledge is part of the natural world, indeterminateness must be acknowledged to be part of the natural world.

Dewey's metaphysical doctrine about the place of indeterminateness in reality is more general than is warranted by the conclusion of this argument. For present purposes, however, it is sufficient to observe that a limited repudiation of the claim about a determinate universe follows from Dewey's naturalism when taken with his conception of inquiry. Of course neither Dewey's doctrine nor the weaker version supported by this argument needs to be made from the perspective of the universe itself. They are claims made from the best perspective we can get on our general situation vis a vis our environment at the moment.

12. It might be suggested that there is no problem here because Dewey shares with Peirce the assumption that there is a highly general "experimental method" which is pragmatically warranted and which (if shared by problem-solvers) will yield comparable solutions. It is not clear, however, that Dewey has bought into enough of the Peircean framework. There is the clear suggestion in the *Logic* (note 7 above) that the methods of science have to evolve under the pressure of inquiry and the explicit suggestion (in e.g., "The Objects of Valuation," in S. Morganbesser, ed., *Dewey and His Critics*, Journal of Philosophy Inc. 1977, pp. 600 ff) that the objectives of any enterprise will be clarified and refined as inquiries continue. The worry is that if the methods and objectives of science are fixed only at such a general level as to be empty of specific content, then winds of historical change may scatter the fleet of natural science to such an extent that questions may be raised about its unity and identity. The argument here is that something like the Dewey-inspired ethical consideration outlined in the next few paragraphs needs to be drawn into closer proximity to what Dewey says about inquiry if we are to make satisfactory use of his philosophy of knowledge. (The suggestion answered here comes from Peter Manicas, whose very perceptive criticisms of an earlier draft of this paper were gratefully received and on all other occasions, not resisted, but accepted with what I hope were adequate modifications to the paper.)

13. As it is all too easy to misinterpret "authority structure" as entailing a mechanism by which policy and attitudes are fed from the top down through some rigid hierarchy, it should be said that "authority" here is understood as any source to which people look for guidance and its structure in a society may be profoundly diffuse. This would be the case in particular in a society which practiced what Dewey understood by "democracy." Dewey's pluralism, however, did not preclude the acceptance of hierarchies of authority extending over limited areas of life and based strictly on competence in the relevant practices.

The Tacit Victory and the Unfinished Agenda

[**EDITOR'S NOTE**: *On April 11, 1991 at the Kent State University conference celebrating the Polanyi centennial there was a panel discussion which bore the title listed above. The panel included nine persons whose interest in Polanyi's thought is longstanding; panelists were asked to comment on the relevance of Polanyi's thought to issues and discussions current in their interests. Sam Watson's remarks were a part of this session at Kent State. A similar panel discussion involving three other persons occurred at the Polanyi Society banquet in November 1991 in Kansas City. Volume XVIII, Numbers 1 and 2 contain "tacit victory" articles from both these gatherings.*]

Polanyi and Rhetorical Studies

Sam Watson

What relations might there be, between someone's act of speaking (or of writing) and that same someone's act of knowing?

Students of Polanyi's thought will recognize that as a *complex* question: Given the presence of the tacit, no articulation is ever exhaustive; no act of articulation is ever complete. On the other hand, it is possible (though it may hardly ever be desirable) to engage in articulation without any act of knowing at all; words used mindlessly may signify nothing, but words *can* be used mindlessly.

Students of speaking and of writing will recognize the question above as an *important* one. However, though many of them are increasingly familiar with Polanyi, they still often miss much of the question's complexity. The question reasonably "frames" Polanyi's influence among these scholars, and it suggests the direction of an agenda as yet unfinished.

It is a question as ancient as it is contemporary. On its basis Plato (*Gorgias*) condemns rhetoric as "mere flattery," while Isocrates insists, "With this faculty [of speech] we both contend against others on matters which are open to dispute and seek light for ourselves on things which are unknown" (*Antidosis*, 256). Beginning with Aristotle, who defines rhetoric as "the faculty of *discovering* in the particular case what are the available means of persuasion" (*Rhetoric*, I.2, emphasis added), the foundation of ancient rhetorical theory and practice was an art of invention largely consistent, I think, with Polanyi's thought. In the age of science, however, this art dissolved; instruction in speaking and writing came to be seen as merely "managerial," a matter of making good use of the knowledge derived

independently, via "scientific" method. This merely "managerial" view of rhetoric finally gave us the mindlessness of rote drill and the purposelessness of the five paragraph theme.

Among scholars and teachers of speaking and writing, the second half of the twentieth century has been a time of recovering ancient rhetorical theory, of reinventing it within and for the contemporary world. Central to those efforts have been attempts to formulate some distinctively rhetorical art of invention. For instance, members of the "good reasons" movement see rhetorical invention as a matter of discovering "reasons for" (or against) particular courses of action, in the absence of compelling fact. And these scholars, such as Chaim Perelman and Wayne C. Booth, have read Polanyi -- partially. They often enthusiastically embrace his "critique of doubt" while, ironically, they continue acritically to accept an essentially Cartesian epistemology, failing to acknowledge the epistemological reorientation which Polanyi offers us.

While scholars of rhetoric have been articulating new (and renewed) theory, they tend not yet to have come to grips with issues of epistemology. Teachers of writing have not done so either, directly, though they *have* been articulating pedagogies and understandings of writing that seem deeply harmonious with Polanyi's thought and that often draw upon him directly. Thus James Britton cites Polanyi in calling our attention to the importance of "shaping at the point of utterance," the sort of meaning-making which takes place *within* an act of articulation. Polanyi is present in the title of Janet Emig's "The Tacit Tradition," a study of the intellectual forebears of contemporary writing instruction. Polanyi informs much of Peter Elbow's work, and he is one important guide for Louise W. Phelps, in her programmatically and philosophically important work, *Composition as a Human Science*. Rather than review the varied citations and uses of Polanyi in the current literature, I would like to point to two areas of current thought, two especially sensitive ones, which are resonant with his work.

Among many extremely influential writing teachers today, a central term is "voice." (It would repay serious study, to determine just why and how teachers of writing have adopted the "vocal" metaphors of speech, while teachers and theorists of speech, with their complex printed schemata and "lines of argument," seem unconsciously to have adopted the metaphors of -- writing!)

"Voice" is an elusive concept, which indeed has meant various things to various teachers of writing. "Voice" is most easily identified with essentially "personal" narrative (and indeed that is one source of the caution and sometimes the disdain these teachers meet in academic circles). In such writing, one may most easily sense the presence (or the absence) of some "person" within the words; for many teachers, "voice" has come to represent the presence of the authenticating personal, in a written text, a sense of some real person taking a stand within (or "behind") the words of the text. I believe that Susan Hilligoss has said it best: "Voice [is] the reader's sense of how the writer knows what she knows -- not by analyzing the argument, but by the degree to which the reader can participate in the re-creation of that knowledge." Indeed, it seems to me reasonable to take Susan one step further: "voice" may be the sense that a text provides of its writer's authority, not as determined prior to and independent of the text, but as established *within* the writing of the text itself. "Voiceful" texts are ones which seem to embody traces of their own creation; they seem to be the acts of some person's coming to know, *within* that person's acts of articulation.

Among writing teachers a similar and kindred concept is "writing to learn," a notion which is, at the least, a needed complement to the "writing to communicate" which has become the academy's stock in trade. Traditional instruction, focused ostensibly on "communication" (though often more concerned, really, with matters of propriety in language and citations) presumed that "knowledge" is to be garnered, somehow, prior to and independent of any

act of writing. Writing is a matter simply of transcribing what someone already knows -- often, someone quite other than the writer herself or himself. Student writing becomes student transcription of what student has read in books or heard in lectures -- a recipe for mindless tedium on the part of students and of terminal frustration and boredom for their instructors. (Should we wonder that, whether intended or not, the result often is plagiarism?)

"Writing to learn" is quite a different orientation; not, I think, finally a competing one but certainly a complementary one. Here the emphasis tends to be on relatively short bursts of essentially *informal writing*, in a variety of modes. Through the writing, students find themselves (partially) articulating the relevant experience and knowledge they are bringing to a new subject of study; they pose questions; they seek out new and tentative connections. Through their written language, they are becoming more active learners. Such writing, as it becomes habitual, should deepen and extend learning; it should also improve students' abilities in "writing to communicate." I am confident on both points, though we do not yet have research studies which demonstrate either. Meanwhile the anecdotal reports, from students and from teachers, characteristically are enthusiastic, sometimes to the point of embarrassment. Needless to say, theoretical treatments of "writing to learn" are yet to be written. When they are written, James Britton and Janet Emig will be seen to have played key roles. And, in even more overarching ways, so will Michael Polanyi; I am fully confident of that.

Polanyi's thought already is a significant source for a direction of work that, on the face of it, might seem to have little to do with speaking and writing. In work that is increasingly influential in educational circles, Donald Schon and others have been developing an understanding of "*reflective practice*," through which practitioners effectively act -- and learn -- in complex and problematic situations. Central to this "professional artistry" is the practitioner's reliance upon the tacit knowledge s/he brings to the situation.

Central, also, are uses of language quite different from the traditional delivery of whatever was already known. Language becomes tentative, speculative, exploratory. In important senses language becomes *conversational*, as the medical doctor works toward an accurate diagnosis or the architect considers the varied constraints on a building's design. Education also needs to partake of this conversation, Schon insists, if our students are to become effective practitioners rather than merely technically knowledgeable.

"Conversations," taken seriously, entail "communities," convivial forums within which persons come together to explore. In terms of organization and prevailing attitudes, our schools and universities today tend to encourage neither conversation nor community among the expert practitioners we call "teachers." The "teacher research" movement, through enabling teachers to become reflective practitioners, is offering a promising alternative. However, as Donald Schon says, such teachers "pose a potential threat to the dynamically conservative [school] system in which [they] live" (1983, 332). Louise W. Phelps (1991), drawing upon both Schon and Polanyi, describes one university's writing program within which reflection is central, and she confronts questions of epistemology of practice squarely, articulating the place of "practical wisdom" within the sorts of knowledge that characterize composition studies.

The question with which I began this overview is philosophically complex and politically charged: when we acknowledge, as Polanyi invites us to do, that persons' acts of articulation may contribute essentially to those persons' acts of knowing, new vistas become possible. One organized movement within which teachers are exploring those vistas is the National Writing Project. There, teachers of writing write; they discuss and share the effective classroom practices they have developed; they become teachers of other teachers. In short, they draw on their own knowledge, within a

convivial community; often, the classrooms to which they return also become communities of learners. And, collectively, they have established a reputation as being the most effective writing teachers in the nation, a reputation which for the first time this year has earned Congressional funding for their continuing efforts.

As we continue quietly to ask that question about the possible relations between persons' acts of articulation and their acts of knowing, we just may be able to transform American education.

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Michael Polanyi and the Philosophy of Medicine

Richard Gelwick

One of the great contributions of the profession of medicine to the twentieth century is Michael Polanyi's philosophy of knowing yet the medical contribution of Polanyi is barely noticed. Most authors, including myself, commenting on Polanyi's polymath character note that Polanyi began his scientific career in medicine but early Polanyi turned to physical chemistry. Except for the interesting historical anecdote about Polanyi's getting diphtheria as a medical doctor while serving in the Austro-Hungarian army in World War I, then writing his doctoral dissertation on the potential theory of adsorption during his convalescence from the diphtheria, little is made of Polanyi's background in medicine or of his use of medicine in his work as a major thinker of this century. In the study of Polanyi, medicine is only a preface to Polanyi's major careers in physical chemistry and in philosophical and social thought. Polanyi's readers are aware of his knowledge of medicine through his use of examples of medical practice and his grounding in biological science. Even so, these obvious clues have not led to the exploration of the importance of medicine in Polanyi's thought.

Polanyi himself did not encourage the pursuit of this line of understanding his work. His focus generally was not upon what he had done but upon the problem of objectivism in our culture that needed to be solved by a reform of our theory of knowledge. His examples and investigations in the theory of knowledge were wide ranging so that he impressed all with his amazing grasp and insight into many disciplines. One felt the need to be an expert in many fields to challenge or to follow him. Besides distracting attention from his training in medicine by his use of a host of fields in his argument, Polanyi himself minimized the place of medicine in his achievements. I asked him once why he had gone into medicine instead of into philosophy. He told me that he really wanted to go into philosophy, but he was not confident that he could have made a living in philosophy. It also seems, by inference, that Polanyi must also have thought that he could not directly enter physical chemistry as a profession or he would have perhaps done that instead of medicine. He had shown an interest in medical research connected with chemistry as early as 1910.[1] We have, therefore, from Polanyi himself little direction toward medicine in an explicit way. For these reasons, we have until now neglected its possibilities.

William T. Scott in his current biographical research on Polanyi has told me that Polanyi served on the Serbian front at an epidemic hospital. He went there voluntarily in place of doing his internship. Going into medical service in war, Polanyi followed the ancient adage that "war trains many surgeons."

In weighing the role of medicine in Polanyi's thought, it may be observed that Polanyi said more about religion than he did about medicine. We now have controversies about the role of religion in Polanyi's final work, but we do

not question the role of medicine. Since he had a degree in medicine, it seems indisputable. Still we need to explore this part of Polanyi's development of his philosophy of personal knowledge or tacit knowledge.

Polanyi spent thirty-three years after dissertation on the potential theory of adsorption before exchanging his chair in physical chemistry for one in social thought. This productive period established Polanyi as a world renowned physical chemist. Still Polanyi's social and philosophical writing did not have a major focus on physical chemistry as a source of his arguments against the objectivist fallacy. In Polanyi's discussion of science as a cultural force, there are only two articles dealing explicitly with physical chemistry, the one on the potential theory of adsorption and "My Time With X-Rays and Crystals," a contribution to the E. P. Ewald festschrift. Therefore years spent in a discipline may not be the clue to look for in considering the way he used a discipline in his thought.

The reason for this rather hidden character of specific disciplines in Polanyi's discussion is given by Polanyi himself. It is the principle of tacit knowing. The disciplines of his prior careers become a part of his subsidiary awareness, and he relies upon them in a subsidiary way for attending to the new problems that he is pursuing. This means that those disciplines are not absent but have become integrated into the semantic and phenomenal aspects, the meaning and the appearance of what he is now targeting, the objectivist problem of our culture.

As soon as one turns to the medical aspects of Polanyi's philosophy, it becomes clearer that medicine has been underestimated in its importance for what Polanyi has to teach us and also for what Polanyi has to offer to medicine. As a beginning in this research on Polanyi, we can discern these things:

1) Polanyi's total approach to the crisis of our culture is as "physician of culture;"
2) Polanyi's theory of knowledge has essential roots, not accidental ones, in medicine;
3) Polanyi's language, his examples, and his metaphors are steeped in medicine;
4) Polanyi's reform of our theory of knowledge in science leads us back to the humanistic art of medicine; and
5) Polanyi offers a foundation for a more humanistic philosophy of medicine. Let us take up each of these separately.

Physician of Culture

It is difficult to tell the conventional intellectual who Polanyi is because Polanyi does not fall into the usual categories these conformists use for classifications. Polanyi cannot be adequately described as a philosopher even though he proposed a monumental philosophical theory, if philosopher means doing philosophy the way most European and American academic philosophers have defined philosophy in this century. As soon as you speak of Polanyi as a philosopher, as I have, you find yourself having to explain that his philosophy is distinctly different from most contemporary philosophy. Since official academic philosophy has virtually ignored or obscured Polanyi, it may be futile to talk to philosophers about Polanyi as a philosopher. People open to the much more perennial and grander tradition of philosophy throughout human experience, not just in Europe and in America, can grasp Polanyi as philosopher better. Polanyi cannot be typed by a school such as existential, phenomenological, or Gestalt even though he has affinities with important elements of all of these. Neither can Polanyi be adequately described as a social thinker or economist. He was a social thinker but the term is too vague, perhaps implying that Polanyi was a sociologist or

anthropologist or political theorist. There is truth again in all of these descriptions. Certainly Polanyi cannot be described as a theologian even though he spoke positively about the importance of faith and of religion in culture, enjoyed the attention of theologians, encouraged the use of his work by theologians, and expressed the ability to believe in religion as one of the major aims of his thought.

If one takes another route and turns to his scientific work, you are again driven into true and relevant titles, such as physical chemist and scientist, that are incomplete. These roles are so important in Polanyi's insights and discoveries that they must be noted, but they are only a part of the dominant character of the man. The errors in understanding science are a major part of Polanyi's discussion, but Polanyi's work proceeds from correcting the mistaken understanding of science into the widest range of human endeavor suggested by Polanyi's own terms such as "man in thought" and "a society of explorers." Ultimately, Polanyi is focused upon the quality of human life in our culture as affected by the objectivist scientific outlook.

If you take the description "physician of culture," you find one of the most appropriate terms to say who Polanyi is.[2] We have begun with the fact that Polanyi did study and briefly practice medicine. The model of the physician is in his training. Considering his time of training in Hungary it is also likely that Polanyi was trained as a generalist, not a specialist, a doctor prepared to take care of his patients as a whole. This approach is primary care, a relationship that demands a comprehensive approach since the doctor has to be responsible for the total person, not just the health or disease of a specific organ of the body. Indeed, primary care is what Polanyi attempted. It is partly what turns some philosophers and social thinkers away from him. Polanyi dares to take on the whole patient, the person and their history. In Polanyi's case, the patient is a culture now composed of individuals who have lost the capacity to affirm their participation in all their knowing and to take responsibility for it.

One of Polanyi's articles, "The Scientific Outlook: Its Sickness and Is Cure"[3] shows this physician's approach to our world's problems. Polanyi here and throughout his social and philosophical thought begins with the symptoms of the patient, goes on to a differential diagnosis, and then prescribes a cure. The boldness of Polanyi in diagnosing the illness of our period of history as rooted chiefly in our philosophy of knowledge is a part of his offensiveness to many. It seems too simple to specialized critics of our culture to think that we could find a primary cause of our disease. Polanyi, on the other hand, is convinced that there is an underlying problem and remedy that once recognized and treated can significantly change our world.

For followers of Polanyi, this mode of physician of culture poses a challenge. It asks them to take on more than a usual intellectual task of problem solving. It asks them to be a part of treating a whole culture. Such a challenge has similarities to the philosophical schools of Greece and of Rome at the beginnings of our civilization when philosophy was about the meaning of life and how to cope with the uncertainties of human existence. The acceptance of such a task places one in the company of persons who seem like missionaries, a role unacceptable to persons who pride themselves on having gone through the enlightenment of scientific objectivism.

Polanyi as physician of culture also poses a challenge to our ways of diagnosing the problems of our time. Polanyi's belief is that ideas have consequences. He thinks that our basic beliefs as a culture affect our human behavior. He dares to go so far as to isolate a primary cause of our disease, our scientific objectivism. Here he is truly a physician doing a differential diagnosis, that is, he has moved from symptoms to a primary cause. In his approach, he has told the patient that to get well there is a cause and a remedy. For many, it is difficult to accept not only Polanyi's remedy but also his belief in the etiology of the disease.

By using the model of physician of culture, one can be true to Polanyi's self-presentation. Like a physician who draws from many areas of knowledge to do her or his work, Polanyi combined the resources of physics, chemistry, biology, literature, art, religion, social science and philosophy to do his work. He did not describe himself as a physician, but his example suggests the influence of the medical model.

Medical Skill and Tacit Knowing

The medical component in Polanyi's thought is found in his fundamental contribution, the principles of tacit knowing. Polanyi almost always began his presentation of tacit knowing by calling our attention to the nature of skills. He asserted that knowledge is a skillful performance. He pointed out how all knowledge, and especially its sophisticated and complex forms, requires much more than what can be detailed in any kind of explicit statement or formula.

The selection of skills as a primary example is especially consistent with medical training. Medicine requires grounding in much basic science - physics, chemistry, biology, anatomy, and the systems of the body such as respiratory, cardiovascular, reproductive, hematology and neurosensory. Much of this is first presented in didactic lectures. The greater balance of medical education, however, is spent in various forms of apprenticeship where the ideas and concepts of the basic sciences are integrated and applied to understanding the human person. Through apprenticeship, the medical student moves from observation to practice. The necessity of apprenticing learning by connoisseurship and by conviviality, leads to Polanyi's claim that knowing is a skill.

In his 1960 address to the World Student Christian Federation assembly in Strasbourg, France, Polanyi began his presentation of his theory of knowing by giving the example of a distinguished psychiatrist who showed his students a rare type of fit.[4] Later the students discussed the case and tried to decide whether the fit was an epileptic or hystero-epileptic seizure. The question was resolved and an important lesson taught when the psychiatrist told his students that this case was a true epileptic seizure but he could not tell them how to recognize it. They would have to learn by continued experience.

Here, in Polanyi's illustration, we have the principle of the medical curriculum. More important, we have in his theory of knowledge a justification for the way the medical profession has to insist upon a lengthy education in practice before the doctor is licensed to practice.

It could not be argued that Polanyi learned only from medicine about skills as a clue to unlocking the modern misconceptions of explicit and of detached knowing. He obviously draws from the also long apprenticeship necessary for laboratory research. Nevertheless, medicine is strikingly insistent upon this factor in its historic self-description of its field as an art.

One reason why the art of medicine is important in considering Polanyi's thought is that medicine arose and progressed into the modern world parallel to the revolutions in astronomy, physics, and chemistry. Medicine had a guild and tradition that preserved and passed on its heritage with less concession to the mechanism, reductionism and objectivism of modern scientism. The art of medicine clearly prepares Polanyi for his profound aphorism that "we know more than we can tell."[5]

Polanyi's Medical Language

We have already noticed that Polanyi takes the approach of a diagnostician and uses that terminology. There are other ways in which medical language is basic to his thinking.

One of these is the word "attending." As we know, this term refers to the object of our knowing, the point upon which we focus our cognitive powers. In the medical context, "the attending" is the term used for the physician receiving and following through with a patient in the hospital. In the decision making process about treatment, the attending is the locus of responsibility. The force of the term is to emphasize the involvement of the physician. It is a dynamic word, one of action, true to Polanyi's basic understanding that all knowing is the action of a person. "Attending to" carries the medical connotation of someone well prepared by training now straining and focusing on a patient who has presented a problem that needs a remedy.

Other medical terms in Polanyi's theory of knowledge are the words "proximal" and "distal." Without medicine these words carry the obvious meaning of nearer and further in location. When one learns that these are essential terms in human anatomy, they take on a richer and more consistently Polanyian meaning.[6]

In learning human anatomy in medical school, a student has to be able to locate the parts of the body accurately regardless of whether she or he is standing above or left or right. The references as the surgeon asks for a clamp have to be clear and precise at the operating table or in a case history. For this reason there is a universal usage of such words as "lateral," "vertical," and "proximal" and "distal."

Also the proximal and distal locations in anatomy are not separated by empty space as they might be in casual lay usage. For example, proximal might refer to my eyes looking across empty space looking at a distal object such as a chair. But in anatomy,proximal and distal lie at different ends of a single body, limb, or organ. When one knows this bodily connected function of these terms, it strengthens the meaning of what Polanyi is describing in tacit knowing. The strong bodily connotations of proximal and distal enhance Polanyi's contention that our knowing is bodily knowing. The distal object is not across an empty space but it is in a continuum of bodily clues that we indwell and shape into a coherence.

The Humanistic Side of Medicine

While medicine developed to its present state out of its own independent tradition that paralleled the rise of modern science, it is also living in the pandemic of scientific objectivism. The pressures of mechanism and of reductionism are seen in many ways in medicine. Foremost in recent medicine is the brilliance of biochemistry and its genetic discoveries. Biochemistry was not pioneered by physicians or even by biologists. The revolutionary work of Francis Crick and James Watson is the work of persons prepared first in a mechanistic understanding of physics and chemistry. Their success has revived the Newtonian dream of Laplace of attaining a molecular knowledge of all living things by knowing their properties in the terms of physics and chemistry. Francis Crick described the human brain as the last frontier of scientific research waiting to be conquered by the analysis of biochemists. Very much alive in the excitement of neurological research is the goal of reducing human thought to electrical and chemical actions.

The application of strict scientific standards has greatly advanced medicine beyond the twentieth century's great reduction of disease through public health and sanitation. We are made aware on a daily basis of advances in

pharmacology for controlling pain and ending disease. The marvel of organ transplants and the increased longevity also upholds the mechanical approach made possible by the use of the principles of physics and chemistry in medicine. In many ways, the objectivist tendencies of modern science are reinforced in the medical world.

Against this trend is a concern for the human dimension in medicine. The dilemmas of medicine partly augmented by the technology and science of medicine have shown again that not all medical judgments can be resolved on an objectivist scientific basis. Decisions about death and dying have to go beyond a physical calculus.

To deal with this increasingly difficult area, medical schools, hospitals, foundations, and the government are investing in programs that contribute human dimensions to medicine. Polanyi's theory of knowledge and its many implications for our culture is central to this mission of humanizing medicine. One of the major contributions that a Polanyian philosophy can make is to remind medicine that it has in its own history of the art of medicine an antidote for the current insurgence of mechanism and impersonalism.

Because modern medicine is especially concerned to wear the mantle of science, it is important that it know that science is based on personal knowledge. Michael Polanyi, medical doctor, has much to offer to the future of medicine. Medicine knows from its own story that it is more than science, it is an art. This art without the kind of reconstruction given by Polanyi's theory of knowledged and criticism of scientific objectivism has little foundation on which to stand. Once Polanyi's contribution is accepted, there is a place for both the science and the art. As Polanyi has shown so well, there is a common ground of knowing from the sciences to the humanities. All knowing is skill because it is founded in tacit knowing. Instead of trying to make an either/or choice in medicine, there is a need to recognize how the science and art of medicine are essentially joined in the work of the human person.

Polanyian Foundations For A More Humanistic Medicine

To elaborate the contribution of Michael Polanyi to the philosophy of medicine today, I want now to move from having suggested that Polanyi's philosophy was substantively influenced by his training in medicine to specific concepts that are relevant to current medical practice.

1. First, every field engaged in science today has to become aware of the extent to which the image of scientific objectivism dominates and colors its concepts, methods, goals, outlook, and practice. Edmund Biernacki (1866-1911), Wladyslaw Bieganski (1851-1917), and Zygmut Kramsztyk (1848-1920) - all physicians and members of the Polish School of Philosophy of Medicine pointed out that with the scientific revolution in medicine in the last half of the nineteenth century, physicians strove to rid themselves of the image of a healer and sought the image of a scientist.[7] This tendency has continued to grow and to spread today until it is virtually taken for granted. What this grand image of scientific knowledge has done is to obscure or to reduce the role of the physician as healer and the patient as person. Today there is an image of the superior physician being a specialist, steeped in scientific information and technology, applying this learning to a disease. Missing in this image is the critical role of the physician who affects a patient not simply by his or her scientific knowledge but by the total relationship that includes ethical and psychosocial dimensions as well. Further, the patient is regarded as a disease, and if a disease cannot be diagnosed, "there is nothing wrong with them."

Medical schools have to work to train their graduates that the affective, the intrapersonal and interpersonal components of medicine are as important as the material structures of illness.

Polanyi's critique of the vast influence of the scientific objectivism is critical to overcoming the impersonalization of medicine. This general outlook still dominates and has to be faced directly at its roots in our epistemological outlook.

2. A harder and more basic point lies in Polanyi's demonstration that scientific knowing is itself a personal achievement. The theory of tacit knowing shows that into every moment of knowing there goes the gathering and integrating powers of the specific person. Polanyi does not solve the problem of the impersonalization of modern medicine by making the humane element an additional component alongside of the scientific one. That way of constructing the problem is both mistaken and also a continuation of the dichotomy between medical science and therapy, between basic sciences and the humanities and arts. In medicine, as in other fields such as physics and chemistry, the attempt to reconcile the nature of science and the nature of the humanities is defeated by creating separate dimensions or separate realms where they operate. Granted that they have distinct functions in what they attend to in their knowing, the sciences and the humanities are not completely compartmentalized. The act of discovery and the act of creation are rooted in the common principles of tacit knowing, knowing by relying on and attending to, by subisidiary and by focal awareness, by indwelling, by reaching for clues and intimations of new aspects and new levels of experience and of understanding, by appeal to a sense of the universal in the minds of prepared colleagues, and by belief in a bearing on reality that is open to all inquirers.

Polanyi's theory of knowledge calls for an end to the divorce between theory and practice, between laboratory and examing room, between medical science and the practitioner. Every treatment is an application of the personal achievements of scientists. Every treatment is also an experiment testing and enlarging the laboratory conceptions of science. The practitioner deals with more than just isolated biological phenomena; he or she deals with the wider dimensions of human illness and contributes their own discoveries. One is in the feedback of specific scientific procedures such as drugs. The other is in the combination of these procedures with the ethical and psychosocial factors of human life. Until medicine restores the continuum between the science and the art of medicine, it will falter under the weight of scientific objectivism.

3. The transformation of medicine away from the distortions by the objectivist ideal of science can be begun by three areas already recognized but needing Polanyi's comprehensive theory of knowing.

> 1) *The rejection of reductionism as a total goal of science and the use of reductionism within reasonable areas:* The attempt to describe completely aspects of life in biochemical terms has attained important results. The mapping of the human genome will advance our ability to treat disease. These results can do much to improve human life. Medicine is and will remain more than the application of biochemistry and more than the application of pathology. When a physician treats a patient, there are not just simple or complex biological facts. The patient belongs to a field of forces that include environment, life style, and society as well as human biology. Polanyi's relating his theory of tacit knowing to the hierarchical structure of human evolution is crucial in seeing that we have in medicine not only life reflecting on life but also the open choice of our destiny which includes values not limited to the biochemical level. We have to move from the limits of reductionism to seeing that we have to choose the values that shape our future. These values are integral to the healing art.
>
> 2) *Recognition of medical therapy as a genuine art based on basic science:* The physician treats patients not idealized laboratory specimens. Edmund Pellegrino, distinguished American physician and medical humanist, has tried to express this view in saying that medicine cannot be reduced to

medical science.[8] Polanyi helps to further this understanding by his central teaching that knowing is a skill. A good doctor is one who knows not only the available scientific information but also one who can apply that to the uniqueness of every patient. Each patient has their own disease and not one identical to a classification. The focus of medicine is the person. Furthermore, a statistical picture remains a generalized view. Here the movement is from theoretical knowledge to the combination of practical experience of the physician, his or her compassion for the patient, and his or her ability to make a new judgment based on their reliance on the totality of their personal knowledge. Because therapy cannot be codified completely, the recognition of the nature of skilled learning through apprenticeship and practice is a major Polanyian contribution. On Polanyi's terms, this clinical application is as true as the laboratory findings of the basic scientist.

3) *A philosophy of medical progress*: Medicine, like other fields affected by the scientific revolution, has tended toward historical nihilism. When the practices of the past were found to be based on inaccurate and misleading conceptions, such as the theory of humors, the effect has been to discard all concern for past medical history. In the desire to be scientific, only the latest and most immediate data and ideas are considered worthy. In addition, the changes in medical knowledge have produced a type of relativism represented by the "constructivist" epistemology of Ludwik Fleck (1896-1961), the best known of the Polish school of philosophy of medicine, held a) "the non-existence of `objective' observations, b) the dependency of the latter on the previous training and preconceived ideas of the observer, c) the dependency of scientific truth on the thought style of the scientific community that generates it, and d) the incommensurability of truths generated by thought collectives . . . ."[9] His work sought to right the balance between scientific research and therapy. Instead of righting the balance, Fleck's way of emphasizing the personal and social contribution of the knower led to greater distrust of the past and a desire for more exact scientific results impervious to change.

That medicine is also a victim of the truth that every theory in its own time looks rational is a realization that needs Polanyi's sense of history. Instead of being skeptical about the past or our present knowledge, Polanyi's understanding of tradition and of universal intent provided a way to rely upon it for perspective and for use until it was succeeded by more satisfying results. The difference is that Polanyi did not abandon truth as guiding us by stages. He accepted the limitations of our historical setting, but he also saw those as bearing on an unending search that would move us to deepening knowledge of ourselves and of the universe. The discovery of the bacteriological causes of diseases and of epidemics overthrew much of previous medical knowledge. This change, however, is a case for tradition, not against it. It teaches, as did the case of Copernicus, that we are embodied and find our measure of truth by reliance upon belief in our powers to make contact with reality. This sense of reality ever inviting, correcting, and advancing our understanding leads to a sense of human responsibility and of positive relation to our heritage. Polanyi's theory shows that we can progress from our past yet recognize our continuing connections with it. We may even in some cases rediscover value of earlier ideas. Paracelsus recommended using plague bubos for preventing other infectious diseases that were similar to plague. This theory was repudiated as absurd yet it is partially validated in the theory of immunity.[10] More pertinent for our time is to reconsider the ability and the insight of the physicians of the past who focused more on primary care of the whole patient than on a singular disease.

In 1910, Michael Polanyi's first scientific paper, "The Chemistry of the Hyrocephalic Liquid" was published here in Budapest. It was a medical paper foreshadowing his later immense scientific achievements. It spoke from a

medical context, and it employed chemistry. On this anniversary occasion, let it be noticed that he took from medicine the wisdom of practice, the idea of knowing as a skill and from it, he became a physician of culture and philosopher to help medicine today.

Endnotes

1. Polanyi's earliest published scientific paper is "Chemistry of the Hydrocephalic Liquid," *Magyar ord. Archiv.*, N.F. 11, p. 116 (1910). It was also followed by two other papers: "Investigation of the Physical and Chemical Changes of the Blood Serum During Starvation," *Biochem Z.*, 34, p. 192 (1911) and "Contribution to the Chemistry of the Hydrocephalic Liquid," *Biochem Z.*, 34, p. 205 (1911).

2. Harry Prosch in his book *Michael Polanyi: A Critical Exposition*, (Albany: State University of New York Press, 1986) also sees Polanyi as a physician of culture.

3. *Science*, 125 (March, 1957), pp. 480-504.

4. p. 3.

5. "Knowing and Being," *Knowing and Being*, Marjorie Grene (ed.), University of Chicago Press, 1969, p. 133.

6. See Richard Gelwick, *Tradition & Discovery*, VI, No. 1 (Winter, 1988-89), pp. 37-38.

7. Ilana Lowy, *The Polish School of Philosophy of Medicine*, Boston: Kluwer Academic Publishers, 1990, p. 7.

8. "Philosophy of Medicine: Problematic and Potential," *The Journal of Medicine and Philosophy*, 1(1976), pp. 5-31.

9. Lowy, p. 220.

10. Lowy, p. 169.

The Roots of Culture

Robin A. Hodgkin

[**EDITOR'S NOTE:** *This essay was originally printed in the English publication titled* ***The Gospel In Our Culture*** *(Newsletter 13, Summer 1992);* ***TAD*** *appreciates permission to reprint it. Robin Hodgkin requested that the following introductory note be appended for* ***TAD*** *readers: "This brief article skates past several tricky problems. For example, I make too close an elision between Mind, Principle, Logos, Structure and Form. These obviously should be sorted out but it would be a long and difficult row to hoe. Second, Michael Polanyi's writing on levels of orderliness and on the boundary processes between levels was seminal but still calls for more unpacking. And thirdly, his important remarks on the nature of machines and tools has never, to my mind, been adequately explored and expounded."*]

All human culture springs from the way, the process, by which *we*--a parent and child, a community, a church--*make sense of the universe*. Kristin Ofstad is right to suggest (Newsletter 11) that some of our present confusion results from a failure to dig down to the roots of sense and meaning which underlie our "Christian" culture. I propose to look at just two of these roots--Technology and Science--and to ask what they really are: or at least to get near to their simple essence. Are they separable? How do they relate to each other?

We can be helped in this enquiry, first, by Michael Polanyi. He taught us to think about a many-leveled universe and stressed that there is a hidden (tacit) knowing which undergirds and influences all our explicit knowledge. In language, for example, the hidden grammar that we learnt as children still shapes our style and energy of expression. There are also deeper patterns in our mind-body which constrain us or offer unexpected openings for our competence. For example: we are born with an aptitude for climbing but not for flying. Consciously or unconsciously we build with this substratum of tacit knowledge, shaped by evolution as well as experience, and make sense with it--sense which we share with others.

The second way of understanding the roots of science and technology is to reflect on the development of children's thought, via Piaget. This implies more than looking at the learning of individual children. We must go further and understand the importance of a child's background, enriched by many social and linguistic "givens": of love, trust, play and mutual exchange. This is where culture starts.

The subject is large, so we shall have to cut corners. Let us focus on Naomi, aged three, playing with her mother watching. She is building a tower with four bricks. She seems to be experimenting and making hypotheses--"what if . . . try this." Crash. Start again. Naomi's mother comments encouragingly and occasionally supplies a word for what is going on. "It wasn't quite balanced, was it, my love? Try it in the middle--gently." "Ah, that's splendid. Now it's standing firm and upright." Notice the prevalence in this kind of talk of what the philosophers used to deride as "value judgments." Language, morality, emotional dispositions, music, physical and artistic and social skills are all being shaped and nourished in such early interactions between two people and "nature."

In this kind of gently monitored and guided constructive play, science and technology are already beginning to appear in their distinctively different ways. *Making* dominates in those activities which we term "technological." Articulate, *shared theory* and abstract terms dominate in the kind of knowing that we term "scientific." They are complementary. Even the most "theoretical" scientists possess and use practical and other non-verbal skills in their work; and vice versa.

It is worth stressing that "techne" originally meant making things *well*, as in "technique"; "…ology," "logos," of course means "word." However, because "word," theologically, has such a tremendous connotation, I think we are justified in seeing a deeper meaning in "technology" than just "talk about making things well." Logos suggests *mind*--the Mind of God at work in the world, through life and through living creatures. So when Naomi was successfully making something, even before she was a competent language user, logos or mind was, in a small way, flowing through her into the material she was handling, judging and thinking about. This is basic technology: mind flowing into matter and ordering it.

This is the broader definition of technology than is customary. It covers icons as well as machines, cathedrals as well as factories. In education, at least, it is usually a good idea to keep the concept of technology wide. Children thrive on an open and adventurous diet of *making*, of putting the bits and sub-skills together in a disciplined way to make a whole. Creative experience in, say, the arts or literature can carry over, more readily than "factual" knowledge, into creative competence in more focussed fields such as engineering or medicine.

What about science? In essence it is the opposite. If a child is generalizing from experience, she is using her conceptual skill and elementary language to draw principles or statements about observed patterns *out of matter* and into language. Such words as "balance" or "center of gravity" may have to wait a long time before they click as active concepts in Naomi's growing mind. Such control of concepts is supposed to happen around the age of twelve. But more fundamentally, the essential wordless deductions, the ground-work, was being performed there, on the floor, long before the scientific vocabulary had been mastered.

Science therefore involves the drawing out of mind-like patterns from matter--from a play-thing or from some chosen object of observation. Such patterns are then articulated, linguistically or mathematically, for a community of critical inquirers. This may lead to good science or to bad science. Polanyi emphasized that the quality will depend very much on the degree to which the relevant scientific community shares both an understanding of the background and what he called "a universal intent" to persist in searching for more and more truth.

This way of thinking about science and technology makes an unfashionable demand on us: that we should regard logos or mind or principles as existing in the universe and not just in human heads. Polanyi was not alone in reviving this idea for the modern mind. Owen Barfield, his near contemporary, went much further and some of Jung's ideas and certainly Teilhard de Chardin's pushed in that direction. This perspective may still not be fashionable but it is beginning to crop up even in the writings of philosophically inclined biologists.

Much of the pristine experience of children gets covered up and forgotten. Obviously, there is great variety in the quantity and quality of the tacit "science" and tacit morality that children acquire. But then the tacit roots of science and technology can be utterly choked and distorted by layers of media-twisting and untruth, by commercialism and

gadgetry. When we try to reach down to simple experience or simple truth, we encounter that extraordinary impenetrability of modern communications systems and even, indeed, of modern education. Perhaps teachers of all kinds have failed to absorb and translate the Gandhi-Schumacher lesson: small is beautiful, foster and learn from nature and from the simplest technologies.

It is a Christian lesson too. The Christian gospel starts mainly with simple things, usually growing in some way: seeds and weeds, pearls, salt and a person. This is where the teaching and the learning start and should constantly return. The roots of frontier experiences, almost invisible, are what matter--WE--an I and a Thou--speaking something true, making something lovely, making something lively and putting our hearts as well as our heads into it.

Comments on the Occasion of the 100th Anniversary of the Birth of Michael Polanyi

John C. Polanyi

[**EDITOR'S NOTE:** *Professor John C. Polanyi, a son of Michael Polanyi who became a Nobel Laureate in 1986, made the following remarks on the occasion of the Michael Polanyi Liberal Philosophical Association Commemorative Conference in Budapest, Hungary in August of 1991.*]

I am grateful for this opportunity to re-establish contact with a nation that I knew best before I was born. I have no doubt that through my parents I owe a great deal to this city and this country.

My father, Michael Polanyi, whose centennial is celebrated this year, was the youngest child of Hungarian parents, themselves born in the middle of the last century. My father went to school and to university in Budapest. He served as a junior officer in the Austro-Hungarian army in the First World War.

Following a brief period in the Ministry of Health in Count Karolyi's government, he went to Germany to pursue a career in scientific research. At that time Germany was the world capital for science, as the United States is today.

From the age of about twenty-nine and for the remaining fifty years of his active life, he travelled widely, but almost never to Hungary. His home for over forty years was England, a country which he loved. But he continued in his heart to honour the liberal and creative Hungary that he had known, and the Europe that he feared had passed into history.

Few people have thought as profoundly and passionately about the tragedy of Europe as he did. He laid that tragedy at the door of perverted science. In summarizing his views in this fashion I use words that he might not have used, but I do not think that I distort his ideas greatly by doing so.

The National Socialists (the Nazi's) in Germany, and the Marxists in the Soviet Union -- each of whom engulfed this country in horror -- held to the view that what was not part of science could not sensibly be regarded as existing. It followed that morality did not exist, except as a remnant of outdated superstitions. Truth, justice, and tolerance had been, they believed, shown to be mere impediments to scientific progress.

This was a flagrant distortion of reality. The fact is that science owes its power to its commitment to precisely these values. Science respects opinions which are honestly held -- and not because of the race, religion, or social class

of the individual who holds the view. Science flourishes only to the extent that it respects the individual and tolerates dissent. Justice is served by requiring each new scientific proposition to prove itself before the court of scientific opinion.

Science does not need to levy fines or impose prison sentences on those who fail to acknowledge the curvature of the earth or the existence of atoms. The truth, if it is indeed the truth, does not need to be established at the point of a bayonet. Nor, if it is not the truth, will a bayonet make it true.

Far from validating the horrors of the recent past, science, with the other arts, has provided a rallying point for opposition to tyranny. And far from embracing science, the tyrants of this new age have found themselves at war with science -- attempting to discredit scientific leaders (Einstein, Pauling, Sakharov, and now Fang Lizhi).

The renaissance of Europe is a marvel my father sensed, but never saw. That renaissance does not mean that history is over. Civilised values will continue to be threatened for the rest of time. Not by barbarians so much as misguided idealists, who in their impatience and ignorance urge us to jettison civilised values. We will continue to need individuals with the wisdom to warn us of these hazards. Michael Polanyi was such a one, I believe.

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The Value of the Inexact

INTRODUCTORY NOTE: *The following letter from Michael Polanyi to the British journal,* ***Philosophy of Science*** *was fired off in 1936. Its style and content reveal the daring and the brashness of the then Professor of Physical Chemistry at the University of Manchester. A distinguished physical chemist is contradicting what philosophers say about science as a very precise and quantitative enterprise. More significant, in retrospect, is the way this brief letter poetically embodies the major ideas of Polanyi's mature theory of knowledge. Here we can look back now and see the germ of tacit knowing and the way it explains how science works through skills, apprenticeship, and tradition.*

In 1962, I found this letter in the University of California, Berkeley library and showed it to Polanyi who was then at the Center For Advanced Studies in the Behavioral Sciences at Stanford. He read it over and laughed as he saw the continuity between it and his 1962 Terry Lectures, which later became ***The Tacit Dimension****.*

Richard Gelwick

Sir,

The subject of chemical concepts as opposed to physical ones has always been fascinating to me because it shows the great value of inexact ideas. It is easy to prove that no completely exact statement can be of any value in natural science, but when applied to physics the argument always appears to be a combination of far-fetched trivialities and sophistry. Of course, the mere fact that there is no absolute security for the validity of what we consider exact natural laws should lead to the conclusion that these laws are only valuable in combination with the element of uncertainty in them, which is compensated by the supreme sanction of validity, which is faith.

This, however, shows itself in a much more matter-of-fact fashion when we consider chemical concepts. Chemistry is a world of ideas expressed by such terms as "relative stability," "affinity," "tendency," "inclination," "general expectation," as descriptions of behavior. There is not a single rule in chemistry which is not qualified by important exceptions. The character of a substance or class of substances is as complex as the features of physiognomy and the art of chemistry appears to be the power of being aware of these complex attitudes of matter, and in a thousand delicate attempts to add further evidence to, and enlarge the field of this awareness; thus, were a million compounds synthesized it would be an achievement which could never have been attained by exact methods. It is indeed obvious, that if at any time chemists would have been so ill-advised as to let themselves be frightened by physicists into abandoning all vague methods, and to restrict themselves to the field where exact laws (or what are supposed to be such by the physicists) pertain, the development of chemistry, would, at that moment have stopped dead, and its most

valuable parts would have melted away in the rays of such foolish criticism.

I think it is good to contemplate how useless, or even harmful exactitude becomes at so close quarters to physics. Just link up two of three of the atoms of physics, and their behavior becomes so complex as to be beyond the range of exactitude. How supremely unreasonable it appears then, to claim that, by precise measurements and mathematical treatment, i.e. physical exactitude, a vital knowledge and command of such objects as living organisms and social bodies should be found. All these fields of high complexity gain real profit only from the discovery of specific tendencies of behavior incorporated in their functional outlines.

Chemistry, indeed, leads us so far away from physics, (or let us say, that physics appears, when we look at chemistry, so far remote from everything else in the world) that the description of chemical substances and the art of dealing with them lies quite near, by comparison, to the types of human behavior and the art of commanding human behavior. The mythological language of the alchemists persists in chemistry and is still characteristic of its most vital element.

M. Polanyi

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