

TITLE

u
OBJECTIVITY AND PERSONAL
INVOLVEMENT IN SCIENCE:
AN EXAMINATION OF
MICHAEL POLANYI'S THEORY
OF KNOWLEDGE u

BY
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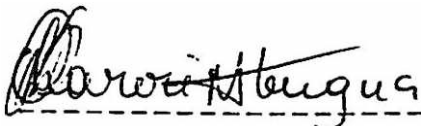
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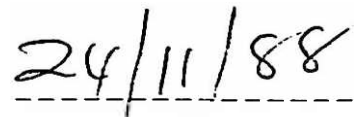
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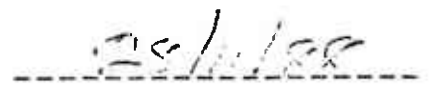


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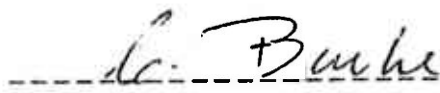
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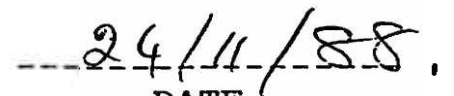
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ABSTRACT

The present study is an attempt to interpret and understand Michael Polanyi's theory of knowledge. Polanyi's theory of knowledge is basically a repudiation of the modern scientific objectivism. He opposes the view that reliable knowledge is one that is completely detached from the knowing subject. This study examines the new view of knowing that Polanyi is putting forward - the view that knowledge is both personal and objective.

We begin this inquiry by giving a short history of Polanyi's intellectual development which we believe is essential for an understanding of his work. The study also examines the arguments that Polanyi advances in order to show that all knowledge is personal. In this regard, the study looks at the role of imagination and intuition in scientific discovery. The question of personal judgement in science is also dealt with at length.

One of the most interesting features of Polanyi's epistemology is the claim that all knowledge is either tacit or rooted in tacit knowledge. This view is derived from Gestalt theory whose overriding principle is that the whole dominates the parts and that we comprehend the whole by integrating its parts. This study examines how Polanyi transposes

Gestalt theory into a theory of knowledge. It also investigates how he uses the theory of tacit knowing in order to show how meaning is achieved in works of art, myths and religion.

This study also explores the new kind of objectivity that Polanyi is putting forward and which he would want us to adopt in place of the false objectivism of positivism which he claims has taken possession of the modern mind, and has resulted in the impoverishment of culture.

ACKNOWLEDGEMENTS

I should like to record my indebtedness to Fr Christy Burke who was the first to suggest that I write on Michael Polanyi and also to Dr G.J. Wanjohi for encouraging me to continue with the study. These two teachers acted as my supervisors and I thank them for their criticism, patience and encouragement.

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Lastly, I cannot forget to thank Dr Caroline Harford of Michigan State University for helping me find most of Polanyi's publications.

CHAPTER ONE

INTRODUCTION

The present study is a critical examination of Michael Polanyi's theory of knowledge. Polanyi's theory of knowledge is basically a repudiation of scientific objectivism. It is opposed to the view that knowledge must be detached from the knowing subject. It is the object of this study to examine how Polanyi modifies this objectivist view of knowledge in order to allow for the personal contribution of the knowing subject.

I. Biographical Data on Polanyi

Before we proceed to state our research problem in greater detail, we shall briefly outline the story of Polanyi's intellectual development.

Polanyi was born on March 11, 1891, in Budapest, Hungary. He joined the University of Budapest in 1908 and enrolled as a medical student. His first scientific paper at the University "Chemistry of Hydrocephalic Liquids", was published in 1901. ¹ While studying at the university, he helped to found a student society known as the Galileo Circle. Polanyi graduated with a Bachelors degree in medicine in 1913 and then went on to study chemistry at the Technische Hochschule in Baden, Germany. He became deeply involved in research and wrote a number of papers in physical chemistry which were published in both

English and German journals. His research mainly centred on the application of quantum theory of thermodynamics and on the thermodynamics of adsorption.

When the First World war broke out in 1914, Polanyi joined the Austro-Hungarian army as a medical officer. While in the army, he continued to do research in physical chemistry. He also corresponded with the leading scientists of the time. Among those he corresponded with was the renowned German physicist, Albert Einstein. Shortly after joining the army, Polanyi was struck down by diphtheria and it was while recuperating from the illness in 1915 that he wrote a thesis for his Ph.D. The thesis was entitled "The Adsorption of Gases by a Solid Non-Volatile Adsorbent" - a thesis that was later rejected but which is today slowly gaining acceptance. The attempts to defend the thesis before the Kaiser Wilhelm Institute did not materialize. The thesis was rejected on the grounds that Polanyi had totally disregarded the electrical concept of inter-atomic forces.

The initial rejection and the later acceptance of this theory was to Polanyi a great lesson on the nature of scientific knowledge. ^{2a} It particularly taught him the important role that the scientific community plays in determining what qualifies as a

genuine scientific contribution. He learnt that for a scientific contribution to be accepted for publication it must not greatly deviate from the existing scientific standards. This, in a way, proves Kuhn's conventionalism right.^{2b}

Polanyi taught for some time at the University of Budapest in 1919 before proceeding to the Kaiser Wilhelm Institute in 1920. He was appointed a life member of this institute in 1929. He carried out intensive research in fibre chemistry and made a number of contributions and discoveries. He was, for example, able to solve the mystery of an X-ray diffraction pattern in a bundle of ramie fibres. In 1932, Polanyi's first book in Chemistry, Atomic Reactions, was published.

His research in chemistry was instrumental in moulding his interests in the method of science and in the nature of discovery in particular. These interests were later to lead him to philosophy.

Polanyi resigned his position at the Kaiser Wilhelm Institute in 1933 in protest against Hitler's policies of anti-Jewish legislation. He was in the same year invited to a chair in physical chemistry at Victoria University in Manchester, England. By this time, he had become deeply concerned about the freedom of science - a freedom that was being suppressed by the totalitarian regimes of the time. He was

particularly critical of the persecution of biologists in Soviet Russia.³ The freedom of science controversy raised some epistemological questions which were of great concern to Polanyi.⁴ In 1938, with others, he helped to found the Society for the Freedom of Science and in 1941 he wrote a book entitled The Contempt of Freedom. This book dealt with the question of scientific freedom.

Polanyi's work in chemistry did not prevent him from cultivating an interest in economics. He had particular interest in the problem of money supply, unemployment and free trade. His many publications in this field include the following books and articles: USSR Economics (1936), "The 'Setting Down' of Capital and the Trade Cycle" (1938), "Patent Reform" (1944) and Full Employment and Free Trade (1945). He also produced a film for teaching economics which was entitled Unemployment and Money (1938).

In 1946, Polanyi delivered a series of lectures at the University of Durham. These lectures were later published in book form as Science, Faith and Society. In 1948, he exchanged his chair in physical chemistry at Victoria University for one in social thought at the same university. His new post was free from any teaching duties. The year 1948 also marked the end of his career as a practising physical chemist. He had by this time published over 200

scientific papers.

In 1951, Polanyi wrote another book on freedom, this time entitled The Logic of Liberty. The book dealt mainly with the question of scientific freedom. From 1951 to 1952 Polanyi was a visiting lecturer at the University of Aberdeen where he delivered the Gifford Lectures on philosophy.

His most important work on philosophy, Personal Knowledge, was based on these lectures and it was published in 1958. In the same year, he gave a series of lectures at the University of North Staffordshire which were in memory of Lord Lindsay. These lectures served as an introduction to Personal Knowledge. They were published in book form in 1959 as The Study of Man.

Polanyi joined Merton College, Oxford, in 1960 as a senior research fellow. While at this college, he continued to expand his new theory of knowledge (first developed in Personal Knowledge) through lectures which were in 1966 published as The Tacit Dimension. Polanyi's last major work, Meaning, was edited for publication by Harry Prosch in 1975. ⁵ Meaning is a collection of a series of lectures delivered by Polanyi at the universities of Chicago and Texas in 1970 and 1971, respectively. He has also lectured at Oxford, Virginia, California (Berkeley), Yale, Duke and Wesleyan universities.

Polanyi was a member of the following societies: Foreign Member of the National Society of Science, Letters and Arts (Naples), Founder Member of the Society for the Freedom of Science, Fellow of the Royal Society (England), and a Member of the American Academy of Arts and Sciences. He also received a number of Honorary degrees both D.Sc. and LL.D. from the universities of Princeton, Leeds, Notre Dame, Aberdeen and Wesleyan.

Socially, Polanyi was greatly admired by all those who knew him. Walter James says of him "... Michael was an admired figure. He was so courteous and so gentle - sweet was the word that sprang to many lips to describe 'Mischie' - a name for him his friends like to use ...".⁶ But as we are also told, Polanyi was a man of great strength. He would be taken over by deep seriousness when a matter pertaining to principle was raised. And as James adds, "There seemed no limits to his knowledge, far beyond the bounds of science and philosophy, and talking to him enlivened the mind and often carried you to a point of excitement".⁷ Polanyi died in 1976 at the age of 85.

II. Statement of the Problem and Objectives of the Study

As we have already pointed out, this study is basically an inquiry into Polanyi's criticism of scientific objectivism or what he also prefers to call the "scientific outlook".⁸ Polanyi is opposed to the view that science can only provide us with a strictly impersonal knowledge. This study examines why Polanyi believes that such an objectivist view of knowledge is wrong and why it is harmful to our culture. The study also examines the new view of knowing that Polanyi is proposing - the view that knowledge is both objective and personal and that the personal involvement in knowledge does not necessarily impair the objectivity of knowledge.

Polanyi is against the modern mechanistic world view whose origin goes back beyond the time of classical physics. This is how Polanyi expresses himself on this point:

... what I am attacking is a claim of science that is even more deep-seated than the ideal of explaining everything in the terms of the world's atomic topography. Long before Laplace formulated the atomic theory of the universe, science had accepted the ideal of strict objectivity and claimed that its results were strictly detached, impersonal. And I have showed that this claim is unreasonable and that its pursuit obscures the very essence of human existence. The facts of a stratified universe can be known to science only by personal participation of the scientist and this alone offers the grounds for securing moral values from destruction by a strictly objective analysis.⁹

This lengthy quotation introduces us to the false objectivism that Polanyi's epistemology is directed against. Laplace is one of those great classical physicists who believed that science, when pursued in an objective and detached manner, would provide us with universal knowledge. In his programme, he sought to explain the world in terms of its atomic topography. In so doing, he hoped to replace all human knowledge with a complete knowledge of atoms in motion. But as Polanyi rightly points out, "the Laplacean ideal of universal knowledge is actually a state of complete ignorance".¹⁰ It tells us absolutely nothing that we are interested in. We shall come back to the Laplacean programme when examining Polanyi's criticism of classical physics. What we want to emphasize at this stage is that in Polanyi's view the ideal aim of science remains what it was during the time of Laplace. Science still aims at replacing "all human knowledge by a complete knowledge of atoms in motion".¹¹ Polanyi is opposed to this reductionist programme.

The question that should be asked at this stage is this: What is wrong with holding the view that the only "valid" knowledge is one that is strictly impersonal? The answer to this question is that such

a view is mistaken because even the most exact operations of science require a measure of personal judgement. This view has a harmful effect on our moral ideals. ¹² And as Polanyi says:

In the exact sciences this false ideal is perhaps harmless for it is in fact disregarded there by scientists. But we shall find that it exercises a destructive influence in biology, psychology and sociology and falsifies our outlook far beyond the domain of science. ¹³

According to Polanyi, the passion for achieving an absolutely impersonal knowledge "presents us with a picture of the universe in which we ourselves are absent. In such a universe there is no one capable of creating and upholding scientific values hence there is no science." ¹⁴

What we want to emphasise at this stage is that the objectivism that Polanyi is rejecting is destructive of almost every aspect of our culture. When our passions for achieving absolute objectivity are fused with our moral passions, they give rise to what Polanyi calls "moral inversion" ¹⁵ or a moral passion for immorality. ¹⁶

In his view, our moral values lose their meaning when they are approached objectively or when they are interpreted in scientific terms. He maintains that

this objectivism has been responsible for the destruction of the accepted moral values in the society. In fact, Polanyi's epistemology is primarily aimed at protecting morality against total destruction by a detached scientific analysis. We shall deal at length with the ethical implications of this objectivism in our fifth chapter.

Another area where Polanyi thinks that this objectivism has a dangerous effect is in the field of biology. He criticizes modern molecular biologists who hold that life can be fully explained in terms of physics and chemistry. He claims that this kind of mechanical reductionism has been the cause "of our corruption of the conception of man, reducing him either to an insentient automaton or to a bundle of appetites".¹⁷ He further says: "This is why science can be evoked so easily in support of totalitarian violence, why science has become the greatest source of dangerous fallacies today".¹⁸ It will be the object of this study to examine these serious allegations that Polanyi is making.

But Polanyi does not stop at the mere repudiation of the objective ideal of knowledge. He has a very comprehensive programme which aims at showing that all knowledge - be it from the exact sciences or humanities - involves the personal participation of the knowing subject. He tells us that we must "learn to accept as our ideal a knowledge that

is manifestly personal".¹⁹ We would, however, like to point out that Polanyi is not making an apology for the personal element in science. He says:

I AM NOT MAKING EXCUSES for the inexactitude of science, nor for our personal actions, which ultimately decide what to accept as the truth in science. I do not see our intervention as a regrettable necessity, nor regard its results as a second-rate kind of knowledge. It appears second-rate only in the light of a fallacy which systematically corrupts our conception of knowledge and distorts thereby wide regions of our culture. 20

The other major objective of this study will be to examine how Polanyi transposes the findings of Gestalt psychology into a theory of knowledge.²¹ Polanyi has used the clue from Gestalt theory to show that all knowledge involves the personal participation of the knower. Briefly stated, Gestalt theory teaches that we comprehend an object by tacitly integrating its parts. We are not directly aware of its parts but we know them as they participate in making the whole. As Polanyi himself says:

I have used the findings of Gestalt theory as my first clue to this conceptual reform. Scientists have run away from the philosophical implications of Gestalt; I want to countenance them uncompromisingly. I regard knowing as an active comprehension of the things known, an action that requires skill. Skillful knowing and doing is performed by subordinating a set of particulars, as clues or tools, to the shaping of a skillful achievement, whether practical or theoretical. 22

Polanyi maintains that all knowlege is Gestalt-like because it involves the tacit integration of parts in

order to form a meaningful whole. A sharp grasp of how Polanyi transposes Gestalt theory into a theory of knowledge will greatly help us to understand how discoveries are made. This is particularly important because Polanyi believes that the paradigm of making a discovery is the key to all human knowledge. The clue from Gestalt psychology has been very useful to Polanyi in countering reductionism which is a logical corollary of the objectivism that he is rejecting.

The theory of tacit knowing teaches that we comprehend a whole by tacitly integrating its parts. The meaning of the whole is lost when we focus our attention on its separate parts. When we focus our attention on the whole we are said to be subsidiarily aware of its parts. The integration of parts in order to form a meaningful whole is a skillful act that cannot be adequately expressed in words. That is the reason why Polanyi insists that we know more than we can tell. The example that he often gives is that of identifying a face we know. Whereas we can identify a face we know among a thousand, we cannot explicitly say how we perform the task. In the words of Richard Gelwick, Polanyi's theory of tacit knowing shows that

What we have been accustomed to call knowledge is like the peak of an iceberg and we have neglected the greater part of our knowledge itself because it is hidden from our direct view when we are using it. Like the bottom of an iceberg tacit dimension is always there.²³

Polanyi's theory of knowledge has been widely used to account for different kinds of knowledge. Reverend T. Osborn has, for example, used the findings of Polanyi to show that Christian faith is a form of personal knowledge. He particularly uses the theory of tacit knowing to interpret the first letter of Paul to the Corinthians. He tells us that "Paul generally attends only tacitly to the particulars of Christian knowledge in order to focus consciously on its object Jesus Christ".²⁴ He continues to argue that by focusing attention on their differences and on the particular gifts of the Holy Spirit, the Corinthians are in effect losing the meaning of the crucifixion of Christ.

What we are emphasizing here is the relevance of Polanyi's theory of knowledge for the understanding of Christianity. Many theologians have found his epistemology very useful in the interpretation of religion. Polanyi himself has argued that God is not the kind of being whose existence can be demonstrated by use of logical and scientific arguments. He says that "it is only through participation in acts of worship-through dwelling in these that we see God".²⁵

In another text he says:

God is a commitment involved in our rites and myths. Through our integrative imaginative efforts we see him as the focal point that fuses into meaning all the incompatibles involved in the practice of religion.²⁶

We shall pursue this theme in greater depth in our forth chapter which also deals with how meaning is achieved in works of art.

But in underscoring the important role that the knower plays in the shaping of knowledge, Polanyi's theory of knowledge should not be seen as a retreat to irrational subjectivity. He maintains that the shaping of knowledge is a responsible act which is free from any subjective predilections. Personal knowledge is sought with universal intent and this is what prevents it from being purely subjective. Thus the measure of the new kind of objectivity that Polanyi is proposing is not the absence of personal involvement but the presence of "universal intent". This is the new kind of objectivity that Polanyi would want us to adopt in place of the false objectivism that has taken over the modern mind.

Thus Polanyi realises that what is needed is not an objectivist or a subjectivist epistemology but a new theory of knowledge that will unite these two apparently conflicting poles of knowledge. It is on the basis of this balanced and carefully thought out approach to the problem of knowledge that Polanyi's epistemology deserves our attention. We hope that this study will not only deepen our understanding of Polanyi's thought but that it will also help us to have a balanced view of science and of knowledge in

general, admitting both objectivity and subjectivity.

III. Methodology

This study is based on library research. Reference will be made to those works that are relevant to the understanding of Polanyi's thought. Most important, however, will be the works of Polanyi himself. His books as well as his numerous articles in both philosophical and scientific journals will form the foundation of this study.

IV. Literature Review

Apart from Polanyi's own publications, a number of works by other writers have been found relevant to the present study. We shall briefly review those works in the present section.

The first book that has been found relevant to the present study is Richard Gelwicks's The Way of Discovery. This book offers a comprehensive interpretation of Polanyi's thought and its long term implications for the crises of modern culture. Gelwick admits that his approach to Polanyi's thought is a sympathetic one. He compares the changes brought by Polanyi's theory of knowledge with the changes that have characterised the scientific revolutions. ²⁷ Gelwick uses his own diagrams to interpret the theory of tacit knowing. He agrees with Polanyi that we "know more than we can tell" and that the greater part of

our knowledge is hidden from our direct view when we are using it. He advises that the best way to enter into Polanyi's thought is to follow the story of his intellectual development.

Belief in Science and Christian Life is another work that is relevant to the present study. This work is a collection of six addresses given at a conference at St. Catherine's Cumberland Lodge, Windsor, England, in 1978. They were prepared for publication by Thomas Torrance. These essays investigate the religious implications of Polanyi's thought. The essays indicate that Polanyi's epistemology is essential for an understanding of the Christian faith.

Marjorie Grene's book, The Knower and the Known, is also essential for a understanding of Polanyi's theory of knowledge. The book is dedicated to Polanyi. In the first three chapters of her book, Grene examines three versions of objectivity as developed by Plato, Aristotle and Descartes. She argues that for these three philosophers knowledge is final, impersonal and certain. What makes Platonic certainty possible, says Grene, "is the eternity, the superior, intrinsic reality, of its transcendent object, itself by itself, apart from relativity, contradiction or decay".²⁸ She continues to say that Aristotelian certainty is made possible by the "secure natures of kinds of things within the world itself; it is certainty within the real world itself".²⁹ Finally, Grene argues that the Cartesian certainty is made

possible by the "pure intrinsic certainty of the knowing intellect itself needing no support beyond the luminous self-evidence of its own act of understanding". 30

Through her criticism of these three brands of objectivism, Grene is able to establish a more adequate epistemology which accommodates both subjectivity and objectivity.

Another work that has been found relevant to the present study is Ian Barbour's Issues in Science and Religion. Some of his ideas show a lot of Polanyian influence which he acknowledges. Barbour is in this book trying to modify our common view of scientific objectivity in order to allow for the personal involvement of the scientist. He argues that the method of measurement in science is influenced by the observer and that even the verification of theories ultimately depend upon the judgement of the scientist. The point that Barbour is making is that the observer and the observed cannot be separated. He goes on to argue that scientific knowledge arises "from the interplay between nature and ourselves and that we have no access to things in themselves apart from our investigation". 31

Quoting from the works of Hanson, he points out that "not only that all data are theory-laden but also that all properties are observer-dependent". 32

Turning to the question of objectivity, Barbour agrees with Polanyi in asserting that it is the knower's commitment to universality that prevents personal knowledge from being purely subjective. He maintains that "the idea of objectivity should not be discarded but rather reformulated to include the contribution of knowing subject". 33

Arthur Koestler's The Act of Creation, is also relevant to the present study. This book explores the part played by imagination and intuition in both science and art. Koestler's inquiry shows that there is no fundamental difference between the creative process in science and other creative processes that seek to make contact with external reality. Polanyi, as we shall later see, attaches a lot of significance to the role played by imagination and intuition in scientific discovery.

George Kneller in his book, Science as a Human Endeavour, has also underscored the important role that the scientist as a person plays in the shaping of his own knowledge. He is aware of the fact that scientists like all other people are driven by strong emotions. He notes that in any piece of research it is the scientist as a person who intuits, reasons, experiments and draws conclusions. But Kneller is also aware of the objective side of science as the following quotation shows:

Science is a disciplined enterprise seeking impersonal truth, but it also can be highly personal, even subjective. If this statement sounds paradoxical it is only because many people suppose that reason and passion are mutually exclusive. Sometimes they are. But often they support each other, as in creative thinking where emotion provides the driving force and reason the discipline. 34

Kneller continues to argue that impersonal truth is not arrived at impersonally but through an immense effort of the whole person. He maintains that "only the universally accepted findings of science are stripped of emotion not the struggle to attain them".35

The foregoing literature review is not exhaustive. There are many other works that are relevant to this study. Reference will be made to them as this thesis unfolds.

NOTES

1. For a full list of Polanyi's publications, see Intellect and Hope: Essays in the Thought of Michael Polanyi, eds. Thomas A. Langford and William H. Pateat (Durham: Duke University Press, 1968), pp 432-36.
- 2a. See his essay, "The Potential Theory of Adsorption" in Knowing and Being, ed. Marjorie Grene (London: Routledge and Kegan Paul, 1969), pp 87-96. See also Richard Gelwick, The Way of Discovery: An Introduction to the Thought of Michael Polanyi (New York: Oxford University press, 1977), p. 33.
- 2b. By conventionalism we mean that the work of a scientist should not greatly deviate from the existing scientific tradition.
3. In Russia, the Government had forced the Soviet Academy of the Sciences to reject the Mendelian laws and the whole of biology related to these laws. See Michael Polanyi, The Logic of Logic of Liberty (London: Routledge and Kegan Paul, 1975), p. 27.
4. Michael Polanyi, The Tacit Dimension (Garden City: Double day, 1966), pp 3-4.
5. Polanyi was by then advanced in years and felt he needed assistance in preparing these lectures for publication. See Michael Polanyi, Meaning (Chicago: University of Chicago Press, 1975). p. ix.
6. Belief in Science and Christian Life: The Relevance of Michael Polanyi's Thought for Christian Faith and Life", ed. Thomas F.

- Torrance (Edinburgh: The Handsel Press, 1980), p. xii.
7. Ibid., p. xii.
 8. See Michael Polanyi, "Scientific Outlook: Its Sickness and Cure", Science, Vol. 125 (March, 1957), pp. 480-84.
 9. Proceedings of the Royal Society of Medicine. Vol. 163 p. 975. Quoted in David Holbrook, Education, Nihilism and Survival (London: Darton, Longman and Todd, 1977), p. 44.
 10. Michael Polanyi, "History and Hope", The Virginia Quarterly Review. Vol. 36, No.2 (Spring, 1962), p. 191.
 11. Michael Polanyi, Meaning (Chicago: University of Chicago Press, 1975), p. 25.
 12. Harry Prosch has written a very illuminating essay on the ethical implications of Polanyi's thought. He argues that Polanyi's criticism of contemporary epistemology was generated by his concern for moral values which were being destroyed by this epistemology. See his essay, "Polanyi's Ethics", Ethics, Vol. 82 (1971-72), pp. 91-113.
 13. Michael Polanyi, Personal Knowledge: Towards a Post-Critical Philosophy (London: Routledge and Kegan Paul, 1959), p.vii.
 14. Ibid., 142.
 15. Polanyi gives Marxism as an example of this moral inversion. See Personal Knowledge. pp.

- 222-227 and also "Scientific Outlook," pp. 480-481.
16. See "Polanyi's Ethics", pp. 109-110.
 17. Meaning, p. 25.
 18. Ibid., p. 25
 19. Michael Polanyi, The Study of Man (London: University of Chicago Press, 1959), p. 27
 20. Michael Polanyi, "Genius in Science", Encounter, 38 (January, 1972), P. 50. The words in capital letters are so in the original
 21. William T. Scott refers to Polanyi's theory of knowledge as a gestalt philosophy. See his essay, "Polanyi's Theory of Knowledge: A Gestalt Philosophy" in the Massachusetts Review, vol. 13 (Winter, 1962), pp. 349-368.
 22. Personal Knowledge, p. vii.
 23. The Way of Discovery, p. 138.
 24. Robert T. Osborn, "Christian Faith as Personal Knowledge", Scottish Journal of Theology, vol. 28 (1975), p. 117.
 25. Meaning, p. 156.
 26. Ibid., p. 156.
 27. The Way of Discovery, p. 56.
 28. Marjorie Grene, The Knower and the Known (London: Faber and Faber, 1966), p. 17.
 29. Ibid., p. 17
 30. Ibid., p. 17
 31. Ian G. Barbour, Issues in Science and Religion (London: SCM Press 1966), p. 285.

32. Ibid., p. 285. See also N.R. Hanson, "The Dematerialization of Matter", in Ernan McMullin, ed. The Concept of matter (Notre Dame: University of Notre Dame Press, 1963), p. 549.
33. Issues in Science and Religion, p. 177.
34. George F. Kneller, Science as a Human Endeavour (New York: Columbia University Press, 1978), p. 160.
35. Ibid., p. 160.
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CHAPTER TWO

PERSONAL INVOLVEMENT IN SCIENCE

The object of the present chapter is to investigate the extent to which knowledge can be said to be personal. This is a major theme in Polanyi's theory of knowledge. Polanyi is mainly concerned with the role played by the knower in the acquisition and holding of knowledge. He seeks to demonstrate that science is a much more human enterprise than most people have tended to think. Science involves the full participation of the scientist. Polanyi is opposed to the modern mechanistic world view which is based on classical physics. He rejects the view that the world can be described objectively without mentioning the observer's influence. Knowledge must always involve a knowing subject, for as William Wallace tells us:

The most important thing to note about knowledge is that it is not the result of a mechanical process; rather it is a perfection found only in living things, a vital and immanent operation whereby one thing (the knower) becomes another (the thing known) in an intentional way. Once this is seen one can define knowledge generally as the possession of something in an immaterial fashion, or the possession of a thing without its matter. The one knowing or possessing it is called the subject and the thing known or the form possessed is called the object. Knowledge never occurs except in this framework of subject-object relatedness. 1

What we want to underline here is that knowing is not a mechanical process, for it involves our imagination,

our intuition and our personal judgements. Knowledge cannot therefore be detached from the knowing subject because it is he who gives shape to it.

Polanyi has shown in numerous different ways that "into every act of knowing there enters a tacit and passionate contribution of the person knowing what is known". "This personal co-efficient", he says, "is no mere imperfection but a necessary component of knowledge".² Starting from the selection of a good problem worth of scientific investigation, until arrival at discovery and its eventual verification, Polanyi shows that all these stages involve the personal judgement of the scientist. Thus Polanyi looks at knowing as an activity that requires certain mental skills. The object of the present chapter will therefore be to examine the validity of Polanyi's contention that all knowledge is personal and that we cannot have an absolutely objective knowledge.

I. Role of Imagination and Intuition in Discovery

As we pointed out in our introductory chapter, the paradigm of making a discovery is to Polanyi the key to all human knowing. All forms of human knowing from the exact sciences to the arts are united by this heuristic principle. There cannot therefore be any discontinuity between the study of nature and the study of man.³ Discovery provides a common ground

for the two forms of knowing.

Polanyi looks at knowing as a way of discovering rationality in nature. It is a way of integrating the disjointed parts of our experience in order to give meaning to them. In other words, to know in science is to discover the underlying order and unity in the chaotic world of experience. Viewed in this way, it can be seen that knowledge is personal because it is the knower himself who makes the discovery. "Discovery", as Greville Norburn rightly points out, "does not happen by itself."⁴ Knowing, and therefore discovery, to use the words of Arthur Koestler, "often means simply uncovering of something which has always been there but which was hidden from the eye by the blinkers of habit".⁵ This is the same point that Polanyi is making when he says that one can discover only something that was already there, ready to be discovered. We cannot discover anything unless we are convinced that it is there, ready to be found.⁶ The creative act in discovery, as Koestler further argues, "should not therefore be understood to mean creation in the "sense of the Old Testament." "The creative act", he adds, "does not create something out of nothing; it uncovers, selects, reshuffles, combines, synthesizes already existing facts, ideals, faculties, skills".⁷ As our quotation shows, Koestler's view of discovery and of the creative act in general,

seems to correspond with that of Polanyi who looks at discovery as a way of merging the fragmented parts of our experience.

Polanyi's epistemology is unique. He approaches the problem of knowledge from the discovery point of view. This approach distinguishes him from most traditional and contemporary epistemologists who have tended to concentrate on certitude and demonstrability as the criterion of knowledge while ignoring the process by which knowledge is acquired. Polanyi assumes that knowledge is possible and then proceeds to investigate how it is discovered.

As we have already pointed out, Polanyi's success in showing that even the so-called exact sciences are not as impersonal as they are often thought to be, lies in his recognition of the important role that imagination and intuition play in the act of discovery. Imagination and intuition are not regarded as rational ways of making discoveries because they are extra-logical in character. In a paper entitled "The Creative Imagination", Polanyi points out that:

The enterprise that I am undertaking in this article has been severely discouraged by contemporary philosophers. They do not deny that the imagination can produce new ideas which help the pursuit of science or that our personal hunches and intuition are often to the point. But since our imagination can roam unhindered by argument and our intuition cannot be accounted

for, neither imagination nor intuition is deemed a rational way of making discoveries. They are excluded from the logic of scientific discovery, which can deal then only with the verification or refutation of ideas after they have turned up as possible contributions to science. 8

Although Polanyi acknowledges that imagination and intuition are extra-logical, he still maintains that the two are indispensable to science. It is through imagination that the scientist integrates the disjointed parts of experience in order to give them meaning. The capacity to create which is aided by imagination is not confined to the scientist, for as Bronowski tells us:

A man becomes creative, whether he is an artist or a scientist, when he finds new unity and variety in nature. He does so by finding a likeness between things which were not thought alike before, and this gives him a sense at the same time of richness and understanding... This is not a mechanical procedure and I believe that it engages the whole personality in science as in the arts. 9

The fact that science, like the arts, involves the use of imagination is a clear indication that science is not a cold and mechanistic enterprise but a process that requires our full participation. There cannot therefore be any discontinuity between the sciences and the arts. The two share common psychological conditions.

Writing on the relationship between Eastern mysticism and modern physics, Fritjof Capra has also underscored the important role that intuitive powers

play in science. He tells us that the "rational part of research would be useless if it were not complemented by the intuition that gives scientists new insights and makes them creative." ¹⁰ Thus Capra seems to agree with Polanyi in acknowledging that the scientist's insights are not rooted in explicit operations of logic. Intuition and imagination border on the mystical and this is the reason why they are not regarded as rational ways of making discoveries. But as Capra tells us,

...mystical thought provides a consistent and relevant philosophical background to the theories of contemporary science; a conception of the world in which scientific discoveries can be in perfect harmony with spiritual aims and religious beliefs. ¹¹

Thus, for Capra, knowing in science is not a mere mechanical process, but one that requires our imagination and intuition. Capra's study of Eastern mysticism and modern physics has shown that there cannot exist an absolutely impersonal knowledge as classical physics had taught. Modern physics itself has abandoned this false ideal. We shall come back to this point when considering Polanyi's criticism of classical mechanics. The moment we recognise the important role that imagination and intuition play in science, we will have no difficulty in seeing that "science is not an intruder into our cultural life using faculties fundamentally different from those

used by artists, poets, writers and historians. 12

The identification of a problem is the first step towards scientific discovery. Polanyi says:

To see a problem is a definite addition to knowledge as much as it is to see a tree, or to see a mathematical proof - or a joke. It is a surmise which can be true or false, depending on whether the hidden possibilities of which it assumes existence actually exists or not. To recognise a problem which can be solved and is worth solving is a discovery in its own right. 13

But the identification of a good problem is an act requiring a judgement of value. A scientist will only seek to solve those problems that are valuable to science. He must therefore decide which of the many problems confronting him is worth inquiring into. Such decisions are personal because there is no strict rule to be followed in making them.

The identification of a problem seems paradoxical. This was a problem that had puzzled Plato when he made Meno ask:

And how will you investigate, Socrates, that of which you know nothing at all? And even if you happen to come full upon what you want, how will you ever know that this is the thing that you do not know? 14

This question is very important. What Meno is driving at here is that we either know what we are looking for and then there is no problem, or we don't know what we are looking for and we cannot expect to find anything. 15

In other words, the recognition of a problem implies knowing and not knowing at the same time. ¹⁶ Plato resolved this paradox erroneously by invoking the theory of recollection of knowledge from a prior existence.

Polanyi, too, finds this problem puzzling. He argues that it is an important problem that has been ignored by many people probably because of the strange way in which Plato had resolved it. Polanyi resolves this problem by arguing that we are endowed with intuitive powers which enable us to sense the presence of a hidden truth. The identification of problem is what Polanyi calls tacit knowledge. It is a knowledge that is implied but which is not explicit. We cannot explicitly say what we are looking for yet we can look for it by relying on the clues to its nature. By being subsidiarily aware of these clues, we are able to anticipate the solution of a problem. The power of identifying a problem and of anticipating its solution is what Polanyi refers to as "strategic intuition" ¹⁷. But he cautions that the kind of intuition that he is talking about radically differs from that of Leibniz, Spinoza and Husserl. He argues that his intuition is "a skill for guessing with a reasonable chance of guessing right, a skill guided by an innate sensibility to coherence". ¹⁸

The way we make a discovery resembles the way we solve a difficult perceptual problem. In fact, for Polanyi, discovery is nothing but an extension of perception. He looks on knowing as a way of integrating disjointed parts in order to form a meaningful whole. As he tells us:

My own theory of scientific knowledge is, and has been from the start twenty-five years ago, that science is an extension of perception. It is a kind of integration of parts to wholes, as Gestalt psychology has described; but in contrast to Gestalt, which is a mere equilibration of certain bits to form a coherent shape, it is the outcome of deliberate integration revealing a hitherto hidden real entity. 19

Knowing understood as a way of integrating disjointed parts into meaningful wholes, as Polanyi has elsewhere argued, resembles the way a blind man finds his way using a stick or the way a doctor diagnoses a disease. It also resembles the way we find our way using inverting spectacles. All these acts involve the integration of disjointed parts in order to form meaningful wholes. We shall only examine one among many examples that Polanyi has provided, namely that of finding our way using inverting spectacles.

When we put on inverting spectacles we feel completely lost and find it difficult to find our way. After using the spectacles for sometime, we are able to make sense of the images which we see. How is this possible? It is not that the images have been inverted

once more. They remain inverted but a new way of seeing has been established. The wearer of the inverting spectacles is now able to make sense of what he sees. He has been able to reorganise the inverted images into a meaningful coherence. This making of sense out of chaos is what discovery is all about.

Polanyi sees the closest parallel to the way we find our way using inverting spectacles in Einstein's theory of relativity.²⁰ Arguing that Michelson-Morley experiment had very little to do with the discovery of this theory, Polanyi shows that Einstein discovered it through speculative imagination. Polanyi tells us that "the theory of relativity involves conceptual innovations as strange and paradoxical as those we make in righting an inverted vision".²¹ The theory of relativity demonstrated that all space and time measurements are relative to the observer. (We shall come back to this point when examining Polanyi's criticism of classical physics). What we want to stress at this stage is that the theory of relativity was a product of intuition. It was not a theoretical response to the Michelson-Morley experiment.²² Einstein himself has in his autobiography pointed out that his theory was a product of intuition. He claims to have discovered it at the age of 16 when he was a school boy. His theory was rejected on the ground that

intuition was not a legitimate way of making a discovery. In referring to Einstein's theory of relativity, what Polanyi wants to emphasize is that imagination and intuition play a very important role in the act of discovery. The activity of knowing in science cannot therefore be described as an impersonal and mechanical process.

II. Passions in Science

The most dramatic and perhaps the most passionate moment in science is the moment of discovery. This is when scientific passions are at their highest point. We all know the story of Archimedes rushing naked from the baths of Syracuse shouting "Eureka". This was after discovering the principle of displacement or what later came to be known as the Archimedes principle. This emotional outburst signifies the grasping of a truth which comes in a flash.²³ It heralds the birth of a new idea. Koestler refers to this sudden insight as the moment of truth²⁴ while Bernard Lonergan refers to it as the dramatic instance.²⁵ Capra refers to it as the moment of enlightenment.²⁶ These emotional outbursts that characterise discovery come after a period of what A.B. Garret calls incubation and frustration.²⁷ Polanyi reports the elation that filled Kepler when he discovered his third law of planetary motion. Kepler

had this to say:

The thing which dawned on me twenty five years ago before I had yet discovered the five perfect bodies between the heavenly orbits, which sixteen years ago I proclaimed as the ultimate aim of all research; which caused me to devote the best years of my life to astronomical studies, to join Tycho Brahe and to choose Prague as my residence - that I have, with the aid of God, who set my enthusiasm on fire and stirred in me an irrepressible desire, who kept my life and intelligence alert - that I have now at long last brought to light. Having perceived the first glimmer of dawn eighteen months ago, the light of day three months ago, but only a few days ago the plain sun of a most wonderful vision - nothing shall now hold me back. Yes, I give myself up to holy raving. If you forgive me, I shall rejoice. If you are angry, I shall bear it. Behold I have cast the dice, and I am writing a book either for my contemporaries, or for posterity. It is all the same to me. I may wait a hundred years for a reader, since God has also waited six thousand years for a witness. 28

We have adduced this lengthy quotation because it clearly illustrates the intense emotional feelings that fill a scientist or any other person, for that matter, when he or she receives a new vision of reality. The text reveals that science is not as passion-free as most people have tended to think.

The sudden insights that characterise a scientific discovery as Capra tells us, do not come

when sitting at a desk working out the equations, but when relaxing in the bath (as was the case with Archimedes), during a walk in the woods, on the beach, etc. During these periods of relaxation after concentrated intellectual activity, the intuitive mind seems to take over and can produce the sudden clarifying insights which give so much joy and delight to scientific research. 29

Polanyi uses almost identical words to describe the process of discovery. He says:

... discovery does not usually come at the culmination of mental effort - the way you reach the peak of a mountain by putting in your last ounce of strength - but more often comes in a flash after a period of rest or distraction... All the efforts of the discoverer are but preparations for the main event of discovery, which eventually takes place - if at all - by a process of spontaneous reorganisation uncontrolled by conscious effort. 30

Polanyi points out that scientific passions "are no mere psychological by-play".³¹ He maintains that passions have a guiding function which is indispensable to science. Scientific passions are not ordinary passions but intellectual passions announcing that something is intellectually precious to science. These passions are a sign that the scientist has made contact with the hidden reality. In fact they are a response to the intellectual beauty of science.³² But since, as Polanyi points out, "no part of science can be said to be beautiful unless it is also believed to be true, we must claim for this emotional response also that it makes contact with reality".³³ Thus the beauty of a scientific theory is a sign of its truthfulness. But beauty is not the only mark of a theory's truth. The theory must also be pregnant with yet unforeseeable implications. It must foreshadow an indeterminate range of future discoveries. Polanyi continues to write:

Any process of inquiry unguided by intellectual passions would inevitably spread out into a desert of trivialities. Our vision of reality to which our sense of scientific beauty responds must suggest to us the kind of questions that it should be reasonable and interesting to explore. They should recommend the kind of conceptions and empirical relations that are intrinsically plausible and which should therefore be upheld - even when some evidence seems to contradict them, and tell us also, on the other hand, what empirical connections to reject as specious, even though there is evidence for them, and even though we may as yet be unable to account for this evidence on any other assumptions. This is the selective function of scientific passion. 34

From the above quotation we learn that scientific passions are essential in suggesting to us those problems that are of scientific value and are worth investigating.

The sense of exhilaration that goes with the scientific discovery is not solely confined to the scientist. That is why Martin Goldstein asks us to compare the emotions of the scientist at the moment of discovery with those of "poets at creative moments, people having religious experiences, and others at moments of intense feelings associated with a vision of reality".³⁵ Goldstein compares the elation that filled Kepler when he discovered the third law of planetary motion with the feelings reported by Jonathan Edwards (a clergyman and theologian) on his conversion to Christianity. These were the words of Edwards:

After this my sense of divine things gradually increased, and became more and more lively, and had more of that inward sweetness. The appearance of everything was altered; there seemed to be as it were, a calm sweet cast of appearance of devine; glory, in almost everything, in the sun, moon and stars; in the clouds and blue sky; in the glass, flowers, and trees, in the water and all nature which used greatly to fix my mind. And scarce anything among the works of nature, was so sweet to me as thunder and lightning, formerly nothing had been so terrible to me. Before, I used to be uncommonly terrified with thunder, and to be struck with terror when I saw thunderstorm rising; but now, on the contrary, it rejoices me. 36

When we compare these religious feelings with those of Kepler when he discovered the third law of planetary motion, we cannot fail to see some striking similarities. The person having a new vision of reality sees the world differently. He sees order where at first he had seen only chaos. That is why he cannot resist being elated.

Polanyi himself sees the prayerful search for God as conforming to the pattern of scientific discovery. He reports the story of St Augustine whose long labours to achieve faith in Christianity culminated in his conversion.³⁷ Thus Polanyi is aware of the striking similarities that exist between the creative process in science and other creative processes that seek to make contact with the hidden reality. Even poetry, as Kenneth Barne tells us, is an instrument for uncovering the hidden reality. It is a tool for "penetrating into our hearts and minds, of

discovering in experience depths and subtleties that would never otherwise be apparent to us".³⁸

Polanyi's analysis of the personal element in science clearly shows that there cannot be any discontinuity between the sciences and the arts. Passions provide a common ground for the two ways of attaining knowledge. Knowledge derived from the sciences cannot therefore be said to be of a higher status than knowledge derived from the arts.

III. Science and Personal Judgement

Polanyi does not deny that there are rules for guiding discovery. He believes that such rules exist and that they are in fact important to science. But he points out that the application of rules rely on acts not determined by rule. The scientist must always make a personal judgement before applying any particular rule. He must decide which of the many rules before him is best suited for his purpose. In Polanyi's view, "no solution of a problem can be accredited as a discovery if it is achieved by a procedure of following definite rules."³⁹ The decision when to apply the rules must be made by the scientist himself. This was a fact that Immanuel Kant recognised.

In the Transcendental Analytic, Kant has shown that into all acts of judgement there must enter a

personal decision that cannot be accounted for by rules. He refers to the power of making such decisions as the "Mother-Wit".⁴⁰ He says:

A physician, a judge, or a ruler may have at command many excellent pathological, legal or political rules even to the degree that he may become a profound teacher of them, and yet he may easily stumble at their application. The ability to apply the rules correctly is a talent which can be practised only, and cannot be taught. 41

Polanyi has further shown that rules by themselves cannot establish the truth or falsity of a given theory. He says that even after the fulfillment of rules such as those of verification (e.g. reproductibility of results, agreement between determinations made by different and independent methods, and fulfillment of predictions)⁴² or even those of falsification, a scientist may still doubt the truth of the scientific theory in question. "Agreement with experiment", as Polanyi says, will "always leave some conceivable doubt as to the truth of a proposition and it is for the scientist to judge whether he wants to set aside such doubt as unreasonable or not".⁴³ In another text Polanyi writes:

It is true that a single piece of contradictory evidence refutes a generalisation, but experience can provide us with only apparent contradictions and there is no strict rule by which to tell whether any apparent contradiction is an actual contradiction. The falsification of a scientific statement can therefore be no more

be strictly established than its verification. Verification and refutation are both formally indeterminate . 44

From this quotation we learn that neither verification nor falsification can conclusively tell us whether a given scientific theory is right or wrong. It is therefore upon the scientist to weigh the evidence which is before him and make his own personal decision.

Joseph Flanagan has also recognized this personal element in knowledge. He distinguishes three phases in the knowing process. These are: experiencing, understanding and judging. He argues that the last stage in knowing is the most personal because it requires the knower to exercise a high sense of responsibility. Flanagan says:

Judging is different. In this activity the grasp of the sufficiency or insufficiency of the evidence is somehow even more up to you and your integrity as an inquirer; and so you feel more responsible for your reflective understanding than you do for your experiencing or your direct insights. As the three phases in knowing succeed and interrelate with one another you, the knower, have a cumulative sense of responsibility. This aspect of knowing leads us to the fourth quality of knowing : it is personal. 45

From this text we can see that the knowing agent has the final say in deciding what qualifies as knowledge and what does not. These decisions are made with universal intent and this is what prevents them from

being purely subjective. We shall deal at length with this universal quality of personal judgements in our fifth chapter.

Cardinal Newman refers to our faculty of making personal judgements as the "Illative Sense" ⁴⁶ Newman maintains that there are no ultimate tests for truth or error in our inferences. In his view, inferences do not necessarily lead to assent. He tells us:

...in no class of concrete reasonings, whether in experimental science, historical research, or theology is there any ultimate test of truth and error besides the trustworthiness of the Illative Sense that gives them its sanction; just as there is no sufficient tests of poetical excellence, heroic action or gentleman-like conduct, other than the particular mental sense, be it genius, taste, sense of propriety, or the moral sense, to which those subject-matters are severally committed. ⁴⁷

Thus Newman seems to agree with Polanyi in maintaining that in all forms of inquiry there must enter a personal judgement that cannot be accounted for by rules.

This analysis indicates that the scientist is not a truth-finding robot as most people have tended to view him. He is not just concerned with the recording of facts. He plays a very important role in deciding the validity or invalidity of any scientific proposition. He is from the beginning to the end the ultimate judge in deciding each consecutive step of his inquiry. Thus scientific knowledge is not just

personal because it is the scientist who intuits and imagines. It is also personal because it is he who decides what qualifies as scientific knowledge and what does not.

IV. Classical Physics

Classical mechanics is regarded by most people as the paradigm of objectivity. In fact it approaches the objective ideal of knowledge "so closely that if is often thought to have achieved it".⁴⁸ Classical mechanics (also known as Newtonian physics) totally ignores the influence of the human observer in the acquisition of knowledge. It reduces all physical events to the motion of their material objects in space. This mechanistic view of the universe is also deterministic, for it teaches that all physical events have a definite cause and give rise to definite effect. According to this view, the future of a system could be predicted with absolute certainty (at least in principle) if its state at any moment in time were known in details. This belief was best expressed by Laplace in his Essay on Probability (1812) when he said:

An intellect which at a given instant knew all the forces acting on nature, and the position of all things of which the world consists - supposing the said intellect was vast enough to subject this data to analysis - would embrace in the same formula the motion of the greatest bodies in the universe and those of the

slightest atoms; nothing would be uncertain for it and the future like the past would be present to its eyes. 49

Polanyi is opposed to this mechanistic view of the universe because it has very dangerous epistemological implications. Such a view reduces the knower to a passive spectator who merely describes an external reality. This mechanistic view of the world assumes that the world can be objectively described without mentioning the observer's influence.

The view that classical mechanics is strictly objective "leaves out of account the element of personal judgement involved in applying the formula of mechanics to the facts of experience".⁵⁰ Such application requires the personal judgement of the scientist.

Taking a single planet circling round the sun as an example, Polanyi argues that Newtonian mechanics cannot predict the exact location of such a planet at any future moment of time. "Astronomers", he says, "can merely compute from one set of numbers, which they identify with the position of the planet at a particular time, another set of numbers, which will represent its position at future moment of time"⁵¹ Polanyi further shows that there are no formulas that can explain the discrepancies between theory and

observation. Such discrepancies are to be explained in the light of astronomer's personal judgement.

Polanyi's critique of classical mechanics has demonstrated that "even the most strictly mechanized procedure leaves something to personal skill in the exercise of which an individual bias may enter". 52

Modern physics has recognised that the world cannot be objectively described. It has exposed the shortcomings of classical physics. In the words of Henry Margenau:

The new fact is that the search for truth modifies truth, that there is an effect of the knower on the known, that knowledge, too, is action. Four decades ago the typical observation of science was the measurement of the position of the star, an act wholly detached from the celestial object far away, and insignificant to its further motion. Today with our principal concern about the atom we regard such observations as atypical, as limiting cases... When the genius of Heisenberg first confronted the physicist with this interpretation of the measuring process, he evinced a shock reaction, for his whole concept of objectivity was shaken and his neat distinction between spectator and spectacle broke down. 53

In modern physics, as Capra has shown, the universe is to be "experienced as a dynamic insperable whole which always includes the observer in an essential way". 54 But although the new physics has shown that no clear distinction can be made between the observer and the observed, Polanyi still thinks that the modern mind is obsessed with the passion to achieve strict objectivity -an objectivity based on

the mechanistic world view of classical physics. He expresses this belief aptly when he says, "...the spell of the Laplacean delusion remains unbroken to this day. The ideal of strictly objective knowledge, paradigmatically formulated by Laplace, continues to sustain a universal tendency to enhance the observational accuracy and systematic precision of science, at the expense of its bearing on its subject matter".⁵⁵ This false objectivity, as we shall later see in our fourth and fifth chapters, has a disastrous effect on our culture.

V. Conclusion

Our analysis of the question of personal involvement in science indicates that the view that science can provide us with a strictly objective knowledge is not true. There simply cannot exist an absolutely objective knowledge because all knowledge is shaped by the knowing subject. It is the knower who intuits and imagines and it is he who discovers rationality in nature. We have also seen that scientific knowledge arises from the interaction between nature and ourselves and that the observer cannot therefore be divorced from the object observed. The study has shown that rules by themselves cannot verify or refute anything in science. The scientist must have the skill to apply them correctly.

Polanyi has managed to bridge the gap that has tended to separate what C.P. Snow calls the two cultures - the culture of science and the non-scientific culture.⁵⁶ The two cultures involve the personal participation of the knower although in varying degrees.

Polanyi's theory of knowledge should not be seen as a retreat to irrational subjectivity. For although he holds that knowledge is personal, he does not believe that it is entirely subjective. Personal knowledge can also be objective because it is sought with "universal intent". It is the knower's commitment to universality that prevents knowledge from being purely subjective. Our fifth chapter will investigate this new kind of objectivity that Polanyi is proposing.

Notes

1. William A. Wallace, Elements of Philosophy: A Compendium for Philosophers and Theologians (New York: Alba House, 1977), p. 38.
2. Michael Polanyi: Personal Knowledge: Towards a Post-Critical Philosophy (London: Routledge and Kegan Paul, 1958), p. 312.
3. Michael Polanyi, The Study of Man (Chicago: University of Chicago Press, 1959), p. 72.
4. Greville Norburn, "Science and Spirit": Philosophy, 35 (1960), p. 345.
5. Arthur Koestler, The Act of Creation: A Study of the Conscious and Unconscious in Science and Art (New York: Dell Publishers Co., 1964), p. 108.
6. The Study of Man, p. 35.
7. The Act of Creation, p. 120.
8. Michael Polanyi, "The Creative Imagination", Chemical and Engineering News, 44 (April, 1966), p. 8.
9. J. Bronowski, A Sense of the Future: Essays in Natural Philosophy, eds. Piero E. Ariotti and Rita Bronowski (Cambridge: The MIT Press, 1977), p. 12.
10. Fritjof Capra, The Tao of Physics: An Exploration of the Parallels between Modern Physics and Eastern Mysticism (Glasgow: Fontana Paperbacks, 1978), p. 39.

11. Ibid., p. 30.
12. Kenneth Barne, The Creative Imagination (London: George Allen and Unwin, 1960), p. 25.
13. Personal Knowledge. p. 120.
14. Plato The Dialogues of Plato, Vol. 1, translated by B. Jowett (Oxford: The Clarendon Press, 1953), p. 277.
15. "The Creative Imagination", p. 88.
16. See Joseph Flanagan, "The Self-Causing Subject: Intrinsic and Extrinsic Knowing", in Loneragan Workshop, Vol. III, ed. Fred Lawrence (Chicago: Scholars Press, 1982), p. 34.
17. "The Creative Imagination", p. 89.
18. Ibid., p. 89.
19. Michael Polanyi, "Genius in Science", Encounter 38 (January, 1972), p. 48.
20. "The Creative Imagination", p. 87.
21. Ibid., p. 87.
22. Personal Knowledge. p. 22.
23. To understand the nature of the creative process in science, see A.B. Garret, The Flash of Genius (London: D. Van Nostrad Co., 1963). This book gives over 50 stories of discovery. The book is written in a language understandable to both laymen and scientists.
24. The Act of Creation. p. 101.

25. Bernard Lonergan, Insight: A Study of Human Understanding (London: Darton, Longman and Todd, 1983), p. 3.
26. The Tao of Physics, p. 39.
27. The Flash of Genius, p. 4.
28. Johannes Kepler, Harmonice Mundi (Harmony of the World), Book V., Ch. 10. Also quoted in Personal Knowledge, p. 7. The third law of Kepler that is being referred to here relates a planet's average distance from the sun to the time it takes to complete its elliptical orbit around the sun. This law states that the ratio of the square of the time that any planet takes to revolve around the sun to the cube of its mean distance from the sun is the same for all planets. This, and the other two laws of Kepler, revolutionized astronomical calculations.
29. The Tao of Physics, p. 39.
30. Michael Polanyi, Science, Faith and Society (Chicago: University of Chicago Press, 1964), p. 34.
31. Michael Polanyi, "Passion and Controversy in Science", in Science and Society, ed. Alexander Vavoulis (London: Holden Day, 1970), p. 45.
32. Ibid., p. 97.
33. Ibid., p. 97.
34. Ibid., p. 97.
35. Martin Goldstein, How We Know (New York: Plenum Press, 1979), p. 195.

36. Quoted in William James, The Varieties of Religious Experience (London: Longmans, Green and Co., 1941), pp. 248-249. Also quoted in How We Know. p. 195.
37. Science, Faith and Society. p. 34.
38. The Creative Imagination. pp. 25-26.
39. Personal Knowledge. p. 123.
40. Immanuel Kant, Critique of Pure Reason, translated by N.K. Smith (London: St Martins Press, 1968), p. 177.
41. Ibid., p. 178.
42. Science, Faith and Society. p. 30.
43. Ibid., p. 30.
44. "The Creative Imagination", p. 55.
45. "The Self Causing Subject", p. 35.
46. J.H. Newman, An Essav in Aid of Grammar of Assent (London: Burns and Oates, 1881), p. 353.
47. Ibid., p. 359.
48. Personal Knowledge. p. 18.
49. Quoted in M. Capek, The Philosophical Impact of Contemporary Physics (New Jersey: D. Van Nostrand Co., 1961), p. 122. See also Michael Polanyi, Meaning (Chicago: University of Chicago press, 1975), p. 29.
50. Personal Knowledge. p. 18.
51. Meaning. p. 30.
52. Personal Knowlege. p. 19.

53. Henry Margenau, "The New View of Man in His Physical Environment", The Centennial Review. Vol. 1 (1957), p. 24.
 54. The Tao of Physics. p. 93.
 55. Personal Knowledge. p. 141.
 56. Charles P. Snow The Two Cultures: And a Second Look (Cambridge: Cambridge University Press, 1959), pp. 1-21.
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CHAPTER THREE

TACIT KNOWING

The central theme in Polanyi's theory of knowledge is the view that "complete objectivity as usually attributed to the exact sciences is a delusion and in fact a false ideal".¹ That is why he criticizes the Laplacean vision of universal knowledge which is the extreme idealization of this false objectivity. Polanyi recommends that we amend our ideal of science "by acknowledging our personal knowing - our indwelling as an integral part of all knowledge".² This amendment, as we saw in our last chapter, relaxes the tension that exists between the two cultures - the culture of science and the culture of the arts.

According to Polanyi, knowing is a process which involves the merging of disjointed parts in order to form comprehensive and meaningful wholes. This act of integration cannot be adequately expressed in words. This is what Polanyi means when he says that "we know more than we can tell". This is the tacit dimension of knowledge.³ Polanyi maintains that all our knowledge is either tacit or rooted in tacit knowledge. He goes on to argue that "a wholly explicit knowledge is unthinkable".⁴ But he also reminds us that we can only account for our capacity to know more than we can tell if we believe in the existence of an external reality with which we can establish contact".⁵ The

object of the present chapter is to examine what Polanyi means by a wordless kind of knowledge - a knowledge which we possess and yet cannot express it in propositions.

I. Gestalt Theory and Tacit Knowing

Polanyi's theory of knowledge is partly derived from the teachings of Gestalt psychologists. And as we said in our last chapter, knowledge, according to Polanyi is an extension of perception.⁶ Gestalt theory teaches that we understand a physiognomy by integrating its particulars without being able to identify these particulars. But Polanyi's view of perception in a way differs from that of Gestalt psychologists, for whereas they assume that the perception of a physiognomy takes place through the spontaneous equilibration of its particulars impressed on the retina or the brain, Polanyi views perception as an active shaping of experience. He says, "this shaping I hold to be the great and indispensable tacit power by which knowledge is discovered and once discovered is held to be true".⁷

Gestalt theory lays a lot of emphasis on the functional relation between parts and wholes. In fact the central idea in this theory is that the whole dominates the parts. The following quotation sheds some light on how this theory can be used to counter

reductionism which is a logical corollary of the objectivism that Polanyi is rejecting.

It has long seemed obvious - and is, in fact, the characteristic tone of European science - that 'science' means breaking up complexes into their component elements. Isolate the elements, discover all their laws, then re-assemble them, and the problem is solved. All wholes are reduced to pieces and piecewise relation between pieces.

The fundamental 'formula' of Gestalt theory might be expressed this way: There are wholes, the behaviour of which is not determined by that of their individual elements, but where the part processes are themselves determined by the intrinsic nature of the whole. It is the hope of Gestalt theory to determine the nature of such wholes. 8

What we learn from this quotation is that whereas science is generally thought to be concerned with the breaking of wholes into their component parts, Gestalt theory teaches that the only way to understand the whole is to integrate its parts. The integration of parts into wholes is the backbone of Polanyi's epistemology.

Transposing Gestalt theory into a theory of knowledge, Polanyi argues that when we comprehend a set of particular items as parts of a whole, the focus of our attention is shifted from the hitherto uncomprehended particulars to their joint meaning. In so doing, we do not lose sight of the particulars, but we become aware of them in a different manner. This leap from the particulars to their joint meaning is a tacit operation. We cannot explicitly say how it is

done. This is the tacit dimension of knowing that Polanyi is talking about. When we become aware of the parts only as pointers to something else we are said to be aware of them subsidiarily. Polanyi contrasts subsidiary awareness with focal awareness which would fix attention on the particulars themselves. To be aware of something subsidiarily, says Polanyi, means that we are not aware of it in itself but as a clue or instrument pointing beyond itself.⁹ Most things are not the focus of our attention in themselves, words, graphs, maps and myths, for example, are merely pointers to something else: their meaning. They are clues or instruments pointing beyond themselves.¹⁰ If we were to focus our attention on these clues we would, in Polanyi's view, see no meaning in them. Here it is important to distinguish between focal and subsidiary awareness. Subsidiary and focal awareness are only two kinds of awareness given to the same object. The distinction between the two is based on the meaning which we attach to the particulars. Polanyi says, "when we focus on a set of particulars uncomprehendingly, they are relatively meaningless, compared with their significance when noticed subsidiarily within the comprehensive entity to which they contribute".¹¹ Thus when a doctor diagnoses the illness of a patient, what he merely does is to endow with meaning the symptoms of the patient's illness which he was at first only focally aware of.¹² This

means that the doctor has integrated the symptoms of the patients illness into a meaningful whole which is in fact the diagnosis of the illness.

To understand how the theory of tacit integration bears on scientific knowledge and on knowledge in general, we should recall what we said in our last chapter concerning Polanyi's conception of science. According to Polanyi, science is concerned with the interpretation and seeing of patterns and relationships in nature. We said that nature appears chaotic to us ¹³ and that it is upon us human beings to find some order in it. For Polanyi, science is not just concerned with producing a summary of a given set of facts. This, he says, is the task of editors of encyclopaedias and compilers of telephone directories. ¹⁴ Science aims at discovering coherence in nature. It does not merely aim at recording facts. Looking at knowledge in this way we can understand why Polanyi insists that knowing involves the merging of disjointed parts in order to form a comprehensive whole. The tacit feat involved here is a personal act that must be carried out by a conscious mind. This chapter is therefore in a way an expansion of our last chapter which dealt with the role played by imagination and intuition in the act of discovery.

II. The Structure of Tacit Knowing

Polanyi has cited numerous examples to show that we can have a wordless kind of knowledge. Most of his examples are those pertaining to "knowledge how". We recognise a face we know among a million yet we cannot tell by what means we know it. We know how to swim yet we cannot tell by what mechanism we keep afloat; we can recognise the moods of a human face yet we cannot tell by what signs we do so. A chicken sexer succeeds in sorting out chicken by sex yet he is not able to say how this is done. We could enumerate many more examples but these few are sufficient to show what Polanyi means by a wordless kind of knowledge. These examples should not, however, be taken to imply that the only tacit knowledge we possess is "knowledge how" for, as we have already pointed out, all knowledge is either tacit or rooted in tacit knowledge.

In order to understand the structure of tacit knowing, we shall have to consider one of the standard arguments that Polanyi puts forward to prove that all knowledge is either tacit or rooted in tacit knowledge. He reports an experiment in which a person was presented with a number of nonsense syllables. ¹⁵ After being shown certain of these syllables, an electric shock was administered on the experimental agent. After some time, the subject showed signs of

anticipating the shock at the mere sight of the "shock syllables". Asked what made him anticipate the shock, the experimental agent could not tell what made him expect it. He failed to identify the shock syllables yet he relied on them for anticipating the shock. Polanyi concludes that the subject had acquired "a knowledge similar to the one we have when we know a person by signs we cannot tell".¹⁶ The subject's knowledge of the shock-producing syllables is said to have been tacit. He failed to identify the particulars (in this case the shock-producing syllables) because he was aware of them "only in their bearing on the electric shock".¹⁷ The experimental agent was using the shock syllables only as instruments or as clues pointing beyond themselves. He can therefore be said to have been aware of these syllables in a subsidiary manner.

Given this experiment, we are now in a better position to investigate the structure of tacit knowing. It involves what Polanyi calls the two terms, with the nonsense syllables (the particulars) forming the first term and the electric shock forming the second term. Polanyi further argues that tacit knowledge involves two kinds of knowing - knowledge by "relying on" and knowledge by "attending to". He tells us that we know the electric shock (the second term) by attending to it and that is why our knowledge of it

is specifiable. On the other hand, we know the shock-producing syllables only by relying on them for attending to the electric shock. Our knowledge of the syllables (the first term) remains tacit because we are subsidiarily and not focally aware of them. Polanyi refers to the relation between the first and second term of tacit knowing as a functional relation. He says, "we know the first term only by relying on our awareness of it for attending to the second".¹⁸

Using the language of anatomy, Polanyi refers to the second term of tacit knowing as the distal term because that which we are "attending to" (the electric shock) seems to be at a distance from us. He calls our subsidiary awareness the proximal term because things which we 'rely on' (the particulars) are close to us. They are, as it were, interiorized into our own body. In this experiment the subject is said to have incorporated the particulars (which he knows subsidiarily) into his own body. He is said to indwell in them. This justifies the use of the term proximal. The idea of "indwelling" will be dealt with at length at a later stage.

Tacit knowing has four aspects.¹⁹ First, we have the functional structure of tacit knowing. By this Polanyi means that the function of the subsidiary knowledge of the particulars is to direct us to the understanding of the whole. In other words, the

functional import of tacit knowing is to guide us from the proximal, interiorized particulars to the integration of coherent, distal whole. Our subsidiary awareness of the particulars leads us to the understanding of the whole.

The second aspect of tacit knowing is what Polanyi calls phenomenal. By this term, Polanyi means that when we move from the proximal (the parts) to the distal (the whole) the former is transformed and acquires an integrated appearance. In short, the parts change their appearance when viewed in terms of the whole.

The integration of clues into an intelligible pattern gives meaning to these clues. This is the third aspect of tacit knowing. Polanyi refers to it as the semantic aspect. Viewed as separate entities the particulars tend to be meaningless but when we integrate them we endow them with meaning.

From these three aspects of tacit knowing - the semantic, the functional, and the phenomenal - Polanyi deduces a fourth aspect. This aspect tells us that our subsidiary awareness of the particulars leads us to the comprehension of something real. It leads us to a reality. This, according to Polanyi, is the ontological aspect of tacit knowing.

In addition to these four aspects of tacit knowing, we also find that the structure of tacit knowing is triadic.²⁰ First, we have the target which may also be called the problem. Secondly; we have the particulars which we are only subsidiarily aware of, and finally we have the person who links the focal target with the subsidiary clues. The point to be emphasised is that the linking process is carried out by a conscious mind. It cannot be carried out mechanically. It is a personal achievement. We emphasize this point because Polanyi's theory of knowledge is a theory of personal knowledge. He believes that the knowing subject has a very important role to play not only in the holding of knowledge, but also in its shaping. The knower acquires knowledge by tacitly integrating the disjointed clues. This integration leads to a knowledge of the whole.

The important thing to be noted about the theory of tacit knowing is that our knowledge of the whole is never fully specifiable. As Polanyi tells us:

Subsidiary or instrumental knowledge, as I have defined it, is not known in itself but is known in terms of something focally known, to the quality of which it contributes, and to this extent it is unspecifiable. Analysis may bring subsidiary knowledge into focus and formulate it as a maxim or as a feature in a physiognomy but such specification is in general not exhaustive. Although the expert diagnostician, taxonomist and cotton-classer can indicate their clues and formulate their maxims, they know more things than they can tell, knowing them only in practice, as instrumental particulars; and not explicitly as

objects. The knowledge of such particulars is therefore ineffable, and the pondering of a judgement in terms of such particulars is an ineffable process. 21

But Polanyi continues to tell us that it is possible for the relationship of the particulars jointly forming a whole to be ineffable even though all the particulars are explicitly specifiable. 22 The point is that although we can at times identify the particulars forming a whole, that does not mean that we can tell how these particulars are related to one another in order to form the whole.

When Polanyi says that we know more than we can tell he should not be construed to imply that we can know something and at the same time be unable to say that we know it. For Polanyi, "to assert that I have knowledge which is ineffable is not to deny that I can speak of it but only that I can speak of it inadequately, the assertion itself being an appraisal of this inadequacy". 23 So when Polanyi says that we know more than we can tell, what he simply means is that we cannot specify the details of such knowledge.

III. Tacit Knowing as "Indwelling"

The body plays a very important role in Polanyi's epistemology. He divides the universe into two. The first part consists of our body with which we identify ourselves, and the second part consists of those

things that are not a part of our body. Polanyi holds that our body is the instrument by which we know the world. According to him, we make sense of the world by "relying on our awareness of the impacts made by the world on our body and the response our body makes on these impacts".²⁴ Thus, according to Polanyi, we can only know the world by making contact with it. We know the world, he adds, "by attending to it from our body; and our body differs from all the other objects by being the only collection of things which we know only exclusively by attending to them in themselves".²⁵ He conceives the knowledge of our body as the paradigm of tacit knowing, adding that "it is the subsidiary sensing of our body that makes us feel that it is our body".²⁶

Polanyi's view of the body has very striking similarities with that of Merleau-Ponty. In his Phenomenology of Perception, Merleau-Ponty has underscored the important role that the body plays in our experience of the world. He argues that the body cannot be experienced as an object because it is the medium through which we experience other things. He maintains that the body is invisible and intangible in so far as it is the one that sees and touches.²⁷ He further says:

I observe external objects with my body, I handle them, examine them, work round them, but my body itself is a thing which I do not observe: in order to be able to do so, I should need the use of a second body which itself would be unobservable. 28

Thus, like Polanyi, Merleau-Ponty is aware of the central role that the body plays in our knowledge of the world.

When we comprehend a whole, we are said to interiorize its parts, to dwell in those parts. This internalization of parts deprives them of their character as external objects. 29 They become part of us. Polanyi is very explicit on this point. As he points out:

Indeed, whenever we experience an external object subsidiarily, we feel it in a way similar to that in which we feel our body. And hence we can say that in this sense all subsidiary elements are interior to the body in which we live. To this extent we dwell in all subsidiary experienced things... Meaning arises either by integrating clues in our own body or by integrating things outside, and all meaning known outside is due to our subsidiary treatment of external things as we treat our body. We may be said to interiorise these things or to pour ourselves into them. It is by dwelling in them that we make them mean something on which we focus out our attention. 30

The term "indwelling" as used by Polanyi has been modified to mean that "the parts of the external world, when interiorized, function in the same way as our body functions when we attend from it to things outside". 31 According to Polanyi, we live in the particulars which we comprehend in the same way as we

live in the tools and probes which we use. The indwelling that Polanyi is talking about is not formal, for as he tells us, "it forces us to participate feelingly in that which we understand".³² The degree of indwelling, as we shall later see, increases gradually as we move from the exact sciences to the life sciences. It reaches its highest peak in the humanities.

Tacit knowing is not to be confused with deduction. These are two distinct modes of inference. One of major differences between them is that whereas in tacit inference subsidiaries (particulars) are made to bear upon a focus, in logical deduction two focal items - the premises and the conclusions - are joined together. But perhaps the most important distinction between the two is the fact that tacit integration can only be carried out by a conscious act of the mind. Unlike in logical deduction, tacit integration cannot be mechanically performed. This explains why discoveries in science involve a high degree of imagination. Discoveries involve integration not deduction. The process by which we move from the particulars to their joint meaning is a personal one. This is what Polanyi means when he says that all knowledge is personal.

From this analysis we can see the shortcomings of the objective ideal of knowledge - the dangerous

objectivism that Polanyi is repudiating. This false ideal, which is both mechanistic and reductionistic, ignores the fact that we are endowed with tacit integrative powers which enable us to discern coherence in nature. That our knowing is a form of indwelling by which we integrate disjointed parts into meaningful wholes, also shows the absurdity of divorcing the knower from the object of his knowledge as Karl Popper has attempted to do.³³ All knowledge, including the one stored up in books, bears the marks of the knowing subject. We cannot, therefore, be justified in talking of an absolutely impersonal knowledge because such knowledge does not and cannot exist.

IV. Specification and Loss of Meaning

Another very important aspect of the theory of tacit knowing is the claim that when we focus our attention on the parts the meaning of the whole is lost. The pattern is lost when we focus on its separate parts in detail.

Polanyi gives numerous examples of loss of meaning arising from such specification. He, for instance, tells us to repeat the word "table" several times.³⁴ Presently the word loses its meaning. Loss of meaning due to specification explains why so many pre-historic sites were only discovered when flying by aeroplanes

was introduced yet so many generations had walked on these sites without noticing them.³⁵ It would appear that those generations had failed to notice the whole (the sites) because they were observing the particulars from close quarters. They could not therefore integrate them into a meaningful whole. The pilot observing historical settlements from the air is aware of the parts in a subsidiary manner. He is aware of them only as pointers to a comprehensive entity but when he lands he does not only lose sight of the particulars, but also of the whole.

Another example which shows the dangers of specification is that of riding a bicycle - an instance of "knowledge how". Polanyi argues that it is difficult for us to learn how to ride a bicycle by following the explicit rule that "to compensate for an imbalance, we must force our bicycle into a curve - away from the direction of the imbalance - whose radius is proportional to the bicycles's velocity over the angle of imbalance". "Such knowledge", Polanyi says, "is totally ineffectual unless it is tacitly known - unless it is simply dwelt in".³⁶ These examples show the dangers of trying to reduce objects into their determinate particulars. They show the limits of reductionism as a method of acquiring knowledge. We do not understand comprehensive entities by giving explicit attention to their parts. We understand

things by integrating their disjointed parts, by simply dwelling in them. Such specification is particularly destructive in psychology and biology. We shall look into the shortcomings of such extreme reductionism in our next section.

V. Psychology and Tacit Knowing

Polanyi's theory of tacit knowledge gives us a clue as to how we know other minds and the nature of the relationship between the mind and the body.

According to the theory of tacit knowing, we know other minds by indwelling within the specifiable particulars of their external manifestation. When we tacitly integrate a person's behaviour we are able to know his mind. In Polanyi's own words:

... We know other minds by dwelling in their acts - as a chess player comes to know the mind of the master whom he is studying. He does not reduce the master's mind to the moves that the master makes. He dwells in these moves as subsidiary clues to the strategy in the master's mind which they enable him to see. The moves become meaningful at last only when they are seen to be integrated to a whole strategy. And a person's behaviour, in general, becomes meaningful only when integrated to a whole mind. 37

From this quotation we learn that we know another person's mind not just by observing his actions but by tacitly integrating these actions. These actions when jointly integrated point to the existence of a mind.

Polanyi disagrees with behaviourists who assume that all mental performances can be specified fully without referring to mental motives. According to Polanyi, such a task is impossible because we cannot keep track of a man's mental manifestations without "watching them as pointers to the mind from which they originate".³⁸ The point that Polanyi is making here is that the behaviourists are wrong in equating the mind with its manifestations. The mind and its manifestations are two distinct things. The mind is the source from which our behaviour springs. Polanyi would have no quarrel with the behaviourists if, as he says, "the pieces of behaviour which correspond to the presence of a mental state would be focally known".³⁹ He rightly points out that, on the contrary, these pieces of behaviour are known subsidiarily. They are known "as clues to mental states".⁴⁰

Thus Polanyi's main quarrel with the behaviourists lies in their attempts to replace all reference to mental states by descriptions of the behaviour by which these states are known to us. The theory of tacit knowing clearly shows the inadmissability of behaviourism. It shows that we cannot wholly shift our attention to the fragments of conscious behaviour. These fragments, as we have already seen, must be known in a subsidiary manner. They must be known as clues to mental states. In trying to explain the mind

in objectivist terms, behaviourism commits a fallacy which Polanyi calls pseudo-substitution. The fallacy "consists of using objectivist terms which are strictly speaking nonsensical, as pseudonyms for the mentalistic terms which they are supposed to eliminate" ⁴¹ Some of the terms that the behaviourists use to cover the mentalistic terms include stimulus, response and control.

With regard to the mind-body relationship, Polanyi invokes his two kinds of awareness - subsidiary and focal - to show the structure of this relationship. He says that the body seen focally is the body while seen subsidiarily it is the mind. ⁴² It would appear that for Polanyi whenever we integrate the pieces of a person's behaviour a higher level of reality emerges and it is this level that we refer to as the mind or consciousness. Any attempts to specify these pieces of behaviour would destroy the mind.

VI. Biological Reductionism

From our analysis of the structure of tacit knowing we can now easily understand why Polanyi criticises modern biologists and particularly molecular biologists. These biologists hold that the only scientific way to represent living organisms is in terms of physics and chemistry which govern their isolated particulars. This view is mistaken because

living things are comprehensive organic entities and as we have already seen, comprehensive entities are known by tacitly integrating their parts.

We cannot inquire into living things without referring to the purpose served by them, to their teleology. But the functions that an organ performs can only be known "as a part of a meaningful combination".⁴³ This is where tacit integration and the use of mental powers becomes necessary. Life is to be understood by a personal act of comprehension.⁴⁴

What we should note, however, is that in practice, biology does not explain things in terms of physics and chemistry although this is what modern biologists aim at. It studies living things in terms of a mechanism founded on the laws of physics and chemistry but not determined by them. So, although most biologists would want us to believe that they study living things without referring to functions served by them, no biologist can study a living thing without referring to its functions. Polanyi reports the story that circulates among biologists to the effect that "teleology is a woman of easy virtue, whom the biologist disowns in public but lives with in private."⁴⁵

Polanyi looks at biology as an instance of life examining itself. He argues that to describe life in

terms of physics and chemistry would be like interpreting Shakespeare's sonnets in terms of physics and chemistry. ⁴⁶ Such interpretation would have no meaning. The point is that living things are comprehensive entities and their meaning is lost if we reduce them to their smallest elements.

Physical and chemical investigation, Polanyi says, "can only form part of biology by bearing on previously established achievements such as those of shapeliness, morphogenesis, or physiological functions." ⁴⁷ Taking a frog as an example, Polanyi shows that its physical and chemical topography could not tell us anything about it as a frog. The reason for this is that apart from the principles governing the frog's atoms and molecules there are other principles that are irreducibly teleological. Polanyi is very emphatic on this point. He writes:

The achievements which form the subject matter of biology can be identified only by a kind of appraisal which require a higher degree of participation by the observer in his subject matter than can be mediated by the tests of physics and chemistry. ⁴⁸

He further says:

An attempt to de-personalise our knowledge of living beings would result, if strictly pursued, in an alienation that would render all observation in living things meaningless. Taken to its theoretical limits, it would dissolve the very conception of life and make it impossible to identify living beings. ⁴⁹

The dangers posed by an objectivist and a reductionist biology should not be underestimated. Such a biology corrupts our conception of man as a moral being. Man viewed impersonally is reduced to a complex organism whose operations could be predicted by physico-chemical laws. Polanyi seeks to correct this false view. Biology has to be understood as a science which involves a high degree of personal participation. The knowledge of life is from henceforth to be understood as a "sharing of life, a re-living of life, a very intimate kind of indwelling". 50

Looking at the D N A, which is a molecule said to contain the secret of life, Polanyi contends that the pattern of its organic bases is not reducible to physics and chemistry. Reducing it to its physical and chemical level would destroy it as an information-conveying code. As David Holbrook puts it: "the pattern by which DNA transmits 'information' cannot be derived from physical or chemical laws and must be understood in other terms". 51 And as Polanyi tells us:

Whatever the origin of a DNA configuration may have been, it can function as a code only if its order is not due to the forces of potential energy. Just as the arrangement of a printed page is and must be extraneous to the chemistry of the printed page, so the base sequence in a DNA molecule is and must be extraneous to the chemical forces at work in the DNA molecule. 52

What Polanyi is alluding to here is that the upper levels of reality are not explicable in terms of the laws governing the lower level. This will become clearer at a later stage of this essay.

Another philosopher who has addressed himself to the question of biological reductionism is Theodosius Dobzhansky. Although he acknowledges that reductionist biology has been very successful in studying life up to the molecular level, Dobzhansky does not think that molecular biology is the only biology worth studying. He maintains that life should be studied at all levels. He says:

The laws of Mendel, of gene segregation and recombination, are not deducible from any of the glorious achievements of chromosome and gene chemistry. And they need not be so deduced; Mendel's laws and much else in biology have been discovered through studies on organismic level. Biology moves both downward and upward - from the organismic to the molecular and from the molecular to the organismic levels. 53

This quotation reveals that Dobzhansky, like Polanyi, is not opposed to molecular biology as such. Dobzhansky is only opposed to the view that life can be reduced to mere matter - to physics and chemistry. And as George Kneller points out, most biologists believe that

although life is based on inanimate matter, it possesses properties that do not belong to its separate inanimate constituents but only emerge when these constituents are arranged in certain

ways. These biological properties are peculiar to whole entities - to the cell, the organ, or the organism - and can be discovered only through the study of those entities.⁵⁴

This approach to biology is referred to as organicism or emergentism.

Another thinker opposed to extreme reductionism is Fritjof Capra. In his classic The Turning Point,⁵⁵ he criticises a reductionist biology based on the Cartesian world view. He castigates modern biologists for their narrow and fragmented approach to life, arguing that "their approach cannot account for living systems as wholes".⁵⁶ He points out:

Biologists are busy dissecting the human body down to its minute components, and in doing so are gathering an impressive amount of knowledge about its cellular and molecular mechanisms but they still do not know how we breath, regulate our body temperature, digest or focus our attention. They know some of the nervous circuits, but most of the integrative actions remain to be understood. The same is true of the healing of wounds, and the nature and pathways of pain also remain largely mysterious.⁵⁷

What Capra, like Polanyi is pointing out at are the limitations of a reductionist approach to the study of living things. Living things are just too complex to be understood through a reductionist analysis alone. Capra is calling for a change in our approach to the study of living things.

He believes that the change will come from medicine because the functions essential for an

organism's health are above a reductionist description. This revolution will only come about if we abandon the reductionist belief that organisms can be completely described in terms of properties and behaviour of their constituents.

Turning his attention to the phenomenon of healing, Capra criticises modern medicine for failing to treat the patient as a whole person. He says that like modern biology, modern medicine is based on the Cartesian model. It concentrates on the separate parts of the human body thereby running the risk of losing sight of the patient as a person. Such an approach, as Capra further says, reduces health to mere mechanical functioning and cannot therefore deal with the phenomenon of healing. The phenomenon of healing is one that cannot be understood in reductionist terms. Healing involves interplay among the physical, psychological, social and environmental aspects of human conditions. 58

The main problem with modern medicine, as Capra sees it, is its failure to distinguish between illness and disease. Capra looks at disease as a condition of a particular part of the body and illness as a condition of the total human body. Today's medicine has tended to concentrate on disease rather than on illness, forgetting that one can be ill without having

a disease. ⁵⁹ Doctors are today mainly concerned with treating a particular organ or tissue without taking the whole body into account, let alone considering the psychological and social aspects of the patient's illness. Capra is criticising modern medicine because it is only concerned with the alleviation of physical symptoms while ignoring the root cause of illness. He is therefore calling for a change in which the biomedical research will be integrated "into a broader system of health care in which manifestations of human illness are seen as resulting from the interplay of mind, body and environment and are treated accordingly". ⁶⁰

Of course, some people may not totally agree with all that Capra is saying, especially with regard to the distinction he makes between illness and disease, but one cannot fail to see that the direction he is taking is in line with that of Polanyi. They are both calling for a new orientation in our understanding of life processes. Living things are to be viewed as comprehensive organic entities, as wholes whose operation principles cannot be accounted for by the laws of physics and chemistry. We commend Polanyi because he has not only exposed the dangerous nature of reductionism, especially with regard to the knowledge of living things, but also because he has

suggested an alternative for studying such organic entities.

VII. Levels of Reality

From the theory of tacit integration, Polanyi pictures a universe filled with a hierarchical strata of realities which are merged together meaningfully in pairs of lower and higher levels.

These levels of reality correspond to the two levels of tacit knowing, the particulars (proximal) and the whole (distal).

Taking a machine as an example, Polanyi argues that it is composed of two levels. The first level consists of the machine seen as a comprehensive entity while the lower level consists of the parts of the machine seen separately. Although the upper level relies for its operations on the laws governing the lower one, the operations of the upper level are not explicable in terms of the laws of the lower level. ⁶¹ We cannot, Polanyi says, understand the principle by which a watch keeps time by examining its hair spring, its balance wheel and all the other parts in detail. ⁶² This would be like trying to understand living things by examining their physico-chemical structure alone. Only the science of engineering can understand the operation principles of machines, not physics or chemistry. The reason for this is that the upper

levels of reality are not explicable in terms of the laws governing the lower level.

According to Polanyi, every level of reality is subject to a boundary beyond which lies an area undetermined by its own laws. Beyond this boundary the lower level is subject to control by the next higher level. This is what Polanyi means when he talks of boundary conditions. Using the giving of a speech as an example, Polanyi shows that you cannot derive a vocabulary from phonetics, nor derive the grammar of a language from its vocabulary. He further contends that the use of grammar does not provide the content of a piece of prose. 63

What the above examples are meant to show is that the universe is made up of a hierarchical strata of realities which are grouped in pairs of lower and higher levels, and that the organising principles of the higher level are not explicable in terms of the laws governing the lower level.

VIII. Conclusion

From our analysis, we can see that Gestalt theory is central to Polanyi's theory of knowledge. This theory has helped him to expose the inadequacies of reductionism which is a logical corollary of the objectivism that he is rejecting. His epistemology can be described as a holistic epistemology, for it

emphasises the functional relation between parts and wholes. We have seen that attempting to explain wholes entirely by giving explicit attention to their parts is destructive of whole areas of knowledge . This is particularly true of the science of biology.

Understood as a way of integrating disjointed parts into a comprehensive whole, knowing cannot be an impersonal process. It cannot be a mechanical operation but a task that involves the full participation of the knowing subject. We shall in the next section examine how the degree of personal involvement increases as we move from the exact sciences to the arts.

NOTES

1. Michael Polanyi, Personal Knowledge: Towards a Post-Critical Philosophy (London: Routledge and Kegan Paul, 1958), p. 18.
2. Michael Polanyi, Meaning (Chicago: University of Chicago Press 1975), p. 44.
3. Polanyi develops this theme most fully in his small book, The Tacit Dimension (Garden City: Doubleday, 1966), pp. 3-25.
4. Michael Polanyi, Knowing and Being (London: Routledge and Kegan Paul, 1969), p. 144.
5. Ibid., p. 133.
6. Michael Polanyi, "Genius in Science", Encounter, 38 (January, 1972), p. 48.
7. The Tacit Dimension, p. 6.
8. Quoted in Roger Poole, Towards Deep Subjectivity (London: The Penguin Press, 1972), p. 67.
9. Michael Polanyi, The Study of Man (Chicago: University of Chicago Press, 1958), p. 44.
10. Ibid., p. 40.
11. Knowing and Being, p. 128.
12. Ibid., p. 128.
13. J. Bronowski holds the same view. See his book, A Sense of the Future: Essays in Natural Philosophy (Cambridge: The MIT Press, 1977), p.17.
14. Michael Polanyi, "Scientific Outlook: Its Sickness and Cure", Science, 125 (1957), p. 484.

15. This experiment was first done by psychologists Lazarus and McCleary in 1949. See Michael Polanyi, "Science and Man's Place in the Universe" in Science as a Cultural Force, ed. Harry Wolf (Maryland: The John Hopkins University Press, 1964), p. 55.
16. Ibid., p. 56.
17. Ibid., p. 57.
18. Ibid., p. 157. Emphasis Polanyi's.
19. See "Science and Man's Place in the Universe", pp. 58-60.
20. Knowing and Being. p. 181.
21. Personal Knowledge. p. 88.
22. Ibid., p.88.
23. Ibid., p. 91.
24. "Science and Man's Place in the Universe", p. 62.
25. Ibid., p. 62.
26. Knowing and Being. p. 183.
27. M. Merleau-Ponty, Phenomenology of Perception, translated from the French by Collin Smith (London: Routledge and Kegan Paul, 1962), p. 92.
28. Ibid., p. 91.
29. Knowing and Being., p. 91.
30. Ibid., p. 183.
31. "Science and Man's Place in the Universe", p. 63.
32. Knowing and Being, pp. 148-149.
33. See his essay "Epistemology Without a Knowing Subject" in Objective Knowledge: An

- Evolutionary Approach (Oxford: The Clarendon Press, 1972), pp. 106-152.
34. The Study of Man, p. 30.
 35. Meaning, p. 40.
 36. Ibid., p. 41. See also Knowing and Being, p. 144.
 37. Meaning, p. 48.
 38. Knowing and Being, p. 135.
 39. Michael Polanyi, "On Body and Mind" The New Scholasticism, Vol. 43 (Spring, 1969), p. 203.
 40. Ibid., p. 203.
 41. Ibid., p. 204.
 42. Meaning, pp. 46.-47.
 43. The Study of Man, p. 55.
 45. "Science and Man's Place in the Universe", p. 67.
 46. Personal Knowledge, p. 382.
 47. "Scientific Outlook: Its Sickness and Cure", p. 482.
 48. Ibid., p. 482.
 49. Knowing and Being, p. 152.
 50. Ibid., pp. 150-151.
 51. David Holbrook, Education, Nihilism and Survival (London: Darton, Longman and Todd, 1977), p. 43.
 52. Meaning, p. 177.
 53. Theodosius Dobzhansky, Heredity and the Nature of Man (Toronto: The New American Library of Canada, 1964), p. 83.
 54. George F. Kneller, Science as a Human Endeavour

- (New York: Columbia University Press, 1978), p. 148.
55. Fritjof Capra, The Turning Point: Science, Society and the Rising Culture (London: Fontana Paperbacks, 1982), pp. 93-165. Included in the class of extreme reductionists are Francis Crick, Of Molecules and Men (Seattle: University of Washington Press, 1966) and Jacques Monod, Chance and Necessity: An Essay on the Natural Philosophy of Modern Biology translated from the French by Austryn Wainhouse (New York: Knopf, 1971).
56. The Turning Point. p. 95.
57. Ibid., pp. 95-96.
58. Ibid., p. 119.
59. Ibid., pp. 152.
60. Ibid., pp. 164-165.
61. The Tacit Dimension. p. 34.
62. The Study of Man, p. 47.
63. The Tacit Dimension. p. 35.

CHAPTER FOUR
MEANING IN WORKS OF ART, MYTHS
AND RELIGION

In our last chapter, we examined how Polanyi transposes Gestalt theory into a theory of knowledge. We saw that discovery is made by an act of tacit integration. Such integration requires the use of the imagination. We also saw the limits of reductionism as a method of acquiring knowledge. We learnt that attempting to explain wholes completely by giving explicit attention to their parts is destructive of entire areas of knowledge. Knowledge is acquired through an act of tacit integration.

In the present chapter, we are going to examine how Polanyi extends his theory of tacit integration to works of art (poetry, drama, painting, sculpture etc.), myths and religion. Like in the exact sciences, all these areas of knowledge involve the tacit integration of parts in order to form meaningful wholes. That is why Polanyi repeatedly points out that there is no discontinuity between the exact sciences and the arts. They all involve the use of our tacit imaginative powers though at varying degrees. The degree of personal involvement, as Polanyi rightly points out, increases gradually as we move from the exact sciences to the arts.

What should be kept in mind, however, is that unlike in works of art, once a scientific discovery has been made very little imaginative effort is required in order to make use of it. In works of art, this is not the case. For us to enjoy a given work of art such as a poem or a painting, a high degree of imagination is required. This is how Polanyi expresses himself on this point:

. . . once a scientist has made a discovery or an engineer has produced a new mechanism, the possession of these things by others requires very little effort of the imagination. This is not the case in the arts. The capacity of a creative artist's imaginative vision may be enormous, but it is only the vision that he imparts to his public that enables his art to live for others. Thus the meanings that he can create for his public are limited by the requirements that they provide a basis for their recreation by the imagination of other viewers or readers . . . We do have to achieve an imaginative vision in order to use a work of art, that is, to understand and enjoy it aesthetically. 1

This lengthy quotation introduces us to the object of this chapter which is to examine how Polanyi employs his theory of tacit integration to show how meaning is achieved in works of art, myths and religion. We would like to point out at the outset that this chapter is not concerned with how an artist produces a work of art. Our aim here is simply to examine how the reader or viewer of such works achieves meaning when he reads or views them. Works of art, myths, and religion, as we shall later see,

are made up of incompatibles. These incompatibles are meaningless to us unless we exercise our imagination upon them every time we engage in them.

I. Self-Centered and Self-Giving Integrations

Polanyi distinguishes between two kinds of integrations - the self-centered and the self-giving. This distinction enables us to see why works of art and religion are said to involve a higher degree of personal participation than the sciences. Works of art, myths and religion are said to "carry us away". They are, therefore, said to be self-giving. Scientific knowledge, on the other hand, is said to be self-centered because it does not carry us away. As Harry Prosch points out, "We are, it is true, extending ourselves to the objects of science through dwelling in the subsidiary clues that make them up. But we retain ourselves as centers from which we extend a part of ourselves to them. We are not wholly "carried away" or immersed in them..."² The point that should be noted here is that according to Polanyi's categorisation scientific knowledge falls under the category of self-centered integrations while works of art, myths and religion fall under the category of self-giving integrations. Self-giving integrations involve us much more deeply than self-centered integrations.

When Polanyi talks of self-centered integrations, what he means is that in such kind of integrations the focal object is of more intrinsic interest to us than the subsidiary clues that compose it. Thus in self-centered integrations the whole is of more intrinsic interest to us than its parts. Polanyi gives a word as an example of self-centered integration. Words, he says, "function as indicators pointing in a subsidiary way to that focal integration upon which they bear." ³ He goes on to argue that some words can be replaced by road signs, maps or mathematical formulas. Viewed in themselves, words are of no intrinsic interest to us. Our interest in them lies on what they signify, on the focus upon which they bear and this to Polanyi is their meaning. Polanyi rejects the study of language along associationist lines arguing that a word and its object are not equal partners in an association. ⁴ Polanyi's point here is that a word viewed in itself is of no intrinsic interest to us. Our interest in a given word lies on what it indicates. This is true of all signs and of self-centered integrations in general. Polanyi uses the following diagram to illustrate the location of intrinsic interest in self-centered integrations. ⁵



The letter S stands for the subsidiary clues, F for the focal object and ii for intrinsic interest. The negative and positive signs stand for the absence and presence of intrinsic interest, respectively. The above diagram shows that in self-centered knowing the object of our focal awareness (F) is of more intrinsic interest (+ii) than the subsidiary clues (S) that compose it. Thus in the example of a word, what the word signifies is of greater interest to us than the word itself. In other words, what the word names is interesting in itself as an object. What is true of a word is also true of all integrations of perceptions. As Richard Gelwick tells us, "... stars, crystals, physiognomies, and cells are of more intrinsic interest to us than the numerous clues we indwell in order to see them." ⁶ At times we hardly notice these clues. Polanyi says: "It is what is at the end of the cane that engages the blind man's interest, not the feeling on the palm of his hand." ⁷ This short quotation clearly shows what Polanyi means when he says that in self-centered integrations the focal object is what is of intrinsic interest to us. We

should recall that according to the theory of tacit knowing, when a blind man uses a cane to find his way, he is subsidiarily aware of the impact that the cane makes with his hand but he is more interested in the impacts that the cane makes with the ground. This is how the blind manages to find his way using a cane. ⁸

The other kind of integration that Polanyi identifies is one in which the subsidiary clues are of more intrinsic interest to us than the focal object. These are what he calls self-giving integrations and this is where myths, works of art and religion fall. In self-giving integrations we are carried away by the subsidiaries when we dwell in them. Our whole self is involved in such kind of integrations. The subsidiaries in self-giving integrations do not function merely as indicators pointing to something else as does the subsidiaries of self-centered integrations. We are intrinsically interested in the subsidiaries of self-giving integrations. Polanyi uses a symbol as an example to illustrate how this kind of integration takes place. By a symbol he means such things as flags, medals and tombstones. When we look at a symbol in itself we see no meaning in it but the subsidiaries that bear upon it are of great interest to us. The subsidiaries that make a flag, for example, include our self awareness as members of a nation and other diffuse memories such as the

struggle for our independence and so on. All these memories are integrated and put to a focus in the symbol. These subsidiaries are part and parcel of the flag - they are embodied in it. Raymond Firth is right when he says that "flags reflect the entire background thought and culture of a nation." ⁹

Polanyi represents this kind of self-giving integration with the following diagram. ¹⁰



The above diagram shows that in self-giving integration the subsidiary clues S are of more intrinsic interest to us than the focal object F. In this diagram it is of worth to note that the positive and negative signs have been reversed in order to indicate where the intrinsic interest lies.

In all forms of self-giving integrations such as symbolization, the focal object reflects back upon its clues, thus fusing our diffuse memories and arousing in us strong sentiments. This is how symbols and works of art in general are said to carry us away. This "reflecting back" cannot be represented by a straight line. Polanyi represents it with a looping arrow thus: ¹¹

The integration +ii -ii
of our existence S F



The arrow is made to loop to signify how the focal object carries us back to the subsidiaries, to those diffuse memories of our lives. Our own existence is involved in this kind of integration. Polanyi maintains that when we surrender ourselves to the symbol we are carried away by it and vice versa. This is the logic of self-giving integrations, as Polanyi tells us:

Our surrender and our being carried away are thus two sides of the coin and occur at the same instance. We do not surrender to a symbol if we are not carried away by it, and we are not carried away by it if we do not surrender ourselves to it. 12

The capacity of a symbol to arouse intense feelings in us is a fact recognised by Paul Tillich. He argues that a symbol possesses an "innate power".¹³ This is what distinguishes it from a word which is impotent in itself. But Tillich has also argued that words originally had a symbolic character but "in the course of evolution and as a result of the transition from the mystical to the technical view of the world they have lost their innate power".¹⁴

As our analysis shows, Polanyi is making a very sharp distinction between symbolization and indication and therefore between self-centered and self-giving

integrations. He goes on to tell us that to designate a country by its name is structurally different from symbolizing a country by a flag. He maintains that "to designate the United States is to integrate a name to a country, while to symbolize the United States by a flag is to integrate a country to a flag".¹⁵ This distinction between symbolization and designation (or indication) helps us to grasp the difference between self-centered and self-giving integrations. Designation falls under the category of self-centered integrations while symbolization falls under the category of self-giving integrations.

Polanyi identifies another kind of integration which differs from the other two in that both the subsidiaries and the object of our focal awareness are of intrinsic interest to us. An example of this kind of integration is to be found in a metaphor.

A metaphor is made up of two items. The principal item is called the tenor and is the item to which the metaphoric word is applied. The secondary item is known as the vehicle and is the literal meaning of the metaphoric word itself.¹⁶ M.H. Abrams has quoted a metaphor by Stephen Spender to illustrate what he means by the tenor and the vehicle of a metaphor. The metaphor reads:

Eye, gazelle, delicate wanderer
 Drinker of horizon's fluid line.¹⁷

In this metaphor, the word "eye" stands for the tenor while the words "gazelle", "wanderer" and "drinker" which are being compared to the eye are referred to as the vehicle of the metaphor. The two parts of a metaphor have some remote resemblance and meaning is achieved by fusing them together. As an example, Polanyi takes a metaphor from Shakespeare's Richard II which says:

Not all the waters of the rough ride sea
 Can wash the balm from of an anointed king. 18

In this metaphor, the seas failure to wash the balm from the king is referred to as the vehicle and the kings pride and defiance is referred to as the tenor. The vehicle is said to enhance the tenor's meaning.¹⁹ Any attempts to translate the metaphor into prose or to explain it in detail will destroy its meaning and its capacity to "carry us away". The two parts of a metaphor are said to be incompatible in natural terms because their connection cannot take place in nature.²⁰ The parts of a metaphor must be brought together by an act of artistic imagination. The reason for this is that there is no logical relation between them. In the metaphor from

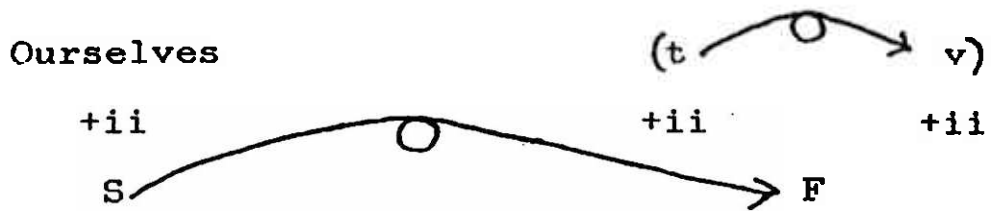
Shakespeare's Richard II, for example, there is no logical relation between the sea's failure to wash away the balm from the anointed king and the king's angry pride and defiance. All self-giving integrations involve the merging of such incompatibles. They are therefore said to be artificial or transnatural integrations. Transnatural integrations are contrasted with natural integrations. In the latter, little imaginative effort is required in order to grasp their meaning.²¹

In our example of the metaphor from Shakespeare's Richard II, we saw that both the tenor and the vehicle are of intrinsic interest to us. They are significant expressions in themselves. We also saw that the vehicle enhances the tenor's meaning. Polanyi uses the following diagram to illustrate how the meaning of a metaphor is achieved.²¹



The letter *t* stands for the tenor and the letter *v* stands for the vehicle. The above diagram shows that both the tenor and the vehicle of a metaphor are of intrinsic interest to us. The vehicle of the metaphor also reflects back on the tenor in order to enhance its meaning. That is why we have a looping arrow linking the tenor with the vehicle.

But as with the symbol, the metaphor has the capacity to carry us away when we surrender ourselves to it. To illustrate this additional feature of a metaphor, Polanyi modifies his schema to read: ²²



What this diagram shows is that the subsidiary clues of a metaphor (which include all those experiences in our own lives which are related to the tenor (t) and the vehicle (v) of the metaphor) are also of intrinsic interest to us. The looping arrow signifies the metaphor's capacity to carry us away.

It should be remarked here that the distinction that Polanyi is making between self-centered and self-giving integrations is not something entirely new. We all know that there is a difference between a work of art, say, by Shakespeare or Michelangelo, and scientific discovery by Galileo or Newton. No one can deny that a high degree of imagination is required in order for us to appreciate a work of art. But little

imaginative effort is required in order for us to understand a given scientific discovery. In fact it is the degree of imagination and personal involvement that distinguishes the arts from the sciences. We have already seen that works of art belong to the category of self-giving integrations whereas scientific discoveries belong to the category of self-centered integrations.

II. Integration in Works of Art

Having examined the difference between self-centered and self-giving integrations, we are now in a better position to understand how meaning is achieved in works of art, myths and religion.

When Polanyi looks at works of art he finds it paradoxical to see that they are regarded as true even though they tell us stories that we clearly know to be untrue. ²³ This is particularly true of a play. A play, say, Shakespeare's Othello is fictitious, the murder of Desdemona by Othello is not genuine yet we take the play to be conveying a true message. Polanyi's point here is that plays, like metaphors, are made up of incompatibles and a certain degree of imagination is required if these incompatibles are to be integrated into a joint meaning. In witnessing a murder on the stage, as Polanyi says, "we are aware of the setting and the antecedents of the stage murder

which are incompatible with the murder being genuine". Yet, he continues, "we do not reject this contradictory affirmation which would make a stage murder a nonsensical deception ..."²⁴ Our powers of imagination are therefore called upon to integrate these incompatibles. Without the powers of imagination a play on the stage would not have any meaning to us.

As our analysis shows, the appreciation of a work of art requires an increasing measure of imaginative effort. That is why, in fact, we do not intervene or run to call the police when a "murder" is committed on the stage.

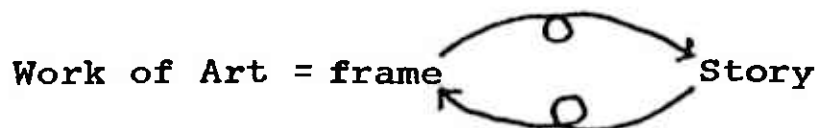
A similar kind of imaginative effort is required in the appreciation of representative painting. Through the use of our imagination we are able to perceive both flatness and depth in a painting. Looking at the painting on the ceiling of the church of St. Ignazio in Rome, Polanyi points out that among other things the painting shows a set of columns which appear to be continuation of the pilasters supporting the ceiling.²⁵ In the words of Prosch, "the painting creates the illusion that the architecture of the church is carried up into the heavens"²⁶ When one moves from the centre of the vaults and views the ceiling from an angle, this illusory perception of

depth is lost. But Polanyi points out that the depth perceived in a genuine art painting is not destroyed by viewing it from an angle.²⁷ He maintains that the function of a work of art is not to create deceptive illusions. He further points out that the perspectival design of most paintings is not fully convincing and that the viewer remains aware that he is facing a flat canvas. Like in a metaphor, the meaning of a painting (its beauty) is acquired through an act of integration. Through the use of our imagination we are able to integrate the incompatible clues of a painting. Some of these incompatible clues include the flat surface which is accepted as contradictory to the perceived depth.

Polanyi further points out that the photograph of a genuine painting taken from an angle would appear distorted because the camera does not pick-up the presence of the flat canvas. The flat canvas would counteract this distortion. We do not see such distortion in a genuine art painting because we are always aware that we are facing a flat canvas. When viewing a genuine painting we are said to be "subsidiarily aware of the flat canvas. It is interesting to note that W.H. Pirenne used the term "subsidiary awareness" with regard to painting in the same way that Polanyi used it with regard to semantic integration.²⁸ When we focus our attention on the

canvass and the brush strokes of a painting separately, their meaning, which is the "story" of the painting, is lost. The canvas and the brush strokes are said to give the painting an artificial quality. This quality is referred to as the "frame" of a work of art.

The frame of a work of art prevents the story from creating an illusion of historical reality. The frame "secures the artistic reality of a painting and guards its distinctive powers from dissolving into the surrounding factual reality"²⁹ By being subsidiarily aware of the frame, we are also aware that we are looking at a work of art and not a factual reality. Polanyi uses the following diagram to illustrate how the meaning of a work of art is achieved:³⁰



In this kind of integration we have two looping arrows linking the story with the frame. The two arrows are made to loop and face opposite directions to signify that the frame and the story embody and reflect each other. And as Polanyi adds, "neither bears on the other nor symbolises the other"³¹

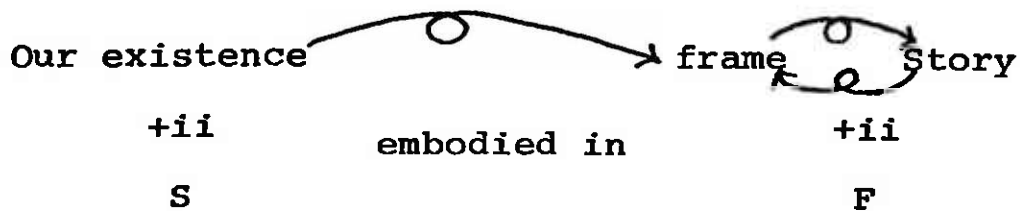
It should be noted that the two component parts of a work of art are logically incompatible. But when

they are integrated by an act of artistic imagination meaning is achieved.

The incompatibles in works of art when integrated produce a new kind of appearance - an appearance that is not present when the parts are seen separately. This is what Polanyi refers to as the phenomenal aspect of tacit knowing.³² But Polanyi points out that what is produced "by poetic imagination is a radical novelty and its reader absorbs this novelty by his own powers of imagination".³³ The poet detaches his poem from his day to day affairs by giving it an artificial frame. This detachment enables us to enjoy the poem "in itself" "and not as we enjoy the satisfaction of our personal desires".³⁴ This is also true of plays. When we watch the play "in itself" we are able to integrate its incompatibles and that is why, in fact, as we have already seen, we do not jump to rescue the victim of a stage "murder" or call the police.

But according to Polanyi, there is more to the grasping of a poem than the integration of its frame and its story. Like a symbol, the poem has the capacity to take us out of our ordinary diffuse existence and to arouse in us strong emotional experiences. Polanyi draws another diagram to illustrate how a poem (and works of art in general)

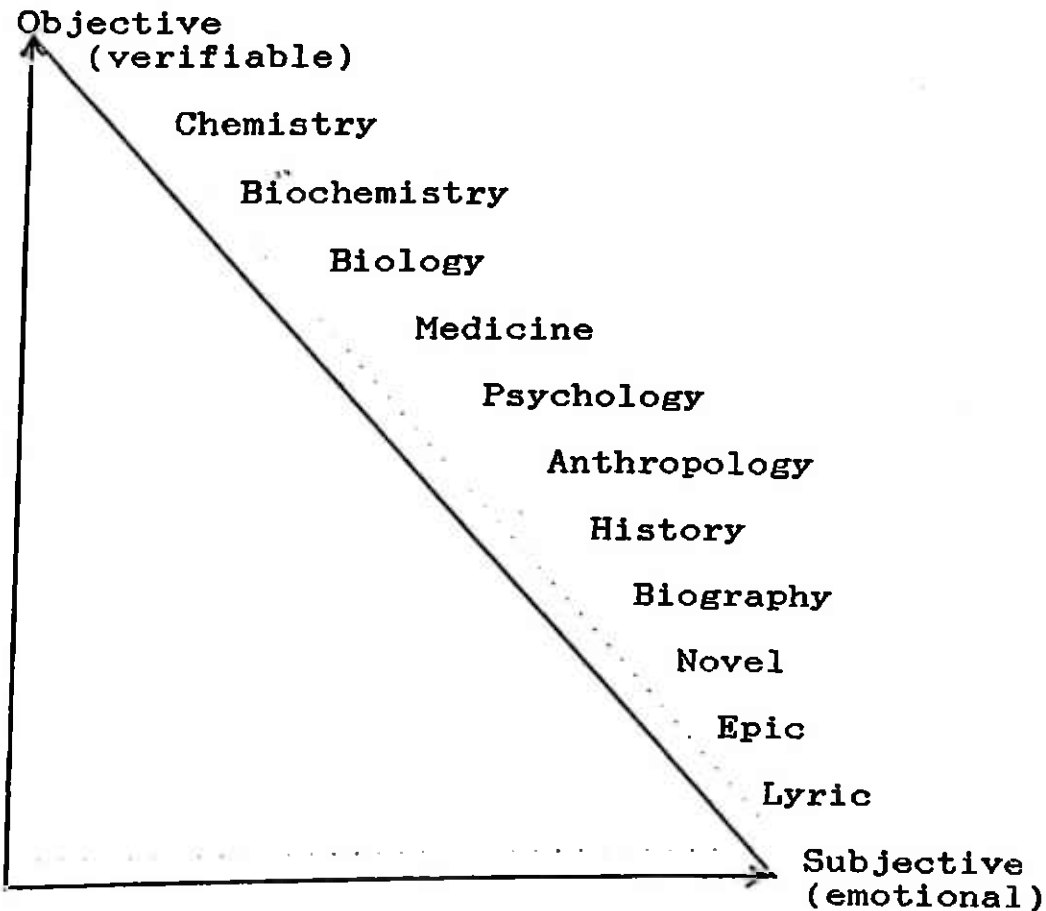
arouses in us strong emotional feelings. ³⁵



As the above diagram shows, in works of art both the subsidiaries and the focal object are of intrinsic interest to us. The arrow that links the two is made to somersault as an indication of how the focal object reflects back on the subsidiaries thus, arousing our sentiments and taking us out of our diffuse existence.

What our analysis shows is that in order to achieve meaning in a given work of art - be it a painting, a poem or even a sculpture - a high degree of imagination is required. The reason for this, as we have already seen, is that works of art are made up of incompatibles and the resultant integrations, unlike those of science, are transnatural. These incompatibles of works of art are meaningless to us unless we exercise our imagination upon them every time we view them. This is what distinguishes self-giving integrations from the self-centered integrations.

Another very important difference between the arts and the sciences, we are told, is that the sciences are subjected to more objective tests.³⁶ This distinction should not, however, be overemphasised because, as we saw in our second chapter, there is always an element of personal judgement involved in the verification and refutation of scientific theories. Art, Polanyi maintains, "has no test external to art. Its making and acceptance must be ultimately grounded on the decision of its maker, interacting, it is true, with both tradition and the public's present inclinations, but nevertheless interacting by and through the maker's own judgement".³⁷ What this means is that the degree of personal involvement is much higher in the arts than in the sciences. Arthur Koestler has shown with the aid of a diagram how the degree of personal involvement (subjectivity) increases as we move from the exact sciences to the arts. We shall reproduce this diagram here because it serves to illustrate Polanyi's conviction that the arts and sciences are continuous.³⁸



The above diagram shows that the degree of personal involvement increases gradually as we move from the exact sciences to the arts. The science that comes closest to the kind of objectivity envisaged by Laplace is classical mechanics (not shown in the diagram). But even here, as we saw in our second chapter, an element of personal judgement is involved.

III. Meaning in Myths and Religion

Polanyi has also extended his theory of tacit integration to myths, rituals and religion. He uses this theory to show how meaning is achieved in these types of integrations. Myths, rituals and religion

fall under the category of self-giving integrations.

Myths, like works of art, are devices for evoking our imagination. When we recite a myth we are taken back in time - to that time when the events being recounted in the myth took place. As in all self-giving integrations, the myth has the capacity to carry us away - to detach us from our daily experiences. As Polanyi says:

What happens when we accept a myth is what happens when we listen to great poetry or a great play or view a great painting. We are carried to its own sphere, away from the sphere in which we lived a moment ago and to which we shall presently return. It is the kind of detachment that we experience by observing a festive occasion or a day of mourning. 39

Ernest Cassirer in his book, An Essay on Man, has also recognised the close kinship between myths and poetry. ⁴⁰ But Polanyi is also aware of one major difference between the two. He notes that whereas all types of self-giving integrations are concerned with events represented, myths are concerned with events recollected. They somewhat take us back in time. A myth is a symbolic expression of a truth which cannot be adequately expressed in ordinary language. Myths should not, therefore, be interpreted literally. Referring to the creation myth in the Bible, Rollo May says:

The myth of Adam is thus not just a tale of man in

paradise who eats an apple in disobedience to a command, but a story by which we confront the profound problem of the birth of human consciousness, the relation of man to authority, and the moral self knowledge as symbolised by the knowledge of good and evil. 41

The myth of creation is a symbol and is supposed to evoke our imagination and to affirm some basic truths. Some of these truths are that God is one and that he created everything, including the first human beings. The myth also affirms that the first human beings sinned against God and that the consequences of the fall of the first man are still with us today. These truths are affirmed in a symbolic manner.

Polanyi maintains that religion is an imaginative activity which involves the merging of incompatibles. He says that "religion is a sprawling work of imagination involving rites, ceremonies, doctrines and something called worship." 42

Religious rituals and myths have great metaphoric meaning. Taking the Christian rite of Holy Communion as an example, Polanyi shows that this ritual has a further meaning apart from that of replenishing biological life. He notes that when people share a meal together "they establish a community of feeling, a conviviality." 43 When this kind of sharing is repeated for a long period of time, it becomes a ritual. This is especially so if it is associated with a myth. "Through the myth", Polanyi says, "we

dwell for the moment in Great Time and are one not only with one another and with our fathers, but also with all. We participate in the ultimate meaning of things." ⁴⁴ This is how a myth is said to detach us from our ordinary experiences.

The myth behind the Holy communion, according to Polanyi, is the myth of the last supper that Christ had with his followers before his crucifixion. This ritual is symbolically said to replenish spiritual life. The bread and wine symbolise the flesh and the blood of Christ, respectively. Christ told his followers to be performing this ritual in his remembrance.

Looking at the Holy Communion, Polanyi notes that it is made up of incompatibles. He observes that while eating and drinking are ordinarily aimed at satisfying bodily hunger, in the Holy Communion the same act of eating and drinking is said to enrich us spiritually. What is even more interesting is that the act of fasting is also aimed at spiritual enrichment. Other incompatibles in the Holy Communion include the consideration of some physical objects to be both flesh and bread and both blood and wine. The idea of deriving a constant supply of flesh and blood (food and wine) from one finite body (i.e. the body of Christ) also seems contradictory. ⁴⁵ Thus the whole

ritual of the Holy communion is made up of incompatibles. But as Polanyi points out, "it is the fusion of these incompatibles accomplished by our imagination that gives meaning to the whole transaction - if we are Christian." 46

Polanyi also sees some contradiction in the act of thanksgiving and prayer. He says:

How could the infinite God of all gods, the God of all world, the God 'who has the whole world in his hand' be in any way pleased, edified, or honoured - much less glorified - by the voices and actions, the postures or even the highest thoughts of a few anthropodial creatures only recently descended from the trees, performing rituals in certain finite places, thought by them to be hallowed, and certain finite times, considered by them to be holy days? The whole 'frame' in which the story of God's praise and glory is given its location - its embodiment - is ludicrously incompatible with such a 'story'. 47

To pray to God asking him to bring down rain, for example, seems contradictory because it implies that we do not trust that he will do what is good for us without our intercession. But Polanyi looks at such prayers as supreme acts of trust. Such prayers are metaphorical in character and are to be compared with the "murder" on the stage which is actually a non-murder. The point is that by asking God to do what is good for us we are confirming our trust in him. Only those who trust in God's goodness can sincerely pray to him. Harry Fosdick is also aware of the perplexities of prayer. He asks, whether, if God is

all wise and all good. "why should we urge on Him our erring and ignorant desires? ... Why should we, weak and fallible mortals, urge the good God to work good in the world?" ⁴⁸ Fosdick's answer to this question is that when we pray we are in fact giving God a chance to do what is good for us. He writes:

Christian prayer is giving God an opportunity to do what he wants, what he has been trying in vain, perhaps for years, to do in our lives, hindered by our unreadiness, our lack of receptivity, our closed hearts and unresponsive minds. ⁹⁹

Thus Fosdick regards prayer not as an overcoming of God's reluctance, but as a laying hold of His highest willingness.

What we have been trying to do here is to underscore the relevance of Polanyi's theory of knowledge for the understanding of religion. Many theologians have found Polanyi's epistemology very useful especially with regard to Christianity. Thomas F. Torrance has edited some very illuminating essays on the relevance of Polanyi's thought for the understanding of Christianity. ⁵⁰ These essays clearly indicate the richness of Polanyi's thought.

Conclusion

The object of this chapter has been to show how the degree of personal involvement increases as we move from the exact sciences to the arts. We have

seen that although the making of a scientific discovery requires a high degree of imagination, very little imagination is required in order to make use of such a discovery. This is not the case in works of art. For us to enjoy and achieve meaning in a work of art a high degree of imagination is required. We have seen that works of art and even religion are made up of incompatibles. These incompatibles have to be integrated by an act of imagination if meaning is to be achieved.

In shifting his attention from the exact sciences to works of art, myths and religion, Polanyi has proved that his work is highly interdisciplinary. His epistemology is not confined to scientific knowledge. It deals with almost all the departments of human knowledge.

Notes

1. Michael Polanyi, Meaning (Chicago : University of Chicago Press, 1975), p. 85.
2. Harry Prosch, "Polanyi's Ethics", Ethics. Vol. 82 (1971-1972), p. 101.
3. Meaning. p. 70.
4. Ibid., p. 69.
5. Ibid., p. 70.
6. Richard Gelwick, The Way of Discovery : An Introduction to the Thought of Michael Polanyi (New York: Oxford University Press, 1977), p. 102.
7. Meaning, p. 71.
8. Michael Polanyi, Personal Knowledge : Towards a Post-Critical Philosophy (London : Routledge and Kegan Paul, 1958), pp. 55-56.
9. Raymond Firth, Symbols Public and Private (London: George, Allen and Unwin, 1973), p. 341.
10. Meaning. p. 72.
11. Ibid., p. 73.
12. Ibid., p. 73.
13. Paul Tillich, "Religious Symbols", in Symbolism in Religion and Literature. ed. Rollo May (New York : George Braziller, 1960), p. 72.
14. Ibid., p. 76.
15. Meaning. p. 74.
16. See M.H. Abrams, A Glossary of Literary Terms (New York: Holt, Rinehart and Winston, 1957), pp. 36-37.

17. Ibid., p. 36.
18. See William Shakespeare, Richard II, Act 3, Scene 2. Quoted in Meaning, p. 77.
19. See "Polanyi's Ethics", p. 102.
20. Ibid., p. 102.
21. Meaning, p. 78.
22. Ibid., p. 78.
23. Ibid., p. 83.
24. Ibid., p. 83.
25. Ibid., p. 90. See also "What is a Painting?" American Scholar, 39 (Autumn, 1970), pp. 665-669.
26. "Polanyi's Ethics", p. 103.
27. Meaning, p. 91.
28. Ibid., p. 91.
29. Ibid., p. 92.
30. Ibid., p. 86.
31. Ibid., p. 87.
32. See "Michael Polanyi", Science and Man's Place in the Universe" in Science as a Cultural Force, ed. Harry Woolf (Maryland : The John Hopkins University Press, 1964), p. 59.
33. Meaning, p. 87.
34. Ibid., p. 87.
35. Ibid., p. 88.
36. Ibid., p. 100.
37. Ibid., p. 103.
38. Arthur Koestler, The Act of Creation : A Study of the Conscious and Unconscious in Science and Art

(New York: Dell Publishing Co., 1967), p.332.

39. Meaning. p. 124.
40. Ernest Cassirer, An Essay on Man : An Introduction to a Philosophy of Human Culture (New Haven : Yale University Press, 1944), p. 75.
41. Rollo May, "The Significance of Symbols' in Symbolism in Religion and Literature. ed. Rollo May (New York : George Braziller, 1960), p. 34.
42. Meaning. p. 152.
43. Ibid., p. 152.
44. Ibid., p. 153.
45. Ibid., p. 154.
46. Ibid., p. 154.
47. Ibid., p. 155.
48. Harry Fosdick, The Meaning of Prayer (London : Thomas Nelson and Sons, 1915), p. 63.
49. Ibid., p. 63.
50. See Belief in Science and Christian Life : The Relevance of Michael Polanyi's Thought for Christian Faith and Life. ed. Thomas F. Torrance (Edinburgh : The Handsel Press, 1980).

CHAPTER FIVE

OBJECTIVE AND SUBJECTIVE POLES OF KNOWLEDGE: TOWARDS A THEORY OF PERSONAL KNOWLEDGE

Our inquiry into Polanyi's theory of knowledge so far, might have given the reader the impression that Polanyi subscribes to a purely subjectivist epistemology. This is not the case, for although Polanyi attaches great significance to the role that the knower plays in the shaping of his knowledge, he does not believe that such participation impairs the objectivity of knowledge. The object of the present chapter is to examine the new brand of objectivism that Polanyi is proposing - an objectivism that will replace positivistic objectivism which he dismisses as both false and dangerous. The objectivism that Polanyi is rejecting radically differs from the brand of objectivism being developed by Karl Popper in his book Objective Knowledge and other writings.

Before we analyse Polanyi's brand of objectivism, we shall at first outline the shortcomings of scientific objectivism and also show how it differs from Popper's objectivism.

I. The Objective Ideal of Knowledge

In his book entitled Towards Deep Subjectivity, Roger Poole distinguishes three structures of objectivity. He points out:

There seem to be three major structures of objectivity. Others are in fact subdivisions of these. They are a tenacious and unquestioning grasp of 'facts' (data and quantifiability of data); a refusal to make public the justification for its acts and decisions, and an inbuilt tendency to take account of the parts rather than the whole.

Objectivity contends that facts have to be accepted if there is to be objective discourse. It is considered sub-rational to question the status of facts. In mathematics, physics, biology, chemistry, there are facts. It is therefore evident to objectivity that all human ratiocination which claims to be objective should adopt the impersonal stance of the scientist. Objectivity insists that facts have to be reckoned with and arranged in some convenient way. The suggestion that some facts ought not to be facts is rejected as merely subjective. 1

We have quoted from Poole's work at length because it reflects clearly the kind of objectivism that Polanyi is repudiating. This objectivism is not only mechanistic and reductionistic, but also dehumanising and destructive. As Theodore Roszak tell us, "Objective knowing is alienated knowing; and alienated knowing is, sooner or later, ecologically disastrous knowing". 2 This type of objectivism detaches the knower from the object of his knowledge. It teaches that the only reliable knowledge is one that is "impersonal, universally established, objective." 3 This view is erroneous because all knowledge is shaped by the knower's personal act. We have seen that even the most exact operations of science, including classical mechanics, require a measure of personal involvement. This objectivism is dangerous because it undermines the role of the

knowing agent in the determination of reliable knowledge.

Polanyi believes that this objectivism has been responsible for the collapse of the accepted moral values in the society. In fact his interest in epistemology was generated by the damage he thought an objectivist view of knowledge was doing to our moral ideals. ⁴ That is why he had to change his career from physical chemistry to philosophy.

This objectivism teaches that facts can be "deployed in an objective, context-free way, even when the facts are about human beings". ⁵ This objectivism, says, David Holbrook, "makes it seem that the universe is only 'matter in motion' and is therefore one in which man's moral being has no place". ⁶ In other words, this objectivism treats the whole of reality, including man, as simply a system of data or objects which are fully amenable to the method of science. This kind of objectivism ignores the fact that man is essentially a subject and not merely an object. It therefore degrades the human person.

Many authors, particularly those writing on nihilism, believe that this objectivism must eventually lead to despair and absurdity-to nihilism in fact. It leads to a loss of meaning and the discrediting of all moral values because they cannot

be "objectively" verified. Objectivism has come to mean that facts have to be accepted without any question, and as Poole further points out, as a result of this attitude objectivity carries "a mature rich and integrated acceptance of the evils of the world ⁷." Citing the case of apartheid in South Africa as an example, Poole laments:

...an objective discussion of the fact of apartheid in South Africa would not, of itself, arrive at the necessity of abolishing apartheid. That would be a matter for the Prime Minister of South Africa and his government. The facts are objective: they concern existing interests in gold-mining, exports and imports, arms supplies and the right of traditional settlers to the land they settle. These are facts as accepted by objectivity. ⁸

The point is that this type of objectivity is opposed to "any form of moral appraisal. It insists that facts are to be accepted as they are and all subjective, ethical inquiry about their status "is down-graded as subrational". ⁹

The problem that Polanyi is addressing himself to is a real problem and is one that poses a threat to our future. This problem, as our reference to other authors indicates, is not peculiar to Polanyi. It is a problem that other thinkers are aware of and it requires our serious attention. As we have already pointed out, Polanyi's theory of knowledge is primarily aimed at securing our moral values from

total destruction by a strictly objective analysis. When, this objectivism is extended to the field of morality, it gives rise to what Polanyi calls moral inversion. In other words, our moral values tend to lose their meaning when analysed objectively. Even our youth and our educated people have not been spared of this damaging objectivism. As Polanyi points out:

...our morally neutral account of all human affairs has caused our youth, and our educated people in general, to regard all moral profession as mere deceptions-or at best as self-deceptions. For once we induce ourselves to regard all established rules of moral conduct as mere conventions we must suspect our own moral motives. Such self-suspicion does torment our age, and particularly our youth, seducing them into destructive forms of moral expression, since this alone seem proof against suspicion of hypocrisy... In other words, we also have been busily engaged in laying the groundwork for nihilism. 10

Thus the problem that Polanyi is tackling touches on practically every aspect of our culture. As Richard Gelwick says, "A survey of the pressing problems of our time reveals the omnipresence of the scientific outlook and its dangers to our future. Behind nearly every issue stands the influence of the objective ideal of knowledge".¹¹ In the field of education, this objectivism has a similar disastrous effect. David Holbrook, in his book entitled Education, Nihilism and Survival, criticises our modern education system, arguing that "we are subjected continually, not least in the Arts, and in the Humanities in Education, to a new dogma, to a metaphysic, whose

assumptions are nihilistic - there is nothing to believe in, all former values are discredited, life can have no meaning. Man's life has no moral dimension, and his strivings are absurd." ¹² Polanyi, like Holbrook, also expresses his dissatisfaction with our educational system. He is particularly critical of the way those involved in the study of man are approaching their problem. Taking the functionalist method of social anthropology as an example, Polanyi writes:

This approach regards any institution, custom or idea as fulfilling its function to the extent to which it contributes to the stability and coherence of the existing society. No matter how cruel, treacherous, or abysmally stupid a custom it will be presumed to fulfill a social function in this sense. For example, the butchery of innocent people on the charge of witchcraft is said to solve the problem of satisfying hate while keeping the core of society intact ... this approach produces a set of terms in which the most important distinctions are eliminated. It replaces morality by conformity, if an action falls short of conformity it is a "maladjustment" or deviance. Pickpockets and Prophets, Hitler and Gandhi, Jesus of Nazareth and Judas Iscariot are all classed together as deviants; a functionalist anthropology cannot distinguish between them. ¹³

It is this detached approach to education that Holbrook is writing against in his book Education, Nihilism and Survival.

Other thinkers that are opposed to objectivism are the existentialists. Existentialists recognise that "man himself is existing in this world and therefore

he is unable to detach himself completely to study objectively the world of being as a whole".¹⁴ The existentialists are therefore against the abstract objective truth of science. For them, even in the most apparently objective description of phenomena there must enter an element of personal judgement. One of the leading existentialists, Soren Kierkegaard has even gone to the extent of affirming that truth is subjectivity. He maintains that truth is not a quality of propositions, but of human beings.

Polanyi's theory of knowledge is aimed at showing the bankruptcy of positivism and the failure of objectivism to give an adequate account of human knowledge. As Robert Osborn points out, "Polanyi objects not only to the lack of comprehensiveness in the modern scientific understanding of knowledge, but also to its lack of consistency".¹⁵ He says further, "positivism, by denying the intangible - such as mind and morality - must deny therefore the reality of knowing itself. If one cannot know the person, the knower, then knowledge itself is unknowable and without claim to reality".¹⁶

The present cultural crises that have been brought by objectivism indicate the need for a change in our world view. In the words of J.L. Adams:

In terms of epistemology, this one thing needful beyond objectivity may be characterised as

"understanding": it penetrates to the "inside" of an object and thus feels the pulse of a dynamic reality in both object and subject. In terms of metaphysics this one thing needful is the recognition that the categories of the mind fit also the structure of the world. The world is not a box. As Fichte insisted, it is always related to ourselves.

The importance of Polanyi's theory of knowledge lies in the recognition of these very important facts.

To counter this dangerous objectivism, Polanyi calls for a new view of knowing - a new epistemology that will not divorce the knower from the object of his knowledge. This new view of knowing will show that life has meaning.

II. Scientific Objectivism and Popper's Epistemology

Although Popper is an advocate of an objectivist epistemology, his brand of objectivism is different from the scientific objectivism that Polanyi is rejecting. We shall, therefore, briefly outline Popper's objectivism and then show how it differs from scientific objectivism.

Popper's main concern is with how to tackle the problem of knowledge. To begin with, Popper in his paper entitled "Epistemology without a knowing subject" ¹⁸, distinguishes three worlds or universes. His world one is made up of physical objects and physical states. His world two consists of states of

consciousness or of behavioural dispositions to act. Popper's world three is constituted of objective contents of thought including theories, problems, tentative solutions and arguments. Also included in world three are books, micro-films and all the other recorded material in libraries. Popper contends that epistemologists should be concerned with world three because this is where knowledge in the objective sense is to be found.

We should here point out that Popper regards epistemology as a theory of scientific knowledge which, according to his categorization belongs to world three. On the other hand, knowledge in the sense of "I know" belongs to the category of the world of subjects, the second world. Popper dismisses as irrelevant the traditional epistemologies of Locke, Berkeley, Hume and Russell. The verdict of irrelevance also falls on a large part of contemporary epistemology and also on epistemic logic, "if we assume that it aims at a theory of scientific knowledge". 19

Why does Popper dismiss traditional epistemology as irrelevant? He gives the following answer:

My first thesis is this. Traditional epistemology has studied knowledge or thought in the subjective sense - in the the sense of the ordinary usage of the words "I know" or "I am thinking". This, I assert, has led students of epistemology into

irrelevances: while intending to study scientific knowledge, they studied in fact, something which is of no relevance to scientific knowledge. For scientific knowledge simply is not knowledge in the sense of the ordinary usage of the words 'I know'. While knowledge in the sense of "I Know" belongs to what I call "second world", the world of subjects, scientific knowledge belongs to the third world, to the world of objective theories objective problems and objective arguments. 20

Popper maintains that knowledge in the objective sense is free knowledge for it is independent of anybody holding it or assenting to it. He goes on to make this startling remark: "Knowledge in the objective sense is knowledge without a knower; it is knowledge without a knowing subject".²¹ According to Popper, knowledge in this sense appertains to the items of world three which include theories, problems, arguments, tentative solutions etc. He dismisses with contempt knowledge in the subjective sense saying that such knowledge should be the concern of psychologists or sociologists.

The main weakness of a subjectivist epistemology, which Popper also calls the bucket theory of mind,²² is its quest for certitude. The latter, in Popper's view, is unattainable. Certitude and truth, according to Popper, are unattainable because all knowledge is in form of guesses. It is conjectural and can be falsified by future experience. Instead of talking of truth, Popper prefers to talk of verisimilitude or approximation to truth. A theory's nearness to truth

is judged by the number of falsifying tests it has undergone and withstood. Since we cannot have a permanent knowledge, Popper suggests that epistemologists should study the process by which knowledge evolves. He tells us:

I think we shall have to get accustomed to the idea that we must not look upon science as a body of knowledge but rather as a system of hypothesis, that is to say, as a system of guesses or anticipation which in principle stand up tests and of which we are never justified in saying that we know that they are true or more or less certain, or even probable. 23

The reason why Popper insists that epistemologists should study only knowledge in the "objective sense" is that in his view knowledge is never static. It is always changing. Knowing, according to Popper, is an evolutionary process and epistemologists should study these processes. He holds that knowledge begins with the identification of a problem which is followed by a tentative solution (or theory) and which is in turn followed by error-elimination. After the elimination of error, a second problem arises and the process goes on ad infinitum. Popper diagrams this process in the following way:



Here, P1 stands for the first problem, TT tentative theory, EE error-elimination and P2 the second

problem.²⁴ For Popper knowledge is dynamic and it is this dynamic process that epistemologists should study.

The point which needs to be emphasized at this juncture is that Popper's brand of objectivism is different from the scientific objectivism that Polanyi is rejecting. Popper is telling us how we should tackle the problem of knowledge. He is telling us that epistemologists should be concerned with problems, theories, arguments, etc., in order to understand how knowledge evolves. This approach can be termed objectivist because these problems, theories, and arguments are in a special way independent of anybody holding them although they originate from a knowing subject. As can be seen, in Popper's epistemology the knower is not alienated from the object of his knowledge in the Laplacean sense. In fact it is the epistemologist studying knowledge who assumes a detached stand and not the knower himself. Strictly speaking, Popper's objectivism cannot therefore be said to be dehumanising. We therefore assert that Osotsi Mojola is wrong when he suggests that "Popper's exaggerated objectivism and the ideal of impersonal knowledge has the tendency of undermining the values he himself (Popper) espouses and which generally all men desire."²⁵ Popper would be inconsistent if his epistemology undermined moral values because he is

himself a champion of such values. The fact is that Mojola has not properly understood Popper, at least on this point. He has failed to make a distinction between the kind of objectivism that Popper is propounding and the one that Polanyi (whom he quotes at length) is rejecting. In any case, Polanyi does to some extent seem to allow for the kind of objectivism that Popper is advocating. In a chapter entitled "objectivity", in his book Personal Knowledge, Polanyi writes:

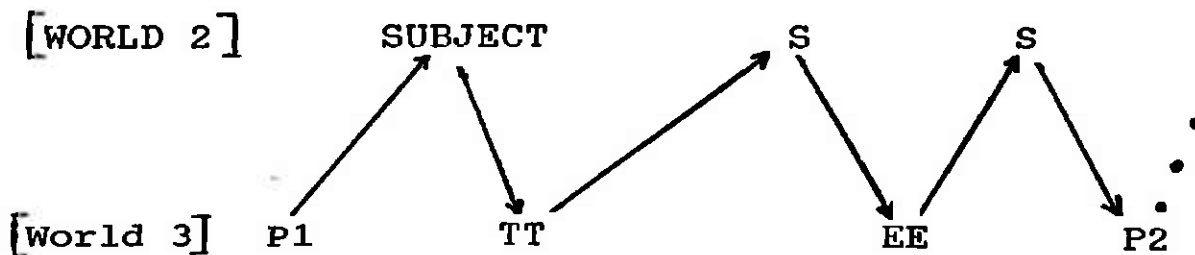
Indeed all theory may be regarded as a kind of map extended over space and time. It seems obvious that a map can be correct or mistaken so that to the extent to which I have relied on my map I shall attribute to it any mistakes that I made by doing so. A theory on which I rely is therefore objective knowledge in so far as it is not I, but the theory which is proved right or wrong when I use such knowledge. 26

Although Polanyi acknowledges that a theory is a form of "objective knowledge", this should not be construed to mean that he believes epistemologists should only study such kind of knowlege as Popper advocates.

The problem with Popper is that he is using the word "knowledge" in a very wide sense. Strictly speaking, the items of Popper's world three cannot all be termed as knowledge, for knowledge must be in the mind of a knowing subject, as Polanyi and other philosophers have pointed out. Some of the contents of Popper's world three such as books, as John Macquarrie

observes, can only be termed as potential knowledge ²⁷ and not knowledge in the strict sense of the word.

Further, it is to be observed that even the contents of Popper's world three must have been brought into being by a person, so world three cannot be said to be wholly autonomous. There is also an interaction between world two and world three. Without this interaction the "objective knowledge" that Popper is envisaging would not be dynamic, and knowledge would not evolve. To show how this interaction takes place, Susan Haack modifies Popper's schema of evolutionary knowledge in the following manner;



This modified schema is meant to show that a dynamic epistemology requires a knowing subject. ²⁸ There must be a knowing subject (represented in the schema by the letter S) who tries to solve a problem (P1) in order to arrive at a tentative theory (TT). The tentative theory is followed by the elimination of error (EE). The elimination of error is in turn followed by the emergence of a second problem (P2). This means that

for knowledge to evolve there must always be an interaction between world two and world three. World three cannot, therefore, be said to be strictly objective.

Popper is also mistaken when he says that the study of knowledge in the subjective sense is not epistemology but psychology. We contend that any study of knowledge from whatever angle is epistemology. Any study of knowledge that disregards the role played by the subject in the shaping and holding of knowledge is inadequate.

This brief analysis of Popper's epistemology must by now have shed some light on the distinction between scientific objectivism and Popper's objectivism. We can now embark on an examination of the new kind of objectivity that Polanyi is propounding.

III. Objectivity as Universal Intent

Comprehension is neither an arbitrary act nor a passive experience, but a responsible act claiming universal validity. Such knowing is indeed objective in the sense of establishing contact with a hidden reality; a contact that is defined as the condition for anticipating an indeterminate range of yet unknown (and perhaps yet inconceivable) true implications. It seems reasonable to describe this fusion of the personal and the objective as personal knowledge. 29

This quotation introduces us to the new kind of objectivity that Polanyi is advocating. It is an objectivity that differs from the positivist objective paradigm which is now outmoded.

In Polanyi's view, it is possible to have a knowledge that is both personal and objective because the measure of objectivity is not the absence of personal involvement but the presence of "universal intent". Objectivity in knowledge is not measured in terms of impersonality or detachment. In fact, the knower contributes to the objectivity of knowledge for he seeks to uncover a hidden reality which is independent of himself and which is to that extent impersonal. What is more, when the knower makes contact with the hidden reality, he expects his findings to be universally accepted - at least by members of his community. If he is a scientist he will expect his colleagues with whom he shares a common tradition to agree with him. "Universal Intent" is the term Polanyi uses to describe the responsible judgement of the scientist or any other knower, for that matter, when he makes any claim to knowledge. It is this universal intent in knowledge that prevents inquiry and discovery which are intensely personal from being purely subjective.

Polanyi refers to his theory of knowledge as "Personal Knowledge" and deliberately avoids the use of the term subjective because he believes that there is a difference between the "personal in us" which enters into our commitments, and our subjective states. The term "personal knowledge" is meant to suggest that

knowledge transcends the objective-subjective dichotomy. As we pointed out in our first chapter, it is this balanced and carefully thought out approach to knowledge that makes Polanyi's theory of knowledge significant and worthy of our consideration. The following quotation which introduces us to Polanyi's doctrine of commitment makes a clear-cut distinction between the personal and the subjective. Polanyi says:

...I think we may distinguish between the personal in us, which actively enters into our commitments, and our subjective states in which we endure our feelings. This distinction establishes the conception of the personal, which is neither subjective nor objective. In so far as the personal submits to requirements acknowledged by itself as independent of itself, it is not subjective, but in so far as it is an action guided by individual passions, it is not objective either. It transcends the disjunction between the subjective and objective. 30

In another text Polanyi says:

It is the act of commitment in its full structure that saves personal knowledge from being merely subjective. Intellectual commitment is a responsible decision, in submission to the compelling claims of that which in good conscience I conceive to be true. It is an act of hope striving to fulfill an obligation within a personal situation for which I am not responsible and which therefore determines my calling. This hope and this obligation are expressed in the universal intent of personal knowledge. 31

These two quotations clearly show how knowledge, understood as a commitment, transcends the objective - subjective dichotomy. By submitting to universal demands and by trying to make contact with the hidden reality, the knower is able to transcend his own

subjectivity.

It is interesting to note that the personal submits to requirements acknowledged by itself as independent of itself. This goes a long way to show that the search for truth and the proclamation of such truth is a responsible act. It is a commitment and all commitments are responsible acts. Polanyi says of a scientist that "his acts are personal judgments exercised responsibly with a view to a reality with which he is seeking to establish contact"³² and that "no one can utter more than a responsible commitment of his own and this fulfills the finding of truth and of telling it".³³

According to Polanyi, the thought of truth is a personal act because it implies a desire for it. But he cautions that such a desire though personal, is a desire for something impersonal. How are these seeming contradictions to be resolved? Polanyi makes the following suggestion as a way of resolving these contradictions:

We avoid these seeming contradictions by accepting the framework of commitment, in which the personal and the universal mutually require each other. Here the personal comes into existence by asserting universal intent, and the universal is constituted by being accepted as the impersonal term of this personal commitment.³⁴

Polanyi sees the mechanism of commitment at work in the way a judge makes a difficult legal decision. He maintains that a judge, like a scientist making a

discovery, has a wide discretion of choice because he has no fixed rules on which to rely on. The judge is compelled by universal intent to make the right decision but this compulsion establishes a sense of responsibility. And as Polanyi says:

While the choices in question are open to arbitrary egocentric decisions, a craving for the universal sustains a constructive effort and narrows down this discretion to the point where the agent making the decision cannot do otherwise. The freedom of the subjective person to do as he pleases is overruled by the freedom of the responsible person to do as he must .35

Thus the structure of commitment consists of both personal and compulsive elements.

Greville Norburn has compared Polanyi's conception of objectivity to Immanuel Kant's theory of appreciation of beauty³⁶. Kant has argued in his Critique of judgement that when we judge a thing to be beautiful there is something objective about that judgement. When we make such judgement we are tacitly claiming some sort of objectivity - some sort of universality. At least we expect the majority within our community to agree with us. Judgments of beauty, like judgments concerning scientific facts, carry with them a "universal intent". Such judgments are not an expression of our own subjective mental states. They are utterances claiming universal

validity. As can be seen, all scientific judgements or judgements of facts in general include, or at least presuppose, some evaluative components. There can therefore be no sharp distinction between judgements of value and judgements of fact, for as Marjorie Grene says, "there can be no description wholly independent of prescription." 37

George Kneller is another philosopher who is aware of both the objective and subjective dimensions of knowledge. He notes that although science is deeply rooted in passions, scientific knowledge can still be said to be objective because it claims universal validity.³⁸ It is interesting to observe that instead of impairing the objectivity of knowledge, the knower's personal involvement actually enhances this objectivity. This is the great paradox of personal knowledge.

IV. . Knowledge and the Possibility of Error

One other interesting feature of Polanyi's theory of knowledge is the claim that knowing is a hazardous business. When we assert to know anything we are in fact taking a risk. Any act of factual knowing, says Polanyi, "presupposes somebody who believes he knows what is being believed to be known. This person is taking a risk in asserting something, at least tacitly, about something believed to be real outside

himself." ³⁹ What Polanyi is emphasizing here is that we have no strict criteria for telling when we have made contact with the hidden reality. So, although our claims are made with universal intent, this does not mean that they are always and necessarily true. Our claims to knowledge may be genuine and yet fail to be universally accepted. Even a true claim may fail to get universal acceptance.

The universal intent with which a scientist looks for knowledge and proclaims it should not be confused with the establishment of universality. Polanyi is quite forthright on this matter. He says of a scientist:

We are not holding that he has thereby established universality, but only that he has exhibited a universal intent, for a scientist cannot know whether his claims will be accepted. They may turn out to be false, or, even though actually true, they may fail to carry conviction. He may even suspect all along that his conclusions will prove unacceptable. In any case, their acceptance will not guarantee him their truth. "Acceptance" is not equivalent to "truth". To claim validity for a statement merely declares that it ought to be accepted by every one, because everyone ought to be able to see it...⁴⁰

What should be stressed here is the fact that a discovery or any other scientific claim is universally accepted does not necessarily mean that that claim is true. It is also possible for a genuine scientific contribution to be rejected particularly if it does not conform to the existing scientific standards.

Polanyi's potential theory of adsorption serves as an example of a contribution that was initially rejected but which is today slowly gaining acceptance.⁴¹

Although the possibility of error is an indispensable part of our efforts to capture an element of reality, Polanyi still believes that such efforts are worthwhile. He repeatedly points out that in spite of the possibility of error we are called upon to search for truth and state our findings.⁴² The possibility of error, he asserts, "is a necessary element of any belief bearing on reality and to withhold belief on the grounds of such a hazard is to break contact with all reality".⁴³

It would appear that Polanyi has no strict criterion for telling when we have made contact with the hidden reality. We may be absolutely certain that we have made that contact but that belief might turn out to be false; yet Polanyi does not think that the holding of such a belief is irrational. If our belief about the external reality can be false it can also be true. We must take a chance for the sake of truth.

V. Scientific Knowledge and the Scientific Community

Although Polanyi's theory of knowledge deals with knowledge in general, he pays particular attention to scientific knowledge. He maintains that the scientific enterprise is made up of a community of persons

organised in a way which resembles in certain respects a body politic, and which also works according to economic principles which govern the production of raw materials. In fact, he refers to the scientific community as the Republic of Science as an organisation with its own checks and balances. ⁴⁴

Science is deeply rooted in tradition. All scientific contributions must conform to the current scientific opinion about the nature of things. ⁴⁵ Any scientific contribution that greatly departs from the existing scientific standards must, in Polanyi's view, be rejected. Such rejection, as we have already seen, is risky because some genuine contributions may be rejected simply because they do not conform to the existing standards. But such rejection is necessary if contributions by cranks, frauds, and bunglers are to be avoided. ⁴⁶ So here we are faced with a quasi-paradox to which Polanyi addressed himself.

He maintains that "the professional standards of science impose a framework of discipline and at the same time encourage rebellion against it." ⁴⁷ This is what he further says about these standards:

They must demand that, in order to be taken seriously, an investigation should largely conform to the current predominant belief about the nature of things, while allowing that in order to be original it may to an extent go against these. Thus, the authority of scientific opinion enforces

"the teachings of science in general, for the very purpose of fostering their subversion in particular points."⁴⁸

What Polanyi is saying is the although science is based on a traditional framework, and that the scientist must respect the existing scientific standards, the scientist is free to go against these standards. This is the only way that his contribution can be original. It is also the only way that science can advance. However, this kind of contribution should not greatly deviate from the existing standards of science otherwise it will be dismissed as implausible. In trying to meet the existing standards of science, the scientist prevents his inquiry from being purely subjectivist. The scientist feels the urge to convince his fellow scientists of the rightness of his own knowledge claims because he holds the "conviction that his mind and theirs operate from the same premisses."⁴⁹ The scientist "is disturbed by the fact that the evidence which convinces him could fail to convince them (his fellow scientists) and feels that it must do so in the end".⁵⁰ As Kneller puts it, "because the scientist wants passionately to persuade other scientists of the truth of his hypothesis, he will seek to make his hypothesis as logically sound and as adequate to the facts as possible".⁵¹

This urge to convince the scientific community of the truth of any knowledge claim is a clear indication that the

search for knowledge is not a purely subjective affair. It is a task done with universal intent.

VI. Conclusion

This chapter has exposed the failure of objectivism to account for knowledge. Such objectivism is not only false and dangerous but also dehumanising. We have also found Popperian objectivism to be inadequate. His exaggerated objectivism which teaches that epistemologists should only study problems, theories, arguments etc., that is, the contents of world three, is totally unacceptable. No meaningful discussion can ensue from such a detached study of knowledge because all knowledge is given shape by the knowing subject.

What this analysis shows is that Polanyi has succeeded in guarding the process of knowing from being dismissed as a purely subjective act. He has managed to bridge the disjunction between the objective and subjective poles of knowing. We have seen that the knower's participation in the shaping of his knowledge is a responsible act. It is this responsible commitment to truth that prevents knowledge from being purely subjective.

NOTES

1. Roger Poole, Towards Deep Subjectivity (London: The Penguin Press, 1972), p. 46.
2. Theodore Roszak, "Science: A Technocratic Trap", Atlantic Monthly. (June, 1972), p. 60.
3. Michael Polanyi, Personal Knowledge: Towards a Post-Critical Philosophy (London: Routledge and Kegan Paul, 1958) p. vii.
4. See Harry Prosch, "Polanyi's Ethics", Ethics. 82 (1971-72), p. 91.
5. Towards Deep Subjectivity. p. 46.
6. David Holbrook, Education, Nihilism and Survival (London: Darton, Longman and Todd, 1977), front cover. See also p. 3.
7. Towards Deep Subjectivity. pp. 46-47.
8. Ibid., p. 47.
9. Ibid., p. 46.
10. Michael Polanyi, Meaning (London: University of Chicago Press, 1975), p. 23.
11. Richard Gelwick, The Way of Discovery: An Introduction to the Thought of Michael Polanyi (New York: Oxford University Press, 1977), p. 138.
12. Education, Nihilism and Survival. p. 3.
13. Michael Polanyi, "Scientific Outlook: Its Sickness and Cure", Science, 125 (1975), p. 482.
14. Temple Kingston, French Existentialism: A Christian Critique (London: Oxford University press, 1961), p. 194.

15. Robert T. Osborn, "Christian Faith as Personal Knowledge", Scottish Journal of Theology. 28 (1975), p. 103.
16. Ibid., p. 103.
17. J.L. Adams, Tillich's Philosophy of Culture, Science and Religion (New York: Harper and Row, 1965), p. 127.
18. This was an address given by Karl R. Popper on 25th August, 1967, in Amsterdam, at the Third International Congress for Logic, Methodology and Philosophy of Science.
19. Karl R. Popper, Objective Knowledge: An Evolutionary Approach (Oxford: Oxford at the Clarendon press, 1972, p. 108. See also pp.140-141.
20. Ibid., p. 108.
21. Ibid., p. 109.
22. He also refers to this kind of epistemology as the common sense theory of Knowledge, see Ibid., p. 60.
23. Karl R. Popper, Logic of Scientific Discovery. London: Hutchinson and Co., Publishers, 1972), p. 317.
24. Objective Knowledge. p. 119.
25. Osotsi O. Mojola, "A Critical Examination of Karl Popper's Theory of Knowledge", unpublished M.A. Thesis (University of Nairobi, 1977), p. 168.
26. Personal Knowledge. p. 4.

27. John Macquarrie, In Search of Humanity: A Theological and Philosophical Approach (London: SCM Press, 1982), p. 64.
28. Susan Haack, "Epistemology with a Knowing Subject", The Review of Metaphysics, 130 (December, 1979), p. 322.
29. Personal Knowledge, pp. vii-viii.
30. Ibid., p. 300.
31. Ibid., p. 65.
32. Michael Polanyi, The Tacit Dimension (Garden City: Doubleday, 1966), p. 77.
33. Ibid., p. 78.
34. Personal Knowledge, p. 308.
35. Ibid., p. 309. Emphasis Polanyi's.
36. Greville Norburn, "Science and Spirit", Philosophy, 35 (1960), pp. 346-47.
37. Marjorie Grene, The Knower and the Known (London: Faber and Faber, 1966), p. 40.
38. George F. Kneller, Science as a Human Endeavour (New York: Columbia University Press, 1978), p. 160.
39. Personal Knowledge, p. 313.
40. Meaning, p. 195.
41. See his essay, "The Potential Theory of Adsorption" in Knowing and Being, ed. Marjorie Grene (London: Routledge and Kegan Paul, 1969), pp. 87-96.
42. Personal Knowledge, p. 315.

43. Ibid., p. 315.
44. See his essay, "The Republic of Science: Its Political and Economic Theory", in Knowing and Being. pp. 49-72.
45. Thomas Kuhn has dealt at length with the role that the tradition of a given scientific community plays in determining the kind of scientific questions that are to be asked and the kind of solutions that are to be expected. See his book The Structure of Scientific Revolutions (Chicago: The University of Chicago press, 1970).
46. Knowing and Being. p. 53.
47. Ibid., p.54.
48. Ibid., pp. 54-55.
49. Michael Polanyi, Science, Faith and Society (Chicago: The University of Chicago Press, 1946), p. 51.
50. Ibid., p. 51.
51. Science as a Human Endeavour. p. 180.

CHAPTER SIX

GENERAL CONCLUSION

The foregoing analysis has demonstrated the value of Polanyi's theory of knowledge. As we have already seen, the problem that Polanyi is attacking is still with us today. He is concerned with the problem of the self in relation to the world. William T. Scott has described this problem as "the major intellectual and existential problem of our time".¹

Polanyi seeks to show that the modern mechanistic world view is inadequate in dealing with the problems facing us today. He wants to show that the world cannot be separated from ourselves. But a Paul Rubiczek puts it "... our age is still largely dominated by abstract thinking, by impersonal, scientific deterministic thought, by rationalism".² Today, with our passion for achieving an absolutely objective knowledge, we look at the universe as a mechanical system that is devoid of life and which is detached from ourselves. Polanyi has made a gallant effort to correct this false view. He seeks to portray a truer and more meaningful picture of man's knowledge of the world. Like the existential philosophy, Polanyi's philosophy views the individual as an actor and not as a detached spectator. In other words, his philosophy recognizes the knower's oneness with the world.

Polanyi's contribution lies in exposing the serious moral and epistemological implications of

regarding the world as a mechanical system that is detached from ourselves. Our mechanical conception of the world reduces man to a mere object or to a passive spectator. In such a mechanical universe man is not only alienated from nature and from fellow human beings, but also from his own self. David Holbrook explains it very forcibly in the following manner:

Our conception of a world 'without life' has led to a feeling that we too are 'without life,' multifariousness, variety, sentience, intentionality, striving, creativity, or hope. This is embodied in our predominant present-day culture. So reduced to the concrete (Maslow), people have forfeited the future, like brain-damaged patients. By accepting the Galilean Newtonian world, they have maimed their souls, and abandoned the future.³

When our passion for objectivity is extended to the field of morality, all the accepted values lose their moral character. They are downgraded as mere subjectivism or reduced to objective judgments about the best means of optimizing goals. We examined these nihilistic consequences of objectivism in our fifth chapter. We saw how man loses his foothold in reality when he loses his belief in values. Polanyi is therefore asking us to build a truer and more meaningful world view "in which the grounds of man's moral being can be re-established".⁴

The roots of the modern objectivism can be traced to Cartesian philosophy. Descartes introduced into

philosophy the sharp division between the "I" and the world. This division has led to the belief that we can describe the world without ever mentioning the human observer and that we can therefore have an absolutely objective knowledge. This separation of the self and the world is at the basis of classical physics. And although the new physics has shown that this separation is no longer valid, Polanyi is still of the opinion that the modern mind is obsessed with the passion for objectivity - an objectivity based on the Cartesian-Newtonian world model.

Polanyi's philosophy seeks to show that the world is closely related to ourselves and that we cannot therefore take a detached stance when studying it. We have seen that even the most exact operations of science require a measure of personal involvement. Polanyi's philosophy demonstrates that we cannot speak about nature without at the same time speaking about ourselves. We cannot therefore have an absolutely objective knowledge of things.

Thus Polanyi is calling for a profound change in our world view. He is asking us to abandon the now outdated concepts of Cartesian philosophy and Newtonian science, for they are no longer useful in dealing with the problems of reality. Polanyi's philosophy helps to overcome the damaging split between the "I" and the world, subject and object,

knowing and being.⁵ In other words, his philosophy helps to strengthen our oneness with the world.

Polanyi has shattered the myth of pure objectivity in knowledge and science in particular. He has performed a valuable service in drawing our attention to the personal element in knowledge which most other philosophers had overlooked or did not sufficiently emphasize. Out of his own experience as a practising physical chemist, he has successfully shown that science presupposes a human attitude. This study has shown that knowing in science involves imagination, intuition, passions and the making of value judgements which are all personal acts. We have seen that through imagination we are able to integrate the disjointed parts of our experience in order to endow them with meaning. Through imagination we are able to make discoveries in science and also to produce works of art such as paintings and poems. This study has also shown the important role played by passions in all creative acts that seek to make contact with the hidden reality.

Polanyi has demonstrated that in all acts of inquiry (including scientific inquiry) there must ultimately come a point where we cannot apply any rule and must therefore exercise our own personal judgement. He has shown that the rules of science cannot by themselves tell us when to accept or reject

a given scientific theory. The decision to accept a given scientific theory as true must be made by the person making the inquiry. In distinguishing between reliable and unreliable knowledge claims, between a bad and a good theory, and so on, the scientist is squarely in the domain of values. This means that scientific knowledge is not value-free. It involves commitment to the truth and the making of value judgments.

In demonstrating that personal involvement is basic to all human knowledge, Polanyi has bridged the gap that has tended to separate science from the humanities. His epistemology demonstrates that the two fields of knowledge are continuous. They both involve the personal participation of the knowing agent although at varying degrees. We saw how the degree of personal participation increases as we move from the exact sciences to the arts. Polanyi's theory of knowledge helps to restore science to its rightful place in our culture. Science is no longer to be viewed as a intruder into our culture, for its methods and concepts are not fundamentally different from those of other disciplines.

Polanyi is also to be commended for providing us with an alternative conception of objectivity - an objectivity that does not necessarily exclude the personal participation of the knower. He has gone to great lengths to show that his recognition of the

personal element in knowledge does not entail a retreat to irrational subjectivity. He makes it quite clear that although knowledge is personal it is not wholly subjective. The knowing agent transcends his own subjectivity by submitting to the universal demands of knowledge and by trying to make contact with the hidden reality. It is this commitment to the truth and universality that prevents the process of knowing from becoming a purely subjective affair. This is the new conception of objectivity that Polanyi would want us to adopt in place of the false and damaging objectivism that has taken possession of the modern mind.

We must end this inquiry by emphasising that Polanyi's epistemology is timely for it draws our attention to the moral and personal elements in knowledge which most of us have tended to ignore. This epistemology clearly indicates the need for a reappraisal of our methods for studying reality.

NOTES

1. William T. Scott, "Polanyi's Theory of Knowledge", The Massachusetts Review, 3 (Winter, 1962), p. 349.
2. Paul Roubiczeck, Existentialism: For and Against (Cambridge: Cambridge University Press, 1911), p. 11.
3. David Holbrook, Education, Nihilism and Survival (London: Darton, Longman and Todd, 1977), p. 39.
4. Ibid., p. 45.
5. See Belief in Science and in Christian Life: The Relevance of Michael Polanyi's Thought for Christian Faith and Life, ed. Thomas F. Torrance (Edinburgh: The Handsel Press, 1980), p. xv.

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39 (Autumn, 1970), pp. 625-69.

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