Two Cultures Revisited: Michael Polanyi on the Continuity Between the Natural Sciences and the Study of Man

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ABSTRACT Keywords: Snow's problem, Michael Polanyi, the natural sciences, the study of man, continuity and distinction.

Polanyi's response to Snow's problem is a two-step strategy. First, he undermines the supposed gap between the natural sciences and the study of man and establishes the continuity between them. Second, based upon what is achieved in the first step, he explores the distinctions between scientific and humanistic meanings. All this is achieved on the basis of his theory of tacit knowing. Three features of this theory merit attention: (1) the predominance of the participatory perspective; (2) the recovery of the hermeneutic dimension of science; and (3) the constructive use of Heidegger's "being-in-the-world."

The split of science from the humanities and fact from value is a prominent phenomenon in modern times. C. P. Snow addresses this issue in his famous article titled "The Two Cultures" based on his 1959 Rede Lecture. One philosophical version of "Snow's problem" is the discussion of the relation between the natural sciences and the social, human sciences. Polanyi's view on this problem is quite clear. He insists on the continuity between the natural sciences and the study of man. In holding this view, Polanyi finds himself at odds with both positivists and secessionists, i.e., philosophers like Dilthey, Wildelband, Rickert, and Collingwood, who advocated the secession of the humanities, and history in particular, from the domain of the natural sciences. In this essay, I will argue that, by working out a new epistemology, that is, his theory of tacit, personal knowing and an ontology of stratified reality, Polanyi overcomes the deficiencies of both the positivistic approach and the secessionist movement and undermines the supposed gap between the natural sciences and the study of man.

1. The Supposed Gap

Polanyi is in line with Snow in complaining about the gap between science and the rest of our culture, but he disagrees when Snow attributes the gap to specialization, which results in, for instance, literary people's ignorance of thermodynamics. Polanyi thinks that specialization is indispensable to the advancement of modern science and the rest of our culture. Rather, he sees the trouble in the modern understanding of science. In Polanyi's diagnosis, it is the modern understanding of science, which, having originated in the scientific revolution in the 17th century, gained momentum in the Enlightenment, and ultimately found its paradigmatic expression in positivism, is responsible for the gap between science and the study of man. Positivism contributes to and sustains the gap. The break between science and the study of man is a logical consequence of the positivistic conception of science. Obviously, this observation is not compatible with the prevalent positivistic self-understanding concerning the relation between the natural sciences and the social, human sciences, which claims that the latter should model on the former and advocates the program of a unified science. Let's see how Polanyi justifies his thesis.

A survey of his various works in different periods shows that Polanyi's characterization of the positivistic conception of science and knowledge in general can be captured under the following three headings: objectivism, the obsession with the explicit, and reductionism.

By objectivism, Polanyi means the ideal of scientific detachment that sets the goal of absolute objectivity for science and characterizes science as impersonal knowledge. Since the 17th century, this objective, impersonal ideal of scientific detachment has become ingrained in our culture and has become the dominant view of science and knowledge in general.

Closely related to objectivism, is the ideal of wholly explicit knowledge. The paradigm case for this ideal can be found in logical positivism, which equates science with a body of highly formalizable and wholly explicit propositions and takes logical analysis of the structure of scientific theories as the main task of philosophy of science.

The third element in the positivistic understanding of science is reductionism. It manifests itself in the search for a mechanistic theory of the universe which demands insistently that everything should be explained by the laws of physics and chemistry. The Laplacian ideal of a universal knowledge of the world is an excellent example of it. It is also embodied in various naturalistic explanations of man and human affairs, for instance, Freud's reduction of man's morality to a mere rationalization of desires, or the behaviouristic elimination of intentions.

Polanyi points out that simply by adhering to this objectivistic and reductionistic conception of science, and applying scientific methods to the study of man and society, the study of man, as carried out in various disciplines, ends up inevitably with many anomalies, even absurdities, that are easily found in areas from neurophysiology, psychology, anthropology and jurisprudence, to sociology and moral theory.[1] To put it in another way, what Polanyi attempts to say, in my view, is this: if we stick to the positivistic understanding of science and study man and human affairs in a detached manner and in a reductionistic way, we can hardly avoid the "corruption of the conception of man,"[2] reducing him to an insentient automaton, or to a bundle of appetites, or to a passive being conditioned by the existing structure of power and profit. That is to say, man as a sentient, intelligent, and morally responsible being lies outside of the reach of science positivistically conceived. Any attempt to take man's moral and other cultural responsibilities seriously, as being apposite to his being, is doomed to be unscientific. Hence the gap between the natural sciences and the study of men as sentient and responsible beings. We can infer from Polanyi's analysis that, for positivists, there is a discrepancy between what they want to accomplish and what they can accomplish. Due to its objectivistic and reductionistic understanding of science, the program of a unified science is an unachievable goal. The gap between the natural sciences and the study of man is implicit from the very beginning in the positivistic conception of science.

While for positivists this gap is only implicit in their approach, it is blatantly announced by the anti-positivist secessionists.

> Since the end of the nineteenth century there has been a continuous philosophic movement on foot claiming that the humanities, history in particular, must be studied by other methods than those of the natural sciences. In Germany, where this movement goes back to Hegel and Herder, and in Italy, where its roots can be traced back even further to Vico, this philosophic

movement soon became predominant. In England, the writings of Collingwood, who vigorously advocated what he called the 'secession' of history from the domain of the natural sciences, gained a limited influence for this doctrine.[3]

The rise of this philosophic movement was a reaction to the positivistic program of a unified science. But the irony is that, as will be shown clearly later in section 3, when the secessionists drew a demarcation line between history and the natural sciences, they shared the positivistic conception of sciences. Simply put, the dichotomy of history and natural sciences as advocated by secessionists was based upon a positivistic understanding of natural sciences.

In summary, no matter whether it is implied or explicitly stated, the secret of the gap between the natural sciences and the study of man lies in the positivistic conception of science. So, if we intend to bridge the gap, we have to call into question the positivistic conception of science. This is exactly how Polanyi approaches the issue. Polanyi does not take the above mentioned gap as a legitimate one, and he attributes the untenability of the supposed gap to the inadequacy of the positivistic conception of science. He suggests that, "we can start mending this supposed break between science and our understanding of ourselves as sentient and responsible beings by straightening out our conception of scientific knowledge." [4]

2. Revision of the Positivistic Conception of Science

To Polanyi, the positivistic conception of science is far from satisfying. It does not provide us with a true picture of what science really is. It is the target of his lifelong attack.

According to Polanyi, the complete and absolute objectivity usually attributed to science is a delusion, and he rejects it absolutely as a false ideal. The substitute that he offers for the ideal of scientific detachment is personal knowledge.[5] In his view, the personal participation of the knower in the shaping of knowledge is no mere imperfection that should be eliminated, nor a mere psychological by-product, but a logically indispensable element of science.[6] Taking advantage of his expertise as a scientist and his familiarity with a stunningly wide scope of scientific knowledge in different branches, he demonstrates that personal participation exists in mathematics, physics, chemistry, biology, medicine, not to mention the social sciences and the humanities. In surveying the personal participation in scientific inquiry, Polanyi discusses different personal coefficients; among them are personal judgment, appraisal, imagination, intuition, intellectual passions, beliefs or convictions, commitments, and conscience. For the sake of an accurate understanding of Polanyi's position, it is worth noting that, while endorsing the indispensability of personal involvement in scientific inquiries, Polanyi draws a clear line between the personal and the subjective. While what is subjective is defined as being private,[7] personal participation "is a responsible act claiming universal validity. Such knowing is indeed objective in the sense of establishing contact with a hidden reality."[8] In a word, personal knowledge is a fusion of the personal and the universal, the objective.

In order to cast Polanyi's position in sharp relief, it is worth noting that three conceptions of objectivity are involved here. Objectivity 1 denotes the independent existence of external reality; objectivity 2 refers to universal validity and objectivity 3 means scientific detachment. Obviously, Polanyi's theory of personal knowledge is against objectivity 3, something which he calls objectivism, but fully acknowledges objectivity 1 and 2. It retains the universal, objective dimension of science and shows an attempt to situate it

in its real context, namely, the context of personal involvement. In this respect, it is analogous in structure to the concept of "situated reason" which tries to keep balance between the contextuality and universality, the immanence and transcendence of reason at the same time. [9]

The personal coefficients of knowing are often tacit powers of the mind and can hardly be put in explicit terms. The uncovering of the tacit dimension of knowing forcefully undermines the positivistic ideal of wholly explicit knowledge. The fact that we know more than we can tell in various situations in everyday life and scientific research bears witness to the existence of tacit knowledge. But Polanyi is not just content with demonstrating the existence of tacit knowledge; he has a more important point to make. In his view, tacit powers of the mind are decisive and predominant at all levels of human cognition, not only on the pre-linguistic level, but also in the domain of articulate culture. They represent man's ultimate faculty of acquiring and holding knowledge. He says: "While tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood and applied. Hence all knowledge is *either tacit or rooted in tacit knowledge*. A *wholly* explicit knowledge is unthinkable" (italics original).[10] Obviously, this emphasis on the primacy of the tacit dimension of human knowledge is diametrically opposed to the positivistic obsession with the ideal of wholly explicit knowledge.

The analysis of the structure of tacit knowing is recognized as one of Polanyi's most important contributions to philosophy. It can be described as a triad. It has three centers: "first the subsidiary particulars; second, the focal target; and third, the knower who links the first to the second."[11] The knower gets to know the second term by attending to it, while he knows the first term by relying on it for attending to the second term. He has focal awareness of the second term and at the same time subsidiary awareness of the first term. By an act of integration, the knower establishes a from-to relation between the first term and the second term. Polanyi reminds us of the fact that there is one thing in the world which we almost know exclusively by relying on our awareness of it for attending to something else. This unique thing is our body. Normally, we do not attend to our body as an external object, but we always rely on our body as a means for our intellectual and practical control of the outside world. Polanyi generalizes this point and says: "*We may identify, therefore, our knowing of something by attending to something else with the kind of knowledge we have of our own body by dwelling in it* "(italics original).[12] Thus we arrive at his famous thesis of knowing by indwelling. To have subsidiary awareness of the particulars in attending to the coherent entity which they jointly constitutes is to dwell in it. The claim that knowing involves indwelling is reminiscent of Dilthey's hermeneutics and related ideas. Polanyi acknowledges this connection, but he also points out that the strength of his own thesis lies in his analysis of the natural sciences, something that Dilthey's hermeneutics and related ideas completely fall short of: "While knowledge by indwelling is clearly related to Dilthey and existentialism, its extension to the natural sciences is contrary to these philosophies."[13]

In this connection, it is interesting to note how Polanyi interprets the notion of understanding on the basis of his theory of tacit knowing. First, Polanyi thinks that the word "understanding" covers different operations of man's tacit powers. Understanding, or comprehension, is defined as the faculty of making sense of and reorganizing our experience so as to gain intellectual control over it. As noted above, tacit knowing is regarded as the ultimate faculty for acquiring and holding knowledge so it is the key to understanding. Polanyi claims that, understanding, or comprehension, "is the faculty which I recognize as the central act of knowing. For comprehension can never be absent from any process of knowing and is indeed the ultimate sanction of any such act. What is not understood cannot be said to be known."[14] Second, in Polanyi's view, "The structure of tacit knowing is manifested most clearly in the act of understanding. It is a process of comprehending: a

grasping of disjointed parts into a comprehensive whole."[15] In comprehension, the central epistemological relation is that of the parts to the whole. In order to understand the whole, we should know the parts, but the way we know the parts is different than the way we know the whole to which we attend focally. We know the parts in terms of the whole which they constitute, that is, we know them subsidiarily. Surely, this analysis of the mutual relationship between the parts and the whole in understanding or comprehension can shed some light on our understanding of the hermeneutical circle. Third, in defiance of the positivistic doctrine, Polanyi's notion of understanding carries with it a strong metaphysical overtone. Adhering to his realistic position, he characterizes understanding as an attempt to search for the hidden reality which will manifest itself in unthought of, or even unforeseeable, ways in the future.

This brings us to the ontological aspect of tacit knowing, and further, to Polanyi's ontology of stratified reality which is his substitute for the mechanistic world view. According to Polanyi, there exists a correspondence between the structure of comprehension and the structure of the comprehensive entity which is the object of comprehension. The two terms of tacit knowing are identified as two levels of reality. Polanyi maintains that the logic between them is applicable to the whole sequence of levels of reality which constitute the universe. The universe is filled with different strata. Roughly speaking, the most important ones are the following. The lowest is the level of the inanimate nature. Above it is the level of vegetative functions of life; the next is sentience, the perceptive-appetitive agency in animals. Beyond that is the level of conscious behavior and intellectual action. The highest level in the hierarchy is the cultural stratum of human beings, the noosphere. Polanyi claims that "each level is subject to dual control; first by the laws that apply to its elements in themselves and second, by the laws that control the comprehensive entity formed by them."[16] On the one hand, the operations of the higher level—the comprehensive entity—cannot be accounted for by the laws governing the particulars forming the lower level. There are always some boundary conditions on the lower level, namely a set of conditions left undetermined by laws of the lower level. It is the laws of the higher level that exercise control over these boundary conditions. This is called the principle of marginal control. On the other hand, the operations of the higher level must rely on the laws of the lower level that govern the particulars themselves. Therefore, the lower level imposes restrictions on the higher level and determines the conditions of the successful operation of the laws in the higher level and explains the causes of the failure of it. From this ontology of stratified reality, it can be easily inferred that the positivistic strategy of reductionism is untenable. All living things cannot be accounted for by the laws of physics and chemistry. Man's higher faculties, like morality, can not be accounted for by his lower functions.

As mentioned above, the supposed gap between the natural sciences and the study of man is based upon the positivistic conception of science which is now shown to be a misrepresentation of what science really is and should be rejected. Polanyi's theory of tacit, personal knowing and his ontology of the stratified universe brings about a new understanding of science. It suggests that the understanding of men and society can only be achieved by a deep indwelling, that is, by putting ourselves at the same place as the persons that we are studying, and sharing their feelings and thoughts. Therefore, man as a sentient, intelligent and morally responsible being, which is out of the reach of the positivistic conception of science, is redeemed in light of this new understanding of science. Polanyi confidently claims that this new conception of science "opens the door for our entry into human personality in its whole moral, religious, and artistic outlook, as the bearer of a historical consciousness, a political and legal responsibility. Thus it introduces us through an extension of scientific inquiry straight into the whole sentient, creative, and responsible life of human concerns" [17] This is borne out by his critique of secessionists in addressing the topic of history, a sphere where the most striking examples of human responsible decisions are recorded.

3. Critique of Secessionists

In the third lecture of his *The Study of Man*, which is entitled "Understanding History," Polanyi faces up to the challenges raised by the secessionists who insisted on the logical gap between the natural sciences and the humanities, and history in particular. His encounter with the secessionists can be recapitulated here in the following three rounds of arguments and counter arguments.

The first group of arguments of secessionists for the split of history from the natural sciences runs like this: historians study actions, while scientists study events. Human actions involve responsibility, and therefore are subject to the moral judgment of historians, while scientists do not make value judgments. Historians have to re-live, or dwell in the actions of their subjects, while scientists do not.

These grounds for the secession of history from the natural sciences do not hold for Polanyi. First, Polanyi discredits the contrast between action and event by citing animal psychology as an example that lies in the domain of the natural sciences, but that, nevertheless, deals with the actions of animals. Second, as mentioned above, according to Polanyi's epistemology of personal knowledge, among the personal coefficients that he discusses, is appraisal. Every act of personal knowing sets up a standard of excellence by which it appraises what it knows. Therefore, Polanyi claims that, "contrary to usually accepted opinion, every branch of natural science makes value judgments of some kind. Each appreciates the particular comprehensive entities which form its own subject matter, and the corresponding standards of excellence form an ascending series, continuously progressing towards a moral valuation of human actions." [18] Crystallography is an excellent illustration of the practice of appraisal in the exact sciences.[19] It largely consists in a process of appraising any specimen of crystals in light of its standards of excellence. Likewise, in botany, zoology, physiology and animal psychology, scientists all set standards to their corresponding subjects on different levels as living beings. Finally, moral judgments of human actions provide us with one more higher form of appraisal in this ascending series. Third, according to Polanyi's theory of tacit knowing, knowing by indwelling is ubiquitous. "No knowledge of nature lacks some measure of indwelling of the observer in his subject matter, and that the intimacy of this indwelling shows a continuous progression towards that fullest indwelling which has been rightly claimed to be a characteristic method of the historian." [20] Therefore, Dilthey and Lipps were right in claiming that only by indwelling can we know human beings and works of art, but they were mistaken in contrasting indwelling with observation, and thus asserting that this very fact sharply distinguishes the humanities from the natural sciences. In Polanyi's view, " the difference is only a matter of degree: indwelling is less deep when observing a star than when understanding men or works of art. The theory of tacit knowing establishes a continuous transition from the natural sciences to the study of the humanities."[21]

It is worth noting here that, when secessionists attempted to distinguish history and the humanities in general from the natural sciences, they adopted the "usually accepted opinion" about the natural sciences, which is blind to valuations and indwelling in natural sciences. It is not difficult to detect that this "usually accepted opinion" of science is just the positivistic understanding of natural science. Then we have something which is really paradoxical. The secessionists' effort to draw a line of demarcation between history and the natural sciences represented a heroic attempt to challenge the positivistic program of a unified science which tries to model the social and human sciences on the scientific methods that have been proven successful in the natural sciences. So, this philosophical movement is anti-positivistic in attempt. But this very claim of the

secession of history from the domain of the natural sciences is based upon the acceptance of the positivistic understanding of science. This shows, from one perspective, how deeply seated the positivistic conception is in the modern mind.

The second argument of the secessionists places the emphasis on the contrast between the uniqueness of historic events and the repetitiveness of natural occurrences. It was first clearly formulated by Wilhelm Windelband in his *Geschichte und Naturwissenschaft* (*History and Natural Science)*, where he claimed that, while the natural sciences seek nomothetic knowledge (that is, to grasp general laws), historical sciences pursue idiographic knowledge (that is, to describe the individual and unique events). Again, Polanyi thinks that the difference does not amount to the secession of history from the natural sciences. These two approaches, which Polanyi calls the theoretical and the factual, are actually present in all kinds of knowledge. Nevertheless, the relationship between uniqueness and repetitiveness varies in different sciences, from which we can detect a continuous transition:

> The distinctive position of history was thought to be due to the predominance of the factual interest over the theoretical, as compared with the natural sciences, for which the reverse was true. Hence a continuously graded sequence of sciences, with variable proportions of unique to generalized features, was seen to lead from mathematical physics to the study of history.[22]

The third argument of secessionists claims that while historians deal with man's responsible actions in terms of reasons, natural scientists can only explain what happens in terms of causes. Polanyi admits that the distinction between reason and cause is an important one, but he tends to interpret it in more general terms, the result of which renders the program of the secession of history from the natural sciences implausible. To Polanyi, the distinction between reason and cause, "is the distinction between a comprehensive principle operating at a higher level and the effects of the particulars belonging to a lower level on which these operations must rely." [23] The distinction, understood in terms of his ontology of stratified reality, has a metaphysical significance. In the hierarchy of the universe, the comprehensive entity constitutes the higher level of existence, while the particulars that constitute the comprehensive entity form the lower level. We talk about the reason for the success of the operation of the higher level, and the causes for its failure, which can be explained only in terms of the particulars form the lower level. Therefore, Polanyi claims that each level of living beings, and even machines, have reasons for their successful functioning,[24] while the failure of man's rational actions can be accounted for in terms of various causes. Reasons and causes operate at different levels in the stratified universe but form a continuity.

In concluding this section, I want to quote a passage that makes Polanyi's position crystal clear on the problem of the relation between sciences and the study of man. Polanyi says, his position

> denies any discontinuity between the study of nature and the study of man. It claims that all knowledge rests on understanding, and that in this sense knowledge is of the same kind at all levels of existence. But this position admits, at the same time, that as the subject of our understanding ascends to higher levels of existence, it reveals ever new comprehensive features, the study of which requires ever new powers of understanding. I shall readily acknowledge, accordingly, that historians must exercise a special kind of understanding. But I shall argue also that all the characteristics of the historian's method emerge by

> continuous stages from the progressive modification of the methods used within science. As the scientist gradually advances from the study of inanimate nature to that of life, approaching first lower, then higher forms of life and eventually ascending to the study of intelligence in the higher animals, ever higher modes of comprehension come into play, and the study of man merely adds to these yet one more, still higher mode of comprehension. The characteristic features of historiography will thus be shown to emerge by the continuation of a development broadly prefigured already within the natural sciences.[25]

This is a succinct statement of his thesis on the continuity between sciences and the study of man, based upon his theory of tacit, personal knowledge and the ontology of stratified universe.

4. Distinctions within the Framework of Continuity

So far, we have established that, since indwelling and personal participation are ubiquitous in all human inquiry, contrary to the positivistic understanding of science, sciences and the study of man are of the same kind. The difference between them is only a matter of degree. However, this is not the whole story of Polanyi's reflection on the relation between sciences and humanities. In his later years, he devoted himself to clarifying the humanistic meanings as manifested in symbols, metaphors, works of art, myths and religions, based upon his theory of tacit knowing, with a twofold goal in mind: first, to demonstrate the reality of the humanistic meanings; second, to bring out the difference between humanistic meanings and scientific meanings (i.e., the meanings achieved in science). In the present context, it is the latter that is of interest to us.

Polanyi says, "continuity does not preclude fundamental distinctions."[26] Based on the premise of the continuity between sciences and humanities, Polanyi also explores the distinctions between them. Schematically, the distinctions that he touches upon can be restated as follows.

The first point has to do with imagination, which is one of the important personal coefficients in the shaping of knowledge, as mentioned above. It is at work in a large area of human activities. Scientific discoveries, technical innovations, works of art, myths and religions are all achievements involving feats of imagination. However,

> knowledge bequeathed to us by scientific discoveries, we saw, eventually becomes commonplace knowledge to us and seemingly requires no imaginative effort on our part to make use of it, although its original discovery may have required a great deal of imagination. A work of art, on the other hand, is meaningless to us unless we exercise our imagination upon it each time we experience it.[27]

For instance, we do not need to recreate Newton's imaginative vision in order to understand and apply his laws of motion and gravitation, nor need we do this when we use a telephone invented by Bell, but we have to exercise our imagination so as to appreciate a work of art, like Michelangelo's *Moses*, or Beethoven's *Ninth Symphony*.

Second, it is important for arts, myths and religions to have something which Polanyi calls a "frame"

(formal pattern) in contrast to "story" (prose content), like rhyme and meter in a poem, stagecraft in a play, canvas in a painting, and ritual context in religious events. It is this artificial frame that makes works of art, myths and religions detached from our ordinary life and daily concerns. Take a representative work of art as an example: its frame, "separates its affirmation from the context of our life space—the context of the whole course of our existence —and causes it to be detached in this sense from both its author and its public and indeed, from any natural experiences, including those of science."[28] According to Polanyi, this detachment from daily life, is what Kant called "disinterested pleasure" when he talked about the aesthetic appreciation of art. Due to their detachment from natural experiences, arts, myths and religions have meanings that are transnatural, in contrast to the natural meanings that we have in ordinary perception and in science.

Third, the humanistic meanings are self-giving, while meanings found in ordinary perception and in science are often self-centered. According to Polanyi, tacit knowing has a semantic aspect, that is, meaning consists in a from-to relationship. The focal object is the meaning of the subsidiary particulars. The difference between humanistic meanings and the meanings found in ordinary perception and in science lies in the different use of this from-to relation. Basically, the difference can be demonstrated by the contrast between indication and symbolization. In indication, for instance, we use a word to indicate an object. We have no intrinsic interest in the subsidiaries, like the word, but the focal object which these subsidiaries bear on is of intrinsic interest, like the object indicated by the word. By integrating the subsidiaries, we achieve the meaning of them. Polanyi points out, "These integrations might be called self-centered integrations, because they are made from the self as a center (which includes all the subsidiary clues in which we dwell) to the object of our focal attention. " [29] In Polanyi's view, meanings achieved in ordinary perception and in science are of the indication type. By contrast, in symbolization, such as a national flag representing a country to its citizens, the focal object, the flag as a piece of cloth, is of no intrinsic interest, while the subsidiaries, like the existence of the nation and our diffuse and unbounded memories of it, are of great intrinsic interest. It is important to note that, " the symbol, as an object of our focal awareness, is not merely established by an integration of subsidiary clues directed from the self to a focal object; it is also established by surrendering the diffuse memories and experiences of the self into this object, thus giving them a visible embodiment."[30] In this sense, Polanyi calls this kind of integration self-giving, that is, in our surrender to the symbol, we are at the same time being carried away by it. A more sophisticated instance of self-giving meaning is metaphor. When the symbol itself is of great intrinsic interest and is akin to what it symbolizes, it becomes a metaphor. The humanistic meanings manifested in arts, myths, and religions are all self-giving, that is to say, when we are confronted with a work of art, situated in a ritual or a ceremony, we emotionally surrender ourselves and are carried away by them at the same time.

To summarize what has been said, we can see clearly that Polanyi's reflection on the relation between science and the study of man is a two-step strategy. First, is undermining the supposed gap between the natural sciences and the study of man and establishing the continuity between them. Second, based upon what is achieved in the first step, is exploring the distinctions between scientific and humanistic meanings. With this, we can say that now we get a glimpse of the whole picture of Polanyi's response to Snow's problem.

The status of Polanyi's distinctions between scientific meanings and humanistic meanings in *Meaning* has been heatedly debated .[31] Some regard Polanyi's late discussions as a misguided attempt, a deviation or even a betrayal of his early insight which challenges the supposed gap between two cultures and successfully establishes the continuity of science and the study of man. I do not intend to go into the details of this debate here, but what has been said above implies a stance towards the debate which I would like to make

clear. As is clearly shown above, the insight which enables Polanyi to challenge the supposed gap and to establish continuity between two cultures is his theory of tacit, personal knowing and his ontology of a stratified universe. This insight was not denied or forgotten when he explored the humanistic meanings in art, myth, religion in his later years. It still was the basis of his analysis. As is nicely put in *Meaning*, continuity does not preclude distinctions. The distinctions that Polanyi drew presuppose the continuity between the two cultures. They are distinctions within the framework of continuity. Therefore, one has no reason to fear that these distinctions will reintroduce the invidious gap between two cultures. The supposed gap between two cultures is in opposition to Polanyi's account of tacit, personal knowing, while the distinctions between scientific meanings and humanistic meanings are based upon it. Certainly, one can question the adequacy of these distinctions, as one might find here and elsewhere, and, as Polanyi himself admits, there are many loose ends in his philosophy. However, it should be recognized that this kind of investigation was not a deviation, but a deepening of his early insight.

5. Concluding Remarks

It is not difficult to detect that what is crucial to Polanyi's efforts to undermine the supposed gap between the natural sciences and the study of man and to demonstrate the continuity between them, is his revision of the entrenched modern understanding of science and knowledge in general. In my opinion, some features of his theory of tacit, personal knowing merit attention. I mention three interconnected points in concluding my paper.

1. The predominance of the participatory perspective

To some extent, the supposed gap between the natural sciences and the study of man can be viewed as a dualism of perspectives. As Habermas puts it,

> With the methodological separation of the natural sciences and the humanities, the perspectival difference between outside and inside develops. . . . Only an objectifying approach to nature based on observation is now seen as promising for the nomological empirical sciences, whereas the hermeneutical sciences only gain accesses to the historical-cultural world through the performative attitude of a participant in communication. A splitting-up of object realms corresponds to this privileging of the observer's perspective in the natural sciences and of the participant's perspective in the humanities. [32]

Polanyi's theory of tacit, personal knowing shatters this perspectival dualism, and establishes the dominance of the participatory perspective in all human inquiries, especially in the domain of the natural sciences. Scientists are as participatory as historians. The difference between the natural sciences and the humanities is not that the former is observational, while the latter is participatory. Rather, it is a difference within the participatory perspective. To find the difference between the natural sciences and the humanities in this perspective is the task that Polanyi set to himself in his later years when he tried to bring to light the distinctions between scientific meanings and humanistic meanings as achieved in arts, myths and religions. This, in my view, is the significance of Polanyi's philosophical investigation in his final years.

2. “The recovery of the hermeneutic dimension of science”

Closely related to Polanyi’s introduction of the participant’s perspective in the natural sciences is his “recovery of the hermeneutic dimension of science,” to use Richard Bernstein’s terminology, which he employs to characterize the postempiricist philosophy and history of science with Kuhn as a paradigm case.[33] In my view, Polanyi also fits in nicely with this category. This is clearly borne out when he relates his knowing by indwelling thesis to Dilthey’s philosophy and underscores that the difference between them lies in his extending the idea of indwelling to an analysis of the natural sciences. Also, I mentioned previously his emphasis on the importance of understanding as the ultimate faculty of knowing, and pointed out that his analysis of the part-whole relation in tacit knowing can shed some light on our understanding of the hermeneutic circle. To this, I would also add the following. His undermining of the principle of universal doubt in modern critical philosophy,[34] is reminiscent of Gadamer’s critique of Enlightenment’s prejudice against all prejudice. His fiduciary program that reveals the fiduciary rootedness of all rationality is akin to the Gadamerian notion that all understanding involves prejudice. His overcoming of the hostility of the critical philosophy towards authority and tradition and his affirmation that tradition and authority are constitutive of scientific inquiry are analogous to Gadamer’s rehabilitation of tradition and authority. Again, one should remember that all this is achieved in his analysis of natural sciences. I am quite sure that an adequate exposition of the hermeneutical content in Polanyi’s philosophy of science will lend a strong support to Bernstein’s thesis.

3. A constructive use of Heidegger’s “being-in-the-world.”

The refutation of epistemology is in vogue in the present intellectual climate. The whole epistemological enterprise, from Descartes, through Locke and Kant, and continued in various 19th and 20th century philosophies, is under attack. Talk about the “end,” the “bankruptcy,”the “crisis,” and the “overcoming” of epistemology can be heard everywhere. Then, the question arises, what about Polanyi’s theory of tacit, personal knowing?

The central thesis of the modern epistemological enterprise that philosophers like Richard Rorty and Charles Taylor would call into question is the representational construal of knowledge, that is, in Rorty’s words, “To know is to represent accurately what is outside the mind.”[35] As Taylor points out, one of the weak points of this representational model of knowledge is disengagement, or, to put it in Heideggerian terms, knowledge is interpreted as a relation between a disengaged subject and the present-at-hand object. Taylor points out that it is Heidegger’s “celebrated analysis” of being-in-the-world, which reveals that we are “first and mostly” agents engaging things ready-to-hand in the world, that renders this representational construal of knowledge completely implausible. Here we see Taylor’s use of Heidegger’s analysis of being-in-the-world leads to the demise of epistemology. So far as epistemology is concerned, I call this use negative.

In Polanyi, we will find a more positive, more constructive use of Heidegger’s being-in-the-world. To Polanyi, indwelling is not just a way of knowing, it is also a way of being. “Such indwelling is a participation of ours in the existence of that which we comprehend; it is Heidegger’s being-in-the-world.” [36] Each time we dwell in the particulars of that which we want to comprehend, or in the physical tools, or in the intellectual tools, like the interpretative frameworks in our articulate culture, our being undergoes some change. “Indwelling is being-in-the-world. Every act of tacit knowing shifts our existence, re-directing, contracting

our participation in the world. Existentialism and phenomenology have studied such processes under other names. We must re-interpret such observations now in terms of the more concrete structure of tacit knowing."[37]This is Polanyi's way of appropriating of Heidegger's being-in-the-world which shows the epistemological potential of Heidegger's fundamental ontology. The traditional epistemological enterprise that is made possible by disengagement and detachment should certainly be overcome. But this is not the end of epistemology. The problem of knowledge is still there and tempting. What is needed is a transformation of perspective and approach. At least, Polanyi's theory of tacit, personal knowing is a possibility.

Endnotes

[1] For instance, neurophysiologists deny the existence of consciousness (cf., Michael Polanyi, *Knowing and Being* [Routledge & Kegan Paul, 1969], p.42.). Sociologists declare that sociology is a-ethical (cf., Michael Polanyi: *Scientific Thought and Social Reality-Essays by Michael Polanyi*, ed. Fred Schwartz. [International Universities Press, Inc.], p.143). Logical positivists claim that ethical statements are meaningless, etc.

[2] Michael Polanyi and Harry Prosch, *Meaning* (University of Chicago Press, 1975), p.25.

[3] Michael Polanyi, *The Study of Man* [University of Chiacago Press, 1958], p.72.

[4] Michael Polanyi, *Meaning*, p.28.

[5] The attack on objectivism is regarded as the most radical aspect of Polanyi's philosophy of science. As Harry Prosch points out, though people like Norwood Hanson, Thomas Kuhn, Paul Feyerabend, and Stephen Toulmin challenged the "received view" of science and made various radical suggestions to change it, they left intact the ideal of objectivity of science (Harry Prosch, *Michael Polanyi: A Critical Exposition* [SUNY Press, 1986], pp. 30-32.

[6] Polanyi thinks that his theory of personal knowledge deals with the logic of science and knowledge in general, rather than, as might be held, explaining the psychological causes of such knowing. Personal participation has to do with being right or wrong. In "Science, Tacit and Explicit", Polanyi points out, "Any relation which can be said to be right or wrong and any process that can lead to valid results, or fail to do so, forms in this sense a subject for logical analysis." Different from the prevailing conception of strict, formal logic, the logic of personal knowledge is informal. In the same paper, Polanyi says, "I call 'logic' the rules for reaching valid conclusions from premises assumed to be true. Currently, logic seems to be defined instead as the rules for reaching strict conclusions from strict premises. I think we should reject this definition. No strict rules can exist for establishing empirical knowledge." I quote this unpublished essay from Harry Prosch, *Michael Polanyi: A Critical Exposition*, pp.112-113. This paper was presented at the International Congress for the Philosophy of Science, Jerusalem, August, 1964.

[7] Polanyi distinguishes intellectual passions from bodily passions and considers the former as being public and the latter private: "But while appetites are guided by standards of private satisfaction, a passion for mental excellence believes itself to be fulfilling universal obligations" (*Personal Knowledge*, p.174). Also, he points out that scientific beliefs are different from "individual preference—like the love of one's wife and children. The beliefs of scientists concerning the nature of things are held with a claim to universal validity and thus possess normative character"(Michael Polanyi, *The Logic of Liberty* [Liberty Fund, 1998], p.27).

[8] Michael Polanyi: *Personal Knowledge*, p.vii.

[9] As Putnam puts it in "Why Reason Can't Be Naturalized?" (*After Philosophy—End or Transformation*? ed. Kenneth Baynes, James Bohman, and Thomas McCarthy, [The MIT Press, 1991], p.228), reason, is "both immanent (not to be found outside of concrete language games and institutions) and transcendent (a regulative idea that we use to criticize the conduct

of all activities and institutions.)." In his *Postmetaphysical Thinking*, Habermas refers to the above quotation by Putman when he discusses the concept of situated reason which, in his words, amounts to this: "the validity claimed for propositions and norms transcends spaces and times, but in each actual case the claim is raised here and now, in a specific context, and accepted or rejected with real implications for social interaction." (*Postmetaphysical Thinking* [Polity Press,1995], p.139).

[10] Michael Polanyi: *Knowing and Being*, p.144.

[11] Michael Polanyi, "Logic and Psychology", *American Psychologist* 23, 1968, pp. 27-43.

[12] Michael Polanyi: *Scientific Thoughts and Social Reality*, p.142.

[13] Michael Polanyi, *Knowing and Being*, p.156. In the "Bibliographical Note" of *The Study of Man*, Polanyi elaborates on this point more fully. In his account, Dilthey's work "forms a part of a great intellectual network which includes phenomenology and existentialism and has transformed the whole climate of philosophy on the Continent of Europe. Out of it has issued modern Gestalt psychology, which I myself am trying to restore in its philosophical origins. Many of my statements are reminiscent of this movement; but let me recall that its thought was based throughout on the exclusion of the natural sciences from its scope" (*The Study of Man*, p.102).

[14] Michael Polanyi, *Scientific Thought and Social Reality*, p.120.

[15] Michael Polanyi, *The Study of Man*, p.28.

[16] Michael Polanyi, *Tacit Dimension* (Doubleday & Co, 1966), p.36.

[17] Michael Polanyi, *Scientific Thought and Social Reality*, p.96.

[18] Michael Polanyi, *The Study of Man*, p.80.

[19] Michael Polanyi, *Personal Knowledge*, pp.43-48.

[20] Michael Polanyi, *The Study of Man*, p.80.

[21] Michael Polanyi, *Knowing and Being*, p.160.

[22] Polanyi, *The Study of Man*, p.83.

[23] Ibid, p.91.

[24] Polanyi takes the case of the machine very seriously in arguing against reductionism. His analysis of a machine underscores that the reason for the success of the function of a machine cannot be accounted for by the laws of physics and chemistry, but only by its own operational principles. The function of the operational principles relies on the laws of physics and chemistry, which can explain the failure or breakdown of the machine.

[25] Michael Polanyi, *The Study of Man*, p.73.

[26] Michael Polanyi, *Meaning*, p.122.

[27] Idib., p.150.

[28] Ibid..

[29] Ibid., p.71.

[30] Ibid., pp.74-5.

[31] Cf., Marjorie Grene: "Tacit Knowing: Grounds for a Revolution in Philosophy", in *Jounral of the British Society for Phenomenology*, Vol.8, No.3, October 1977, pp. 164-171. Articles in the special issue of *Zygon* on "Science and Religion in the Thought of Michael Polanyi", Vol.17, No.1, 1982. Harry Prosch*: Michael Polanyi: A Critical Exposition*, pp. 235-271.

[32] Habermas: *Postmetaphyscial Thinking*, pp.35-36.

[33] Richard J. Bernstein, *Beyond Objectivism and Relativism* (University of Pennsylvania Press, , 1983), p.30.

[34] The term as used by Polanyi is not limited to the philosophy of Kant as is usually assumed. Rather it is used in a broader sense, which denotes the trend in modern Western philosophy that discredited belief, tradition and authority, on the one hand, and upheld the principle of universal doubt and critical attitude, on the other.

[35] Richard Rorty, *Philosophy and the Mirror of Nature* (Basil Blackwell, 1980), p.3.

[36] In 1964 the Harper Torchbook edition of *Personal Knowledge*, Polanyi wrote a new preface; I quote from page x.

[37] Ibid., p.xi.

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Annual membership in the Polanyi Society is $25 ($10 for students) beginning in the fall of 2002. The membership cycle follows the academic year; subscriptions are due September 1 to Phil Mullins, Missouri Western State College, St. Joseph, MO 64507 (fax: 816-271-5680, e-mail: mullins@mwsc.edu). Please make checks payable to the Polanyi Society. Dues can be paid by credit card by providing the card holder's name as it appears on the card, the card number and expiration date. Changes of address and inquiries should be sent to Mullins. New members should provide the following subscription information: complete mailing address, telephone (work and home), e-mail address and/or fax number. Institutional members should identify a department to contact for billing. The Polanyi Society attempts to maintain a data base identifying persons interested in or working with Polanyi's philosophical writing. New members can contribute to this effort by writing a short description of their particular interests in Polanyi's work and any publications and / or theses/dissertations related to Polanyi's thought. Please provide complete bibliographic information. Those renewing membership are invited to include information on recent work.