THE PHILOSOPHY OF MICHAEL POLANYI

AS A POLITICAL PHILOSOPHY

BY

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Abstract

Polanyi argues that it is not possible for a scientist to be objective for he has to rely on heuristic passion and a commitment to his beliefs. This leads him to virtually reject the concept of the objectivity of the scientific community controlling the development of science by the application of impersonal tests. Science he claims is controlled by the inter-personal knowledge of the scientific community, by a consensus of opinion. Yet science progresses and progress can only come about by the initiatives of individual scientists. This leads Polanyi to develop a theory of liberal conservatism: a situation where the excesses of individual initiatives are controlled by the authority of the scientific community, who judge new claims to knowledge by reference to their inter-personal or traditional knowledge.

It is Polanyi's claim that the scientific community can be used as a prototype to study other communities concerned with scholarship and intellectual activity. The expansion of his concepts to the judicial community and schools of history is therefore examined. But Polanyi has a further claim and this is that non-intellectual communities, although not developing a systematic tradition will have a coherent one and therefore will operate in a similar way to the scientific community. This enables us to see how he can expand his concepts to the moral community, the community of politicians and society as a whole.

In this thesis Polanyi's philosophy of science is critically examined, as well as his attempts to use the scientific community as a prototype for other communities. We also examine and criticise his use of a vitalist theory of evolution, and his attempt to provide a unification of all knowledge.
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<table>
<thead>
<tr>
<th>Abstract</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>2</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>CHAPTER I</td>
<td></td>
</tr>
<tr>
<td>A Theory of Discovery</td>
<td>9</td>
</tr>
<tr>
<td>CHAPTER II</td>
<td></td>
</tr>
<tr>
<td>The Decision of the Community</td>
<td>36</td>
</tr>
<tr>
<td>CHAPTER III</td>
<td></td>
</tr>
<tr>
<td>The Republic of Science</td>
<td>53</td>
</tr>
<tr>
<td>CHAPTER IV</td>
<td></td>
</tr>
<tr>
<td>A Critique of the Republic</td>
<td>64</td>
</tr>
<tr>
<td>CHAPTER V</td>
<td></td>
</tr>
<tr>
<td>The Argument for Freedom in Science</td>
<td>89</td>
</tr>
<tr>
<td>CHAPTER VI</td>
<td></td>
</tr>
<tr>
<td>Other Communities</td>
<td></td>
</tr>
<tr>
<td>i. The Community of Historians</td>
<td>105</td>
</tr>
<tr>
<td>ii. The Judicial Community</td>
<td>119</td>
</tr>
<tr>
<td>iii. The Moral Community</td>
<td>131</td>
</tr>
<tr>
<td>iv. A Justification of Inter-personal knowledge</td>
<td>146</td>
</tr>
<tr>
<td>CHAPTER VII</td>
<td></td>
</tr>
<tr>
<td>The Political Community</td>
<td>155</td>
</tr>
<tr>
<td>i. A Traditional Society</td>
<td>164</td>
</tr>
<tr>
<td>ii. The Community of Politicians</td>
<td>169</td>
</tr>
<tr>
<td>iii. Political Education</td>
<td>175</td>
</tr>
</tbody>
</table>
CHAPTER VIII

<table>
<thead>
<tr>
<th>Conclusion</th>
<th>183</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix</td>
<td>189</td>
</tr>
<tr>
<td>Bibliography</td>
<td>199</td>
</tr>
<tr>
<td>Additional Papers</td>
<td></td>
</tr>
</tbody>
</table>


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Introduction

Professor Michael Polanyi F.R.S. was born in Budapest in 1891, and during the Great War he served in the Austro-Hungarian army as a medical officer. After the war he became a member of the Kaiser Wilhelm Institute in Berlin where he collaborated with Fritz Haber. In 1933 he left Germany and became Professor of Physical Chemistry at the University of Manchester. Fifteen years later in 1948 he gave up his chair and became Professor of Social Studies in the same University. He held this chair until 1958 when he became Emeritus Professor. In that year he moved to Oxford as a Senior Research Fellow at Merton College.

In 1940 he formed, together with Dr. J.R. Baker, the Society of Freedom in Science. The Society was originally formed to oppose the views of the central planning of science put forward by Professor J.D. Bernal F.R.S. and his associates. By 1946 the society had a membership of over 450 in Great Britain and the U.S.A., and in the U.S.A. Professor Percy Bridgman became the leader of the society. By the late forties the Society for Freedom in Science seemed to have emerged as the victor, and the victory was further strengthened by the publication of sociological material by Talcott Parsons and Robert K. Merton which argued for the necessity for freedom in science.

Michael Polanyi states that he first became interested in philosophy when he first met the Soviet ideology which was prevalent under Stalin, and which denied justification for the pursuit of science. He states:

"I was struck by the fact that this denial of the very existence of independent scientific thought came from a socialist theory which derived its tremendous persuasive power from its claim to scientific certainty. The scientific outlook appeared to have produced a mechanical conception of man and history in which there was no place for science itself. This conception denied altogether any intrinsic power to thought and thus denied also any grounds for claiming freedom of thought."
He argues that this led him to see that a moral inversion had taken place, "Scientific skepticism would trust only material necessity for achieving universal brotherhood. Skepticism and utopianism had thus fused into a new skeptical fanaticism."\(^2\) Extreme criticism and a fanatical morality, which denied the existence of morality as it considered it only a subjective belief in certain values and therefore attached the moral fervour to a material interpretation of the world, were fused together.

In considering this fusion his philosophy began to emerge. It was based on two concepts: firstly, that man was essentially a moral creature\(^3\), and secondly, that a knower can know more than he can tell\(^4\). In the sphere of knowledge what Polanyi was doing was to stress the personal commitment of the knower to what he knew, and at the same time indicating the tacit unspecifiable element of knowledge.

The unspecifiable element in knowledge made it extremely difficult to refute entirely a claim to knowledge, and provides an explanation as to why a seemingly false theory can be fruitful. Man in the sphere of science was not concerned solely with basic facts, but with why things happened as they did. He was concerned not just with appearances but with ultimate reality, with the controlling elements behind appearances. But if man was concerned with ultimate reality then the testing of this knowledge became not only difficult, as it was in the physical chemical sphere, but impossible as there are no concrete facts by which such knowledge can be judged. Personal knowledge, Polanyi's term for knowledge claiming universal validity, although controlled by the morality of man, which in the case of knowledge meant an obligation to the truth, let the individual out into a field of wild and wonderful speculations. How could such individual initiatives be controlled in the non sensible world beyond physical and chemical appearances? Polanyi turned to the field he was eminent in. How were wild and wonderful speculations controlled in the world of science when to the participants it seemed that they were not controlled
by facts, experimental data? The answer was clear they were controlled by the consensus of opinion within the scientific community: by the inter-personal knowledge of the members of that community.

This thesis in its first three chapters provides an interpretation and criticism of Polanyi's concept of personal knowledge, and its judgment by the members of the scientific community. In the fourth chapter we consider how far Polanyi's concept of the scientific community can be considered a reasonable interpretation of the scientific community when compared with some of the work of historians and sociologists of science. We then use his concept of personal knowledge and especially the concept of inter-personal knowledge as a tool to examine other intellectual communities, in particular schools of history and the judicial community, and a non-intellectual community; 'the community of moral agents'.

Finally we expand the analysis to include the community of politicians and the political community as a whole.

Polanyi hoped as early as 1951 that the many strands of his philosophy would be developed into a coherent theory which could justify a free society, and has since that date continually returned to the task without completing it. This thesis is in fact a suggestion as to how it could be completed. It brings together an analysis made of the judicial community in the *Logic of Liberty* and of the study of history made in *The Study of Man* and adds to them, as well an analysis of a free society made in these and other works, and in particular in *Personal Knowledge*. The thesis alters the emphasis of Polanyi's work, for it stresses to a greater degree the notion of communal or inter-personal knowledge, where he puts great emphasis on the notion of personal knowledge.
§
Notes Introduction

2. Ibid., p. 4;
3. Ibid.
4. Ibid.
5. M. Polanyi, *The Logic of Liberty*, London, 1951, p. VI-
Michael Polanyi in his book *Personal Knowledge* produces a model of the scientific community. It is a community bound together by a common faith, and by the joint task of its members. Their task is to attempt to gain contact with an external reality, and to reveal to each other the understanding they gain about this reality. The community is then made up of people with the same belief and the same intention: all members of the community believe in the existence of an external reality, and all intend to apprehend and reveal aspects of it.

The members of this community are pure scientists who have gained their own contact with reality. Polanyi calls these scientists mature scientists. They are scientists who are able to make an original contribution to science. He argues that there is no formal method by which they can begin to understand reality. A budding scientist has to pass through a master/apprenticeship relationship before he can become an independent scientist. He needs to submit himself to the authority of a master, and learn from him the approach to reality. Polanyi states:

"You follow your master because you trust his manner of doing things even when you cannot analyse and account in detail for its effectiveness. By watching the master and emulating his efforts in the presence of his example, the apprentice unconsciously picks up the rules of the art, including those which are not explicitly known to the master himself. These hidden rules can be assimilated only by a person who surrenders himself to that extent uncritically to the imitation of another."  

And to stress the difficulty of analysing this learning process he states:

"The large amount of time spent by students of chemistry, biology and medicine in their practical courses shows how greatly these sciences rely on the transmission of skills and connoisseurship from master to apprentice. It offers an impressive demonstration of the extent to which the art of knowing has remained unspecifiable at the very heart of science."
Eventually a scientist breaks away from his master, and adds techniques and approaches of his own. He establishes his own contact with reality.

Polanyi argues that after the scientist has assimilated the skills of his master and added his own he approaches reality by a combination of faith and commitment to his own beliefs. The understanding gained by this method is far from being purely objective knowledge but is a special type of knowledge which Polanyi calls personal knowledge, and this knowledge is not a subjective knowledge as it claims universal validity. He in fact criticises the lay concept of science as a formulation of objective knowledge. He states:

"It goes without saying that no one - scientists included - looks at the universe this way...Nor should this surprise us. For as human beings, we must inevitably see the universe from a centre lying within ourselves and speak about it in terms of human language shaped by the exigencies of human intercourse. Any attempt rigorously to eliminate our human perspective from our picture of the world must lead to absurdity." 7

Pure objectivity, so he claims, is ruled out by the very process of knowing.

Yet cannot it be argued that this may be so but should not we attempt to be as objective as possible and cultivate a detached approach to our research? We should try and withdraw our emotions. Polanyi argues that firstly this is impossible to do, and secondly that it is the very emotional attachment which leads to discovery so it would be unwise to attempt the impossible. Emotions create the will to undertake the necessary research, and growing intellectual excitement tells the scientist when the discovery is at hand. He states:

"Intellectual passions do not merely affirm the existence of harmonies which foreshadows an indeterminate range of future discoveries, but can also evoke intimations of specific discoveries and sustain their persistent pursuit through years of labour." 8

Emotional attachment then is a necessary condition for continuing a successful research programme. It is only by an emotional immersion in his research that a scientist can begin and continue to gain knowledge.
The question arises as to why we need this emotional attachment to achieve discovery. We certainly need an interest in a problem before we attempt to solve it but is it necessary to have an intellectual passion? For instance, is it necessary to exhibit intellectual passion in analysing the results of our experiments? The reason why Polanyi thinks it is necessary is closely bound up with his concept of reality. He seems to have two concepts reality: a concept of a reality which exists far beyond our senses, and a concept of a reality which merges into the reality available to our senses. The book *Personal Knowledge* in fact marks a watershed in the development of Polanyi's philosophy. It marks the culmination of a rather two simple theory of knowledge and the beginning of a more sophisticated epistemology and ontology, although the later developments continue to retain a number of the important characteristics of the old.

Polanyi throughout his work is trying to develop a philosophy of belief. Like Hume he rejects the validity of induction. There is no adequate reason to suppose that what has gone before will repeat itself in situations not examined. Our belief, for instance, that A causes B is not based on a necessary connection between A and B but is based on our experience that in fact A does follow B, on the continuous association of B with A. Hume states that our knowledge of causal relations, "arises entirely from the uniformity observable in the operations of nature, where similar objects are constantly conjoined together, and the mind is determined by custom to infer the one from the appearance of the other." Our 'knowledge' is therefore based on a belief not a necessary connection. If the validity of induction is therefore challenged in this way two alternative approaches seem to open up: we can attempt to formulate a semi-deductive method or develop a philosophy of belief. Karl Popper takes the former course, and argues that science is not inductive but hypothetico-deductive.
As Hume states:

"It is a method of conjectures and refutations which takes advantage of the logical truism, that any universal proposition may be conclusively falsified by one counter example, whereas an 'unrestricted' or 'open' universal proposition could not be conclusively verified by the occurrence of any finite number of exemplifications." 11

Michael Polanyi takes the other alternative and accepts that we have to rely on our beliefs. He attempts to develop a philosophy of belief where the stage of knowledge one reaches depends on a commitment to one's belief. Aententional attachment to one's research is therefore needed as it brings about and sustains one's beliefs.

Yet the philosophy of belief which Polanyi develops is very different to that sketched out by Hume. Hume recognises that it is an alternative to deduction but limits the possibility of developing such a philosophy by the disallowing the possibility of generalising beliefs. He states, "We can never be induced to believe any matter of fact, except where its cause, or its effect is present", 12 and that causation is the only relation which "can be traced beyond our senses and informs us of existences and objects which we do not see or feel". H.H. Price suggests that Hume would probably also accept an addition to this: "constant conjunctions in which the conjuncta are co-existent, not successive - regularities of concomitance, as opposed to regularities of sequence." 13 Beliefs arising from constant conjunctions then are reasonable, as they come directly from our experience but if they do not arise from this sort of experience they must be unreasonable. A reasonable person is one who learns from experience, and behaves according to it. The reasonableness in this case is an inductive reasonableness and not a deductive one.

Price also points out that Hume's doctrine of belief is a very narrow one and does not allow generalisation, for example, water expands when it freezes. He states:
"It will not apply to general beliefs about matters of fact but only beliefs about particular matters of fact. This is because he insists that an idea which we believe must be related to or associated with a present impression."

In the case of Polanyi, Polanyi relies on the necessity for reasonable beliefs based on experience but widens out the notion of experience to include that of the supersensible world. His method of gaining knowledge can give us an experience of the supersensible world, and we certainly can and do make generalisations from this experience. For Hume this first move would be outrageous and the second not possible. Indeed the whole exercise would be beyond the bounds of human capacity.

That in Polanyi's work the pure scientist is trying to move beyond the bounds of our senses can be especially seen in his earlier writings. In the 1946 edition of Science, Faith, and Society Polanyi states:

"It may appear perhaps more appropriate to regard discoveries in natural sciences as guided not so much by the potentiality of a scientific proposition as by an aspect of nature seeking realisation in our minds. The process of scientific intuition is then brought into analogy with extra-sensory perception as established by Rhine."

This quotation, and according to the introduction of the 1964 edition he has now given up the idea of something analogous to a telepathic communication with nature, has the rather startling implication that not only does external reality actively participate in bringing a scientist to a discovery, but that it has mind like attributes. Although moving away from this particular speculation Polanyi continues to believe that external reality can itself be active in leading a scientist to a discovery.

It would appear then that Polanyi is definitely rejecting the Kantian concept of science as an attempt to gain an increasing knowledge of appearances that can be given to us through our senses. He is arguing that the reality the scientist is trying to apprehend is beyond appearances.
He is attempting an apprehension of the essence of things: things in themselves. Kant argued in the *Critique of Pure Reason* that in order to gain a knowledge of things in themselves we would need to have intellectual intuitions but this we cannot do as our intuitive capacity is confined to our senses. Science does not and cannot give us a knowledge of things in themselves but only an increasing knowledge of appearances. Polanyi is taking up a Platonistic position. He is putting forward a two world theory, and arguing that we can and do have a knowledge of supra-sensibilia. He states:

"To say that the discovery of objective truth in science consists in the apprehension of a rationality which commands our respect and arouses our contemplative admiration; that such discovery, while using the experience of our senses as clues, transcends this experience by embracing the vision of a reality beyond the impression of our senses, a vision which speaks for itself in guiding us to an even deeper understanding of reality - such an account of scientific procedure would be generally shrugged aside as out dated Platonism: a piece of mystery-mongering unworthy of an enlightened age. Yet it is precisely on this conception of objectivity that I wish to insist in."  

There are three contentions in this statement: that there is an external reality, that in order to discover this reality we must transcend the experience of our senses, and that the vision we gain somehow vitalises itself and leads us to an even greater understanding of reality. Polanyi argues that in order to cross the gap between the experience of our senses and super sensible reality we must make a logical jump: "the plunge by which we reach at another shore of reality."  

Although his view seems to be Platonistic it is not strictly a platonic solution. He is not arguing that we cannot gain a knowledge of appearances because they are in a state of flux but can gain a knowledge of supra sensibilia by intellectual intuitions. He is arguing that we can gain a knowledge of appearances but that this is only a knowledge of the lowest level of reality, and in no sense should we imagine that we are gaining
a knowledge of ultimate reality. He states:

"What is the most tangible has the least meaning and it is
perverse to identify the tangible with the real. For to regard
a meaningless sub-stratum as the ultimate reality of all things,
must lead to the conclusion that all things are meaningless. And
we can avoid this conclusion only if we acknowledge instead that
deepest reality is possessed by higher things that are least
tangible." 19

Polanyi believes then that our knowledge of appearances signifies only
the lowest level of reality, and that we can progress to a higher level
of reality - to super sensible reality - only by the use of our intuitive
faculties. The method of stimulating our intuitive faculties, or tacit
co-efficient of knowledge, is by "relying on our awareness of them
(particulars) for attending to the coherent entity to which they
contribute." 20 He continues:

"We may say for example that we know the clues of perception by
dwelling in them, when we attend to that which they jointly indicate;
and that we see the parts of the whole forming a whole by dwelling
in the parts. We arrive thus at the conception of indwelling." 21

This then is Polanyi's epistemology. We 'indwell', or we immerse
ourselves, 22 in the clues of perception to gain a knowledge of the whole.
This does not mean that we concentrate on the particulars and that this
gives us a knowledge of the whole, as this would have the opposite result.
It would prevent a concept of the whole from being formed. What Polanyi
claims we do is assimilate the particulars. We make them part of ourselves
(a similar notion to Plato's idea of digesting abstract concepts 23) and
then we are able to achieve a knowledge of a whole. He states:

"Our body is the ultimate instrument of all our external knowledge,
whether intellectual or practical. In all our waking moments we are
relying on our awareness of contacts of our body with things
outside for attending to these things. Our own body is the only
thing in the world which we normally never experience as an object,
but we experience always in terms of the world to which we are attending from our body. It is by making this intelligent use of our body that we feel it to be our body, and not a thing out side.

I have described how we learn to feel the end of a tool or a probe hitting things out side. We may regard this as the transformation of the tool or probe into a sentient extension of our body, as Samuel Butler has said. But our awareness of our body for attending to things outside it suggests a wider generalization of the feeling we have of our body. Whenever we use certain things for attending from them to other things, in the way in which we always use our body, these things change their appearance. They appear to us in terms of entities to which we are attending from them, just as we feel our own body in terms of the things out side to which we are attending from our body. In this sense we can say that when we make a thing function as the proximal terms of tacit knowledge, we incorporate it into our body - or extend our body to include it - so that we dwell in it."

He argues that by indwelling in things or by interiorising things we come not to view them as particulars but to use them to attend to the comprehensive entity which they form.

This is a peculiar notion as quite obviously we cannot literally assimilate particulars, and make them part of ourselves. Polanyi apparently means we assimilate concepts of the particulars, and after a time an abstract pattern emerges which we can consider to be the whole. This is an idea taken from Gestalt psychology, and, as in the numerous examples given by the Gestalt psychologists, concentration on the particulars makes the pattern, or the whole, disappear. Only when we remove our gaze from the particulars and transfer it to a search for the whole does the pattern emerge again. He gives the example of a painting to demonstrate how by concentrating on the particulars we can destroy the whole:

"I shall demonstrate this by recalling Sir Kenneth Clark's experiment, made about twelve years ago, in viewing Las Meninas by Velazquez. Owing to its rough structure, Las Meninas must be viewed from a distance. Clark wanted to observe how, by
approaching it from a distance to a closer point, one sees the painting dissolving into fragments. He hoped to see a gradual transition - but there was none. He wrote:

'I would start from as far away as I could, when the illusion was complete, and come gradually nearer, until suddenly, what had been a hand, and a ribbon, and a piece of velvet dissolved into a fricasse of beautiful brushstrokes.' (Six Great Pictures', The Sunday Times, London, June 2, 1957)

Now if we are asked two questions: 1) which view showed a canvas plus brushstrokes? and 2) which view showed the painting? the answer would be that the view at close quarters showed a canvas plus brushstrokes and the view from a distance showed the painting. We can see only one or the other of these two sights, never the two at the same time. And this is indeed what Gombrich (E.H. Gombrich in Art and Illusion) concludes from this kind of observation. He says that we see either a canvas and blobs or a painting, never the two at the same time.

But the situation changes if we admit two different ways of seeing an object. Gestalt psychology has long since observed that to look at the several parts of a whole can destroy our view of the whole. It would be nonsense to say that when, by moving away some distance, we come to see a collection of parts as one whole, we no longer see the parts. What happens is that we see the parts now in a new way, namely, as parts of a whole. To introduce my own terms, let me say to look at the parts separately is to see them focally, while to see them together forming a whole is to be aware of them subsidiarily."

It would seem that it is possible to discover a pattern in different ways. It is possible after concentration on an apparently chaotic agglomeration of particulars for a pattern to spontaneously emerge. It is also possible that one can be led to perceive a pattern by having the elements of a pattern and its connections indicated to one. On the other hand it is sometimes possible consciously to create patterns in apparent chaos (gestalten-bildung). Transferred to the realm of abstract thought we could argue in the following way. We perceive certain facts, primary aboriginal facts. We build up concepts about them, and our concepts about these primary facts are given the value of factual existence.
For us these mental concepts are our way of understanding the primary facts and for us they virtually are the facts. Already the process of organising chaos has begun, we have built up mental images or concepts of the primary facts and in doing so we have isolated them from other things. We then may spontaneously perceive the relationship between them so that a pattern is created which ties the concepts together into a comprehensive concept of them all or in part. Spontaneity in this case may be related to our previous experience, as a pattern may emerge which is analogous to other patterns we have perceived. It emerges suddenly and comprehensively and could be compared to a vision. On the other hand we could be taught a comprehensive pattern, although it could be argued that a pattern taught in this way may not be perceived in exactly the way the teacher expects.

To teach a pattern a teacher would have to specify certain concepts about primary facts so that the pupil could understand how the pattern could be made to emerge, and then gradually indicate the connecting links between the different facts in order to create the comprehensive picture. Owing to the difficulty of knowing whether or not the concepts have been assimilated in the way the teacher intends we can never be sure that the comprehensive pattern which the pupil forms will be the same as that of the teacher (a reason for the urge to mathematise in all sciences). The teaching method Polanyi advocates is that the pupil, as far as possible, should be led to create his own pattern, i.e., he should make the discovery himself. Eventually when the pupil can perceive patterns without the help of the teacher he becomes an independent scientist.

The spontaneous emergence of a pattern comes about so Polanyi claims, by trying to think about the facts, our concepts of the facts, as a whole until suddenly we perceive the connecting links, and see them, or rather understand them as a whole. This seems to be his main concept of discovery but as we have seen there is a third possibility, and this is a conscious attempt to create a pattern on the seemingly disconnected facts.
If a pattern does not spontaneously appear we can create one by attempting to fit different patterns on the disconnected facts or if this fails by imposing a pattern on the facts. An experienced scientist will have different experimental, mathematical, and statistical techniques which sometimes will bring about the emergence of a pattern in apparently disconnected facts. The pattern may arise not as a result of indwelling, or a growing feeling of certainty but purely as a result of the application of certain techniques.\(^3\) It is possible to argue that this would be accidental discovery but this would not strictly be so as a scientist would be consciously using a number of techniques in the hope that some will bear fruit. The seeming contradiction of this possibility with the notion of indwelling can be weakened somewhat by an argument which states that a scientist will systematically go through a series of techniques with a fairly strong belief that some of them will bear fruit. He will use his experience in judging which are the more likely to bring about the hoped for results. Generally I think that this method is not really the method of indwelling, although it may be a superficial level of it, as in this case it would be unlikely that a scientist would develop an absolute commitment to his discovery.

Polanyi's notion of assimilating particulars has another function within his system. The act of assimilation as well as being an aid, or rather a necessary step in the perception of gestalten, enables one to forget about the particulars and automatically use the knowledge of the whole which one has gained. For instance, we cannot learn to drive a car merely by reading an instruction book. We must practice each operation until it becomes second nature to us. Until we no longer have to think about what we have to do but do it. Only then can we drive a car. However, even in this case if we begin to think about each operation, that is, our attention moves from the whole to the particulars, we very soon find ourselves crashing the gears, and our driving technique sadly declines.
This may demonstrate how we progress from the lowest level of reality to the next level but how can we, when we have a knowledge of the whole, progress to a still higher level of reality? A clue to the answer has already been given for we build on the knowledge that we have gained: a knowledge that has become completely accepted by us so that we no longer try and break it down or analyse it. In Polanyi's language we can say that we heighten our indwelling. He produces the example of speech to demonstrate in an allegorical way the progress from one level to another:

"The first level, lowest of all is the production of the voice; the second, the utterance of words; the third, the joining of words to sentences; the fourth, the working of the sentences into a style; the fifth and highest, the composition of the texts. The principle of each level operates under the control of the higher level."  

Polanyi points out that each level is subject to a dual control: by the laws that apply to its elements in themselves, and by the laws that control the comprehensive entity formed by them. And this multiple control is made possible by the fact "that the principle governing the isolated particulars of a lowest level leave indeterminate their boundary conditions for the control by a higher principle".  

He indicates that, for instance, voice production leaves largely open the combination of sounds to words, which is controlled by a vocabulary; whereas a vocabulary leaves largely open the combination of words to form sentences, which is controlled by grammar; and the sequence continues. He states:

"Consequently, the operations of a higher level cannot be accounted for by the laws governing its particulars forming the next lower level, for example, you cannot derive a vocabulary from phonetics, and you cannot derive a grammar from a vocabulary."  

This analogy is intended to show us how we progress from one level of reality to another, and why we are able to progress in such a way. In particular, when used as an explanation of the scientific task it is indicative of Polanyi's belief that a scientist is not solely concerned
with the study of appearances, the physics and chemistry of entities, but that he is attempting to understand ultimate reality. Even so he points out that this task can never be completely accomplished as reality is inexhaustible. 34

Polanyi then is attempting to provide a theory of discovery which bridges the gap between the sensible world and the super sensible world, the phenomenal and the noumenal world, by the process of indwelling, and the gradual movement of a knower to a knowledge of a mainly hidden reality, rather than by "the plunge by which we gain a foothold on another shore of reality" the expression he used in the work Personal Knowledge. It is an attempt to overcome the problem of the two worlds coming apart, the world of sensible things and the world beyond sense, a problem which is so apparent to Polanyi in his Science, Faith and Society. 35 His insistence that we move gradually from our knowledge of appearances to a knowledge of a super sensible reality by the process of indwelling seems to be a direct attempt to overcome this problem. He sees the distinction and the problem, and attempts to provide a solution. Certainly there remains the gap to be crossed in the movement from the one world to the other, but the necessity for the plunge no longer exists.

In his earlier works, up to the writing of Personal Knowledge Polanyi postulated a Spinozan type of intuition: an intuition with an intrinsic quality of rightness about it. He needed this concept of intuition because of his concept of reality as being very much 'out there' but as he no longer takes up this position he can now postulate the intuition of supra sensibilia as a workaday skill: the tacit co-efficient of knowledge. 36

Thomas A. Langford in his paper Michael Polanyi and the Task of Theology 37 considered Polanyi's explanation of discovery as a visionary method of arriving at the truth. To a certain extent he was justified in considering:
the process in such a way because of Polanyi's phraseology, and the relationship of his work to Gestalt psychology. Yet Polanyi is not really advocating a visionary method in the way that we could consider Swedenborg's method to be visionary. His vision is not a vision in the sense that it is a picture of reality, for he uses the term in a metaphorical sense. It is a vision in the sense that it is a very strong feeling of the nearness of reality. We first have a feeling that we are near to apprehending reality, and as we continue to indwell in our research the feeling becomes stronger until we are absolutely certain that we are apprehending an aspect of reality, and as Polanyi states this certainty "deserves to be called a vision". It does seem possible to explain the method of indwelling in a more simple way, and also to challenge the notion that it allows us to pass beyond the phenomenal world to the noumenal world as we heighten our indwelling and move beyond our knowledge of physical and chemical appearances. Is not the scientist in the same way as the philosopher merely providing an interpretation of the available facts, an interpretation which he believes to be the best, or the truth as Polanyi would say? Such an interpretation does, and is intended to provide a certain stability in seemingly disconnected facts, and to supply clues for further interpretation. By arranging the facts into a theoretical framework the scientist or philosopher is able to give an explanation about them. This task of arranging chaos into a pattern is by no means an easy process but an arduous one. It is an attempt to make sense of the facts by understanding them as a whole, and in such a way that all important elements amongst the facts are accounted for. Yet by its very nature the interpretation that is given cannot be on the same level as the facts themselves, as at the lower level there is only chaos. One has to delve into the facts and try and find some connecting links or principles which can lead the way to some interpretation, and stabilise the seemingly chaotic phenomena.
However by providing an interpretation one is moving away from the immediate facts, and this process continues as a good interpretation of theory should lead to further developments. Gradually as new interpretations are built up on previous ones, one moves even further away from the original facts until it may be difficult to envisage the connecting links between them and this later interpretation. Yet nevertheless links there must be for, although at each stage one lifts the conclusion of an earlier stage on to a new level and in the process changes it into something that seems different, the new interpretation does remain an expansion of the earlier stage, and is necessarily related to it even if it is not immediately apparent that it is so.

As an explanation of the development of science Polanyi's psychology of discovery and epistemology faces numerous difficulties. How, for instance, can the individual scientist adjudicate between different interpretations? As Langford asks, "How can one adjudicate between rival visions or how a rival vision may be related to another must be answered." The answer for Polanyi is relatively easy to produce for rival visions do not occur to the scientist. If we examine Polanyi's concept of indwelling and his argument about the different levels of reality it is possible to provide an explanation as to why this is so.

I do so in my paper "Michael Polanyi and the Problem of Personal Knowledge":

"The visionary is at first immersed in his research and gains an inkling of reality: the first vision. He continues his immersion until a second insight arises: the second vision. This process is continued until an absolute vision of reality is reached. However, at each stage there is only one vision: one insight that deserves to be called a vision. It may indeed be the case that a vision on a higher plane of reality may contradict a vision on a lower plane, but this is because the vision on the lower plane only revealed a smaller aspect of reality, and the new vision is a higher synthesis. Only to the outsider can there be a contradiction, for the process of revealing the planes of reality prevents
the appearance of a contradiction to the visionary. He knows why and how he has arrived at his new vision."

In less esoteric language, the scientist moves on from his original interpretation to a higher interpretation. This does not mean that he sees only one possibility for expanding the original interpretation, but that the one interpretation best satisfies the scientist's requirements. He becomes committed to this interpretation as it seems to provide a true interpretation (really the best interpretation possible at that time) and "deserves to be called a vision". He then develops from this interpretation a further interpretation, and so on. Quite naturally no contradiction is apparent to him in the development of his theory, as he has worked it out and knows how one set of ideas lead to another. However, as the process of discovery, or of interpretation, is not necessarily deductive but can arise by association and analogy the train of thought in the development of a fully fledged theory is not necessarily apparent to the observer, although when the train of thought is produced in a paper the scientist will tend to produce it as a deductive development. However, as the process of discovery is not deductive it is possible for rival theories to appear, and the problem arises of choosing between them. The problem is heightened as the theory is really an interpretation of the facts, and the facts as far as they go can support alternative theories. From a descriptive point of view it could be argued that the best theory is the one that explains the largest amount of facts. We could say that the more general a theory is the better it is as long as it remains internally consistent in its generalised form. So long as a descriptive theory is internally consistent we can designate it correct but the better theory is the one that it is able to describe, or provide an explanation of, a greater number of facts. It creates greater stability in the chaos. Even so, the problem is increased further as a theory often has to be used for predictive purposes. The controversy over the testability of theories arises at this point: whether it is possible to verify or falsify a theory or do neither.
If as Polanyi suggests the process of indwelling takes us beyond the phenomenal world into the noumenal world, and the phenomenal world does not exhibit the same characteristics as the noumenal world then quite clearly it is not possible to provide any test of noumenal knowledge from the world available to our senses: the world of appearances. If, however, the phenomenal and the noumenal world exhibit the same characteristics as Newton thought, then theoretically at least it would seem possible to provide some test of our ideas about the noumenal world by our knowledge of the world of appearances. Unfortunately we could never know in the strict sense of the word whether our test was conclusive, at best we could only provide confirmation. Our belief that the phenomenal and noumenal world exhibit the same characteristics has to be of necessity a matter of faith. Polanyi's doctrine is then that we can confirm theories but neither verify or falsify them.

Paul Tillich suggested that ontological knowledge can be tested by the life process. Unfortunately a much quicker confirmation of a theory is needed in science, although in a sense if a theory is to be tested at all it must be tested by the life process. There is also the possibility that a theory although virtually completely wrong continually gives correct predictions, and thereby receives confirmation as to its accuracy. This opens up the possibility of arguing against any predictive theory by stating that although the prediction is correct the reason for its success is other than that stated in the theory. An amusing example of this appears in the Old Testament. Jeremiah predicts that the punishment of Yahweh will be inflicted on his people. The day of Yahweh comes and the punishment takes place but a number of the Jews argue, to Jeremiah's utter anger, that although the prophecy was correct the reason for the punishment was not as Jeremiah claimed. The people were not punished because of their failure to obey Jahweh but because of their failure to pray to the Queen of Heaven.
For Polanyi then our belief in a theory arises because of our indwelling. At each point in our development of a theory we arrive at a point of absolute commitment, and then move on to the next stage. However he does produce certain criteria for judging the worth of a theory. They are its beauty, which includes a notion of simplicity and internal consistency but has wider connotations than this, and its fruitfulness, that is its ability to lead to further development (It "foreshadows an indeterminate range of future discoveries,""). In other words there are certain facets in a theory which our indwelling allows us to appreciate, and which help to give rise to our commitment to a theory. Our commitment or feeling of certainty then acts as a criterion of truth for us. Karl Popper, for instance, would argue at this point that in fact our commitment to a theory or our feeling of certainty could never be a criterion of truth, although it could be the reason why we put the theory forward to the scientific community as an explanation of the facts. He would accept that the beauty of a theory, although he would be reluctant to use the term, and its usefulness (fruitfulness) would provide a reason for developing a commitment but by themselves could not create certainty. This is recognised by Polanyi, and why he would argue that beauty and fruitfulness by themselves could not create certainty. The feeling of certainty can only arise by indwelling, and some of the elements which arise from this indwelling are a recognition of beauty and fruitfulness. Polanyi's argument is really expressing a psychology of discovery and not a logic of certainty in spite of his use of the term truth. He is really saying that the process of indwelling gives rise to a feeling of certainty. The scientist after the process is absolutely committed to his theory and believes in its truth. To use Polanyi's terminology, he has arrived at a position of personal knowledge which is a subjective knowledge which claims universal applicability.
This is really an attempt to develop a philosophy of belief. Theories to which we are absolutely committed can be used by us to develop further theories, and to describe and predict happenings in the actual world. And as for Polanyi there are no external criteria to estimate the truth of a theory we have to reply on our own certain belief (personal knowledge), as there is nothing else to rely on unless we accept the authority of others.

Polanyi then rather than proposing a logic of discovery is providing a psychological analysis of how a scientist makes a discovery by an emotional immersion in his research. Yet the resultant commitment that the scientist has to his discovery cannot be considered as a justification of truth. At best it can provide an explanation as to why the scientist makes a claim that his theory is true. This is why a scientist when presenting a paper does not refer to the strength of his commitment but provides arguments and experimental evidence to support his theory. Some reasons are irrelevant, for instance, to state that one absolutely believes in the validity of one's theory because one has a feeling which one knows indicates its validity may be the case but is not the sort of evidence the scientific community would take into account when judging a theory. They want evidence that can be confirmed. Arguments that can be examined for inconsistencies, and logical jumps, and experimental evidence that can be duplicated.

By postulating a two world theory, something like a Kantian phenomenal and noumenal world, both of which can be understood Polanyi certainly needs intellectual intuitions "to reach the other shore of reality", and an active reality to help him on the way. Yet if we can have intellectual intuitions over and above sense experience the only way we can judge these intuitions is by repeating the intuitions. A notion of consensus of intuitions arises which is difficult because the scientists
other than the discoverer have not gone through the necessary process of indwelling to achieve such intuitions. They in practice can only judge the discovering scientist's intuition by related fields of knowledge which they accept. However, by the time Polanyi has written *Personal Knowledge* he has virtually given up a two world theory. At least they seem so closely tied together that we can progress from one to the other by the process of indwelling and work-a-day skills rather than by Spinozian type intuitions. We can progress smoothly from the world of appearances to the world of things in themselves. But if a knowledge of appearances is necessary before we move on to higher things, and Polanyi states that it is, then how can we be moving towards a study of things in themselves? As I have already pointed out all we are doing is providing a further explanation of appearances, and there is no need for a two world theory. We are in fact building up concepts about the sensible world, and these concepts about the sensible world can not be said to make up another world, and indeed are meaningless unless we do relate them to the sensible world.

If Polanyi recognised this he would not claim that science is concerned with understanding ultimate reality but only that science is looking at appearances in a special way, as Oakeshott would say, under the category of quantity. However, if science is the examination of appearances under the category of quantity then theoretically at least we should be able to test scientific theories. And likewise gestalten would not spontaneously arise out of appearances but we would put them there (gestalten bildung), and neither would it be necessary to claim that a theory draws back a veil and reveals a hidden reality. The theory would propose an explanation of reality from a particular point of view.

Yet even within Polanyi's theory if we need to understand appearances or the "physics and chemistry" of reality before we move on to higher levels
of reality why cannot we provide some test of our higher level of reality by reference to our lower level? If the high level theory does not seem consistent with what we know about the lower level then surely this is good evidence to suggest that it is probably incorrect?
NOTES CHAPTER ONE


2. Polanyi's model purports to describe the essential features of the scientific community. In this sense it can be considered a Weberian model but at the same time he uses it as a prototype for other communities so in this sense it becomes a Platonic ideal for other communities. However the discrepancy between factual evidence about the scientific community and Polanyi's own recognition of this discrepancy suggests that he occasionally uses it as a Platonic idea. He therefore constantly slides between description and prescription in his examination of the scientific community.

3. Polanyi believes that such a relationship actually exists in the scientific community.


5. Ibid., P.55.

6. For Polanyi it is the element of commitment which decides between personal knowledge and subjective knowledge. He states:

   "We may, for example, represent a functional statement from within as:

   \[
   \begin{align*}
   &\text{Personal} \quad \text{confident} \quad \text{accredited} \\
   &\text{passion} \quad \text{utterance} \quad \text{facts} \\
   &\text{and from the outside as:} \\
   &\text{Subjective} \quad \text{declaratory} \quad \text{alleged} \\
   &\text{belief;} \quad \text{sentence} \quad \text{facts.}
   \end{align*}
   \]

   The arrows in the first row indicate the force of commitment and the brackets the coherence of the element involved in the commitment; accordingly, in the second row both of these set of symbols are omitted.

   The fiduciary passions which induce a confident utterance about the facts are personal, because they submit to the facts as universally valid, but when we reflect on this act non-commitally its passion is reduced to subjectivity. At the same time the confident utterance is reduced to a sentence of unspecified modality, and the facts become merely alleged facts. These elements, set out in the second row, are mere fragments of the commitment that we had previously accredited by the symbols in the first row." (Personal Knowledge, p. 303)
Ibid. p.3.

Ibid. p.143.


Although possible alternatives which allows one to proceed in experimentation after the destruction of induction, they represent entirely different approaches. In this sense one could not be a substitute for the other but are alternatives in conflict.


M. Polanyi, Science, Faith and Society, London, 1946, p. 21. Herman Zanstra, the astronomer, also argues that any method should be used to contact reality whether or not it is the use of clairvoyance or telepathy. See The Construction of Reality, New York, 1962. Both Polanyi's and Zanstra's ideas seem to lead to a rather peculiar notion of reality.

In his earlier Dissertation Kant accepted the possibility of intellectual intuitions.

Personal Knowledge, op. cit., pp. 5-6.

Ibid., p. 123.


This idea of indwelling seems similar to Dilthey's concept of understanding literature. The notion that we must re-live the author's writing process and his way of thought. Also there seems to be connections with Freud's notion of love where our libido overflows on to the outer object and tries to make it part of ourselves, and Heidegger's "Stimmung" which provides an emotional link between the investigator and the object of attention.


25. A term used by William James meaning basic facts before we have developed any concept about them.

27. A similar notion to Ockham's abstractive cognitions.

28. M. Oakeshott in his *Experience and Its Modes*, Cambridge, 1933, argues that intuition is a rapid reorganisation of previous experience.


30. An example of this can be seen in F.W. Carter's "An Analysis of the Medieval Serbian Oecumene: A Theoretical Approach", *Gepografiska Annaler*, Vol. 51, 1969. By using the branch of graph analysis known as connectivity analysis Carter hoped to learn something about the capitals of the medieval Serbian rulers. He started out not with a strategic intuition of the results of his enquiry but with the hope that certain mathematical techniques would reveal a pattern and provide new information. And this they did. (Confirmed in conversation).

* Polany uses the term 'strategic intuition' in "The Creative Imagination" a paper delivered to a meeting of the Study Group on Foundations of Cultural Unity, Oxford, August, 1965, as a solution to Plato's problem in the Meno. If we know the solution of a problem there is no problem and if we do not know the solution we do not know what we are looking for and cannot expect to find anything.


32. Ibid.

33. Ibid.

34. Polanyi's concept of an inexhaustible reality is similar to Paul Tillich's Depth of Reason. It also helps to explain the reason why two contradictory theories can be different aspects of one truth. We can never be sure that they are not because of the inexhaustibility of reality.

36. See M. Polanyi, *The Logic of Tacit Inference*, Address to the International Congress for the Philosophy of Science, August, 25th, 1964. This alteration in his concept of intuition allows a vision of reality, i.e. the truth to become an idea about reality or a hypothesis, but Polanyi does not explicitly make this move. After all one cannot expect visions of the truth every working day but one can expect to have an idea about reality fairly frequently.


42. If the idea of perceiving gestalten is correct, and that different patterns can be perceived by different knowers then this is another reason why we cannot verify or falsify a theory. A pattern is produced by the observer and his perception of it cannot be denied by others. Its subjectiveness prevents refutation. Its truth will be asserted by the observer in spite of its rejection by others.

Polanyi is arguing that absolute verification and falsification are not possible. Yet attempts to verify or falsify a theory can lead to confirmation. For instance, in the case of verification if a theory's predictions are shown to be correct this confirms it. In the case of falsification if a theory is able to stand up to an attempt to refute it it is confirmed.


44. For instance, Ptolemaic theory which could predict eclipses and the conjunction of planets.

45. Polanyi actually states there are three requisites for research in pure science: a knowledge of the field of plausibility, value criteria, and the value of the act of discovery in terms of originality. The first one arises from the scientist's experience, and provides a background for the use of other criteria. He states:
"The excitement of the scientist making a discovery is an intellectual passion, telling that something is intellectually precious and more particularly, that it is precious to science......

The function which I attribute here to scientific passion is that of distinguishing between demonstrable facts which are of scientific interest and those which are not......I want to show that this appreciation depends ultimately on a sense of intellectual beauty......

In fact, without a scale of interest and plausibility based on a vision of reality, nothing can be discovered that is of value to science; and only our grasp of scientific beauty, responding to the evidence of our senses can evoke this vision."  (Personal Knowledge, op. cit. pp. 134-5)

If a scientist's knowledge of the field of plausibility affirms a fact then it is adjudged by the value criteria, which are accuracy (certainty), systematic relevance, which is related to profundity and scientific beauty, and the intrinsic interest of the subject matter. The first two of these value criteria are scientific, the third non-scientific but a deficiency in one can be compensated for by excellence in another. Originality includes the notion of introducing a new way of looking at things but also that the new way of looking should be dynamic and lead to further development.

A fruitful theory is a theory that receives confirmation and leads to the development of other theories but as indicated its fruitfulness is not necessarily indicative of its truth. However it has to be admitted that it is a theory's ability to cope with tests that leads to its development. The tests can be either attempts at verification or falsification, although it would appear that attempts at refutation combined with the theory being produced in a negative existential form would lead to a more rapid development of science, as a theory that was refuted could be discarded and a new theory looked for. In the case of verification a theory which was not verified could lead to a further unfruitful search for verifying evidence.

An unfruitful theory can be either true or false but in any case it is likely to be trivial."

44. Philosophical in the sense that it is a systematic attempt to map the way through a psychology of discovery, and analyse the effects the process of discovery has on the scientific community.

Polanyi has argued that it is the individual scientist who decides on the truth of a discovery, but quite obviously his own commitment to a theory cannot automatically guarantee its acceptance. Before a theory can be considered to be part of scientific knowledge it has to be accepted by the scientific community as a whole. And as Polanyi has argued it is not possible to verify or falsify a theory only one alternative remains. A theory must be judged by the consensus of opinion within the community.

The scientists will not have the discovering scientist's faith in the theory but will use the same criteria for judging a theory: its systematic relevance, internal consistency, and beauty. They will also consider another major factor, and that is how far the discovery fits into the general framework of science. Polanyi states:

"Very little inherent certainty will suffice to secure the highest scientific value to an alleged fact, if only it fits in with a great scientific generalisation, while the most stubborn facts will be set aside if there is no place for them in the established framework of science."\(^1\)

A consensus of opinion about a theory can be formed, so Polanyi argues, because in the 'Republic of Science' there can be found the overlapping of labours. A scientist may know one per cent of all scientific knowledge, another whose work is near to his overlaps and a joint authority is exercised in the overlapping area. This phenomenon is continued throughout the scientific community until a network of knowledge is formed and controlled by the combined authority of the members of the community. The individual scientist submits himself to the authority of his peers but at the same time will exercise a certain amount of authority himself. He will have some authority where his sector overlaps with others, and complete authority in his own sector where it does not.
The 'Republic' then is controlled by an organic, general authoritative structure, and its authority is shared by all mature scientists. Polanyi states, "There are differences in rank between scientists, but these are of secondary importance: everyone's position is sovereign." It is organic because all the scientists are bound together by a mutual faith, and each attempts to be instrumental in serving the community by producing discoveries. The community has of necessity two conflicting elements. It is authoritative, and thereby creates a certain amount of conformity, but at the same time needs to allow for individual initiative. Initiatives do not and cannot come from the community as a whole but from the mature scientist with his personal contact with reality.

Polanyi argues that the aggregate of individual initiatives on the part of the mature scientists creates a spontaneous order which is able to exist because of the coherence of science. He states:

"In so far as there exists a steady underlying purpose in each step of scientific discovery and each step can be competently judged as to its conformity to this purpose and its success in approaching it, these steps can be made to add up spontaneously to the most efficient pursuit of science." 

In other words science can now be spontaneously co-ordinated as our knowledge has been systematized. This allows us to relate each new discovery to the system and, in fact, to be a discovery it must be related to the system. The system of knowledge is automatically used by the mature scientists to judge a theory. However, the possibility of acquiring and then using this knowledge originally arises because of the faith the scientist has in the existence of external reality. It is this faith, and the confirmation of the faith by the gaining of knowledge, which ultimately gives coherence to science.
Polanyi claims that this process of spontaneous co-ordination although not perfect does produce the best possible results. He argues:

"There is no warrant to assume that any particular instance of free mutual adjustment will produce a desirable result. Even the most wonderful successes achieved by such adjustment will not be free of manifest shortcomings nor represent more than a relative optimum. But it suggests, nevertheless, that such tasks as a system of free adjustment may achieve, cannot be effectively performed by any other technique of co-ordination."

The medium for this co-ordination is the instant publicity which is given to the results of research so that an immediate judgement is made possible. The spontaneous co-ordination of knowledge allows a consensus of opinion to arise. A consensus which rises to the level of being the General Will of the scientific community. Polanyi is quite explicit in his use of the term General Will:

"The Republic of Science realises the ideal of Rousseau, of a community in which each is an equal partner in the General Will. But this identification makes the General Will appear in a new light. It is seen to differ from any other will by the fact that it cannot alter its own purpose. It is shared by the whole community because each member of it shares a joint task."

The own purpose of the General Will is, of course, the continued revelation of reality, which is the reason for the very existence of the community. He argues that independent research activities guided and controlled by scientific opinion is the only possible way of organising pure science. The scientific community exhibits a polycentric system of mutual co-ordination and cannot be controlled by a central authority. The polycentric system is the only possible way to organise science because of the nature of science itself. Science is the attempt to understand an external reality which has an independent existence to ourselves. The reality can only be understood by our intuitive faculties and in order for them to come into play the scientist needs to be passionately
committed to the traditions and values of science and to the search for reality. When a discovery is made he needs to be absolutely committed to its contents before he submits it to the community for their judgment. Scientific research then is an intensely personal act and this necessitates the scientist choosing his own research. Nothing must come between the scientist and his personal contact with external reality or discovery will be minimal. He achieves his discovery by the process of indwelling and any interference can only weaken or destroy the passionate commitment which grows through indwelling. Only when the scientist has finally decided on the truth of his discovery does he submit it to the community for acceptance into the general body of scientific knowledge. He "asserts his independence by obeying the dictates of his own conscience." but his obedience to his conscience means that he rigorously checks his discovery before submitting it.

Polanyi actually attempts to describe the conscience in action:

"We can clearly distinguish in all these spheres of discovery the two different personal elements which enter into every scientific judgment and make it possible for the scientist to judge in his own case. Intuitive impulses keep arising in him stimulated by some of the evidence but conflicting with other parts of it. One half of his mind keeps putting forward new claims, the other half keeps opposing them. Both these parties are blind, as either of them left to itself would lead to extravagant wishful conclusions; while rigorous fulfilment of any set of critical rules would completely paralyse discovery. The conflict can be resolved only through a judicial decision by a third party standing above the contestants. The third party in the scientist's mind which transcends both his creative impulses and his critical caution, is his scientific conscience. We recognise the note struck by conscience in the tone of personal responsibility in which the scientist declares his ultimate claims. This indicates the presence of a moral element in the foundation of science."
The rigorously tested theory will only be put before the community if the discovering scientist is convinced of its truth. His conscience will not allow him to put a discovery before the community if he thinks it is something less than the truth. The members of the community will then judge the discovery by their own knowledge, and for Polanyi they can judge it by nothing else as he has denied the effective use of impersonal tests. We can say that they will judge it by the visions of reality that have already been received and accepted by the community as knowledge. As each scientist is himself bound by his conscience to reveal the truth the judging scientists are bound to hold strictly to that which has already been revealed as the truth. The new theory will have to fit in some way into theories that have already been accepted. It is not an arbitrary way of judging a new theory but a reasonable method of judging the truth of a theory by comparing it with knowledge one already possesses.

The decision as to the worth of a theory can only be a conservative judgment and cannot be too radical or speculative. If it is then this would be an indication that the community was losing its faith in that which had already been revealed, or that the conscience of its members was weakening. Change then can and does come about but it is continuous with the past, and arises because of the intimations of future discoveries which are contained in the present accepted theories.

Three confusing strands of thought can be seen in Polanyi's explanation of the community so far: he appears to be stating that the individual scientist can perceive the truth; that the community can produce a General Will, which presumably as it is a Rousseauian General Will is also the truth; and that the real truth is that which is in accordance with external reality. The blanket term 'the truth' seems unable to cope with
the distinctions which evidently exists between the three different truths. This can be explained because Polanyi often uses the term in a psychological sense, for instance, the individual scientist produces a theory which he believes is true. This is merely saying that the truth for the scientist is that which he believes is the truth. He cannot accept something which he does not believe to be the truth as the truth, therefore the truth for him must be that which he believes. Again the truth for the scientific community is that which it believes is true. The members judge a theory by that which they believe to be true, for obviously they will not judge it by that which they consider to be false. The main criterion in doing this is whether or not the new theory fits into their jointly held beliefs. However the real truth, we can say the philosophical truth, is that which is in accordance with reality but this we cannot know. Polanyi is taking up this position when he states, "Though every person may believe something different to be true, there is only one truth."

The use of the term truth in these different senses can create an unfortunate situation. Consider for instance the following. If a scientist declares the truth and is correct, and yet his theory is rejected, how can the community of scientists declare that it is not true and also be correct? This is further complicated by Polanyi's claim that if a scientist has gone through the process of indwelling he is almost bound to be correct. He argues that it can only be incorrect if a wrong interpretative framework has been used but in this case it would be subjective knowledge and not personal knowledge. He states:

"If an active mental process, aiming at universality, can turn out to have been altogether mistaken, can we still say that in it the subject has risen to the level of the personal by reaching out to reality?"
He answers this question by stating that it cannot be personal knowledge as a wrong interpretative framework has been used. Yet this is a matter of belief. We cannot actually know whether a wrong interpretative framework has been used so alternative beliefs have to be in conflict. As he states, "They are contesting each other's mental existence." The conflict can never be conclusively resolved. The life process may seem to demonstrate that one interpretative framework is probably more true that another but as time goes by the situation may reverse itself. This is really an extension of the situation one gets when a theory is rejected. If a theory is rejected and that theory is correct then a right interpretative framework has been used, and if the theory is incorrect then not only the theory but the interpretative framework must be wrong, as the process of indwelling, if a right interpretative framework has been used, will reveal a correct aspect of reality. This analysis demonstrates that Polanyi is using the term truth in a special sense meaning a belief that it is true. However, if this is so then surely this allows us to challenge his concept of the General Will, or at least make it useless for practical purposes? In his paper the Potential Theory of Absorption he points out that a true theory after many years of rejection can eventually be accepted as part of a scientific knowledge because the progress of science allows it to be fitted into the system of science. But this would mean that the General Will as at first expressed by the community was incorrect but if it is really a Rousseauian General Will it cannot be incorrect. This contradiction can be resolved by arguing that the General Will is always correct and if it is not correct then it cannot be the General Will but something else. A similar move to the manoeuvre in the case of personal knowledge: if personal knowledge does not reveal the truth then it cannot be personal knowledge but subjective knowledge. In both
cases of the General Will and personal knowledge their truth is a matter of belief but Polanyi is claiming if we are to call something the General Will or personal knowledge then it must be in accordance with reality. Unfortunately we cannot know whether it is so there is no way of telling beyond all doubt whether a community consensus is the General Will or whether a discovery, in spite of the scientist's absolute commitment to it, is the real truth. This is why, so Polanyi argues, throughout the process of discovery we have to rely on faith, "We must now recognise belief once more as the source of all knowledge."  

Two important insights into Polanyi's philosophy can be gleaned from the foregoing analysis: the process of discovery for the individual scientist can lead to error, and the decision of the community can be in error.

The process of discovery can lead to error, although it is unlikely that the discovering scientist will perceive his error. He can have used the wrong interpretative framework but he will be incapable of realising this because of the very process of making a discovery. He will perhaps be too heavily committed to his discovery, and in any case there can be no absolutely certain demonstration that he is wrong. No one can say for certain that he is wrong, although they can believe that he is wrong. In other words an individual is fallible even though he may be incapable of recognising his fallibility. That occasionally he is capable of recognising his fallibility is accepted by Polanyi as he gives examples of where interpretative frameworks have been weakened and eventually rejected, for instance, the cases of Arthur Koestler's Marxist framework and Karen Horney's Freudian framework. However, within Polanyi's own system there is room to allow the recognition of error, for as the individual scientist is bound by his conscience to reveal the truth then presumably he would be prepared to consider all conflicting evidence,
and if he could not explain it away within his system, or if he could not see how his system may in the future cope with the problem, then he would perhaps become a little less committed to his system. The problem here is that as every attack is met the result of the attack "is to strengthen the fundamental convictions against which it was raised." Combined with this tendency is the tendency just to ignore conflicting evidence. However, as he has given examples of the breakdown of interpretative frameworks it does appear that occasionally the pile up of contradictory evidence can begin to weaken one's faith in an interpretative framework. He has also suggested that there are degrees of commitment for they can be strengthened by successfully meeting attacks, and presumably therefore weakened by failure to meet attacks. As the support of theories and interpretative frameworks is a matter of belief and not knowledge they are open to the force of persuasion which can destroy the belief. Polanyi's use of his own interpretative framework can be seen in his criticism of Karl Popper's doctrines:

"Sir Karl Popper has pointed out that, though not strictly verifiable, scientific generalisations can be strictly refuted. But the application of this principle cannot be strictly prescribed. It is true that a simple piece of contradictory evidence refutes a generalisation, but experience can present us only with 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 no more be strictly established than can its verification. Verification, and falsification are both formally indeterminate procedures."  

In fact within Popper's interpretative framework a generalisation put in a negative form can be falsified by one instance but Polanyi's real argument is that science does not lie within Popper's interpretative framework. It is not that sort of logical system. From a terminological point of view Popper would state that an attempt at refutation that fails confirms a theory, and Polanyi should say that a criticism which is met
strengthens one's belief that the theory one holds is true and one that is not met weakens it (For Popper a refutation attempt that succeeded would finish off the theory). However, as we are dealing with the psychology of commitment, in the case of Polanyi, whether or not a successful criticism could in fact weaken or destroy the whole theory, or rather our commitment to the theory, would depend on the strength of our present convictions, and whether or not we saw the possibility of in the future coping with the criticism. Whether we had a strategic intuition about expansions of the theory which would cope with the criticism. The criticism would have no effect on the real truth of the theory but only on our commitment to it (this of course applies equally well to Popper's and Polanyi's argument). It seems then that Polanyi does admit the possibility that we may be able to recognise our errors, although the possibility may be a little remote.

The decision of the community can also be wrong, in other words the General Will is not always expressed. This is recognised in the quotation I have already given, when he states that "there is no warrant to assume.....that any particular instance of free mutual adjustment between individuals will produce a desirable result....even the most wonderful successes achieved by such adjustment will not be free of manifest shortcomings." This was written before Polanyi's formulation of the General Will thesis but there is no reason to believe that he has changed his mind. Likewise when he considers the rejection of his own theory of adsorption and other theories he again suggests that the General Will is wrong or not expressed. Perhaps the strongest argument to indicate Polanyi's acceptance of the fallibility of the General Will can be derived from his treatment of individual discoveries. As it appears that he accepts the notion that an individual scientist can be wrong in spite of the fact that he has passed through the process of indwelling then quite clearly he could not
then claim that the aggregate of beliefs of the individual scientists is infallible. Particularly as he is at pains to argue that it is the individual scientist and not the community as a whole who is in contact with reality and brings about progress.

If we reject the infallible connotations that go along with the Rousseauian notion of the General Will, then what does Polanyi mean by the use of the term? I think he is really attempting to explain that in a community working in a particular sphere of knowledge there grows up a rapport between its members. It is likely that they will hold similar beliefs, for instance, not only beliefs about the existence of external reality and the coherence of science but beliefs about what can be accepted in science and what can not. This makes it much easier for a consensus to arise between members of the community but the consensus is much more than a mere consensus, it is a strong feeling of the rightness of their decision. It is a powerful feeling because it has arisen from the interlocking system of knowledge which is exhibited in the community, a system to which all members are committed. In a sense we could say it is the spontaneous development of a decision about a theory without much argument for the simple reason that there is a general agreement.

Polanyi wants to lift the process of community decision making beyond the idea expressed in the term consensus but by doing so leaves himself open to the sort of criticisms that can be made against Rousseau's concept of the General Will. The element of infallibility which arises in Polanyi's use of the term, as in the case of personal knowledge, is not absolute certainty (philosophical certainty) but psychological certainty. However, as every scientist knows that rejected theories have as time progresses been accepted and because it is likely that one will not be so committed to a decision about another person's theory as one about one's own, the degree of certainty will not be as great as in the case of personal knowledge.
We have seen that a new theory will be judged by the spontaneous development of a consensus about its worth. The consensus that develops relies heavily on the present knowledge of the community so a new theory will greatly increase the likelihood of its acceptance if it fits into present knowledge. Even so it is possible for the community to make a wrong decision, although the mistake should be recognised as science develops. Likewise a discovering scientist may be in error, and it is possible that he may eventually be able to recognise his error. As there are not impersonal tests for estimating absolutely accurately the truth of a theory we can do nothing else but rely on our own beliefs. Beliefs which are reasonable because they have withstood the gamut of our own and other people's criticisms.

In developing his notion of consensus it occasionally seems that Polanyi is arguing for a coherence theory of truth, for instance, that a theory must be consistent with other accepted theories before it is judged to be true. If this is the case then it suggests the possibility that a theory can be tested, as if it is consistent with other theories it is true and if it is not it is false. Likewise when he develops his notion of the individual discoverer's decision to accept a theory, for example, because of its beauty. This again seems to be suggesting that we have a criterion to judge whether a theory is true or false, as if it is beautiful it is true and if it is not it is false. In other words by introducing theories of truth he is denying his own argument that a theory cannot be tested. Yet although he seems to be introducing such theories, he, in fact, is not doing so, and the reason why he appears to be introducing such theories is his misuse of the word 'truth'. The truth for the individual scientist is something he believes to be true, and one of the reasons he believes a particular theory to be true is because of its beauty. Beauty then is not a criterion of truth but a reason for a particular belief.
Likewise with the decision of the scientific community, consistency is not a criterion of truth but a reason why a theory is acceptable. The same argument applies to his notion of commitment. Commitment is not a criterion of truth but a reason why a scientist makes a claim that his theory is true. Polanyi, I think, is not making the elementary error which it appears he is. He is not really stating that something is true because we believe that it is, for belief cannot justify knowledge, but he is stating that the strength of our belief is a reason why we claim knowledge: that as we can never be sure that we have knowledge then we have to rely on our beliefs. He then argues that as we have to rely on our beliefs we are more likely to get closer to the truth if we have lived over a period of time with our beliefs, have examined them looking perhaps for consistency and beauty, and have criticised them, and by doing this seeming to have confirmed them. We have therefore built up a commitment to them, and the beliefs we then put forward as a theory are more likely to be true than a mere hypothesis put forward on the spur of the moment, although such a commitment built up after this process cannot be a guarantee of the truth. The same reasoning applies to the scientific community. It only possesses a body of beliefs but a body of beliefs that have been confirmed, and because of this confirmation the community has become committed to them. When a new theory is put forward the community will judge it by these beliefs, and in doing so it will be more likely to be correct in its decision than if it made a judgment based on beliefs it did not accept or on a reliance on the discovering scientist's own claim of the validity of a theory. Polanyi, of course, has a theory of truth and this is that a theory is true if it is in accordance with reality. Unfortunately, as he well realises, this theory is of no practical use because of his argument that we cannot know reality but only have beliefs about it.
The conclusion Polanyi comes to is not really unorthodox. We cannot be certain that we have arrived at the truth so we therefore have to rely on our beliefs. It is better to rely on beliefs that we have examined and criticised, and therefore have confidence in than beliefs we have not examined and criticised and thereby confirmed. However, this seemingly pessimistic doctrine is rejuvenated and made far more optimistic by his belief in an active reality which presumably can be activated by indwelling, and will therefore lead the scientist on towards the truth (Popper is less fortunate as he cannot be sure his approximations to reality are improving), and by a theory of evolution which postulates a connecting link between the intuitions of the scientist and reality (see Chapter 5).

A more general criticism can be made of Polanyi's argument as he seems to be continually moving between prescription and description with no clear indication when he is describing or prescribing. For instance, the master/apprenticeship relationship where the novice attaches himself to a master. In Polanyi's youth and early career it does seem that this was how scientists were educated but this relationship is not so clear today when the number of scientists has rapidly expanded. Polanyi therefore slides into prescription. The relationship should exist, and where it does not we are not going to get good scientists. In considering the structure of the scientific community he postulates a spontaneously co-ordinating network (In the Logic of Liberty he even develops a mechanical model to show how it would work). This seems to be intended as an actual description but when it does not work like that it should work like that. His claim that scientists are concerned with the study of ultimate reality: sometimes he argues that they are, sometimes that they are without realising it, and when they claim they are not, well they should be. Polanyi also claims that scientists are searching for the truth but in case they are not he develops a deontology to indicate that
they ought to be. In the examination of the scientific community this
does not cause great difficulties because on the whole one of the concerns
of a scientist is probably to reveal what he believes to be true but it
does when he develops a more general social philosophy, as it leads to
the claim that in politics are generally concerned with searching
for the truth.
E. Barker in his Principles of Social and Political Theory, Oxford, 1951, makes a distinction between an organic society and a non-organic society. An organic society, in analogy with a physical organism, must be one where the parts are instrumental in serving the whole, or the function of an individual in a state is to serve that state. A non-organic society would be one where the function of the state was to serve the individuals. Polanyi's community of scientists has both elements. The function of the scientist is to further the common task, and he is bound together with other scientists by a mutual faith and task. The purpose of the scientific community, as far as in its power, is to provide the conditions necessary for discovery and thereby serve the individual. As both the individual scientist and the community have a mutual purpose the two different elements in the structure of the 'Republic of Science' will create only minimal conflict.


New Introduction to Chicago edition of Science, Faith and Society, op. cit., p. 16.

This is one of Polanyi's major arguments for freedom in science but see chapter 5 for others.

Personal Knowledge, op. cit., p. 308.


It is interesting to note that Polanyi uses the same threefold division of the mind as Freud, for instance, intuitions can be compared with the action of the Id, the critical capacity with the operation of the reality principle, the ego, and the conscience with the super-ego.
10. See "The Republic of Science", Minerva, Autumn, 1962 where he compares the progress of science to Burke's vision of the British nation.


12. Ibid., p. 318.

13. Ibid., p. 319.


15. Personal Knowledge, op. cit., p. 266.


17. Ibid., p. 289.

18. Creative Imagination, op. cit.

19. In Popper's concept a scientific statement to be a scientific statement must be produced in a negative form as in such a form it can be refuted by one contrary instance. For instance, the statement there are no Yetis by the production of one instance of the existence of a Yeti. If on the other hand we stated that Yetis exist the statement could never be refuted, although our failure to produce one would cast doubts on our claim.

The Republic of Science

The community of scientists is a special type of community whose membership is restricted to scientists who meet certain requirements. A scientist to be accepted as a member must have gone through an apprenticeship and made his own contact with reality. His contact with reality will be recognised by other scientists when his work shows originality by providing additions to accepted knowledge. The evidence a scientist can produce as a demonstration of his originality is restricted to evidence which expands in some way this knowledge. We can say that membership of the community is gained when a scientist by his own originality shows that he has become a master in his own particular field of research, and when this mastery is recognised by all the other members of the community. A scientist then to be a scientist must be recognised by other members of the community and the fact that he may or may not be recognised by the lay public is irrelevant.

It is a special type of community because all its members participate in the joint task of apprehending and revealing external reality, and each shares in a joint faith for all believe in the existence of this reality, and that it is possible to apprehend and reveal it.

The individual scientist's method of discovery by the process of indwelling and the community's method of checking discoveries has an interesting effect on the structure of the republic. It means that freedom has to be allowed for individual scientist to conduct his research but at the same time an authority based on traditional beliefs is needed to exercise control over the results of the research. Polanyi in fact claims that there are two sorts of freedom which can be found in the Republic of Science. An English utilitarian form of liberty where the individual is free from external restraints but limits are put on his freedom by
other people's right to freedom, and a Lutheran type of freedom where
the individual can gain freedom from personal ends by submission to
impersonal obligations. The former achieves its ends through individual
initiative, and the latter by moving outside individual selfishness by
devotion to universal ideals. These two types of freedom are apparently
contradictory as the former has selfish and perhaps uninspiring overtones,
while the latter, although perhaps inspiring, restricts the individual
in any attempt to pursue his own salvation in his own way. Polanyi
claims that these two types of freedom are interwoven in the Republic of
Science, and that their contradiction is resolved. In the Foundation of
Academic Freedom he argues that the two liberties taken together help
to create the most efficient method for organising science, and that this
fact explains why it is possible to resolve their apparent conflict.
However, this does not seem to be the case for the fact that they are
instrumental in leading to the most efficient form of organisation cannot
provide an explanation why they are resolved, although it may provide an
explanation as to why the two freedoms are accepted. The fact that they
are resolved within the Republic seems to be because the two freedoms
do not exist within the Republic. It seems that there is only one
concept of freedom operating in the Republic of Science. The freedom
which Polanyi calls Lutheran freedom. It is true that Polanyi, when
arguing outside the context of the scientific community, is arguing for
the existence of these two freedoms in the hope perhaps that utilitarian
freedom will lead to Lutheran freedom but in the case of the Republic of
Science it is extremely questionable whether these two freedoms exist.
In the context of the Republic of Science the scientist in order to be
a member of the community must share the faith and task of the other
scientists. As a member of the Republic he has not the freedom to
do nothing. He is not really free in the sense of being free from
external pressures, and there is a considerable amount of pressure on him
to undertake research and produce his results. If in fact he does not do this then very soon he would cease to be a member of the Republic of Science, as he would be showing no originality, and would cease to be a master in his own particular area of science. Certainly he is free in the sense that there is no pressure on him from outside the scientific community or from inside it to follow a particular line of research. He can choose his own research but this is really covered by the Lutheran freedom which Polanyi writes about.

In the Foundation of Academic Freedom he argues that Luther is the prototype person who gains freedom from personal ends by submission to impersonal obligations. In the same way the scientist submits himself to the ideals of science: ideals which declare that a scientist must struggle to achieve the truth, and present it to his colleagues for recognition. Luther declares that every Christian should be a priest, and like the Lutheran priest Polanyi's scientist is bound by his own conscience without reliance on anyone else to declare that which his conscience indicates. Yet nevertheless this conscience remains bound by the traditions of the community or, as we have seen, the scientist cannot remain a member of the community. The values which his conscience exhibit cannot move too far from the values of the scientific community as a whole. They must lie within a certain range or be rejected. (Every new theory in one sense can be considered as a new value either to be accepted or rejected by the community.) By following the traditions and standards of science the scientist is acting on individual initiative and submitting to the obligations of the community but this does not constitute two freedoms. By acting on his own initiative in choosing his research and eventually producing his discovery he is accepting the obligations of the community. The exercise of individual initiative is not a separate freedom but part of the submission to impersonal obligations,
as only by acting on individual initiative can one fulfill one's obligations to apprehend and reveal reality. An obligation which it is necessary to accept if one is to remain a member of the community.

A utilitarian freedom may exist before one enters the scientific community, as it could be argued one is free to choose one's career but as soon as one enters the community one accepts the obligations that go with the Lutheran type of freedom. Under a similar argument to Polanyi's argument for freedom in science we could say that before a true submission to the ideals of science could take place one must be free in the sense of being free from external restraints and pressures to make the choice.

In other words utilitarian freedom provides the base for Lutheran freedom. However, as true in this sense seems to refer to the strength of the conviction behind the submission it would appear that the argument is that freedom from external restraint is necessary in a choice before a strong conviction about the choice or commitment to the choice can arise, and this does not seem to be the case. A person who has had no choice in choosing his religion can be still absolutely convinced of its truth and as fanatical in following its doctrines as one who has had a choice.

The authoritative element in the community is necessary in order to control the excesses in the speculation of individual scientists. This is really an additional check on his speculation as his conscience has already provided a check. In this sense the conscience has acted on behalf of the community by deciding on the truth of a new theory. The further check is necessary as the emotional element in the development of personal knowledge needs a further control than that provided by conscience, because a conscience by its very nature cannot be an impersonal conscience and provide a certain check on excesses. This is interesting for it is a recognition that in spite of Polanyi's terminology the individual scientist is not infallible, and therefore needs to work in a community with a
no need for a community at all but just for a group of people with an
interest in science who would expand science always along the right
path. 5

Another reason for the importance of authority within the scientific
community is the nature of science itself. Science is a systematic
body of knowledge which it is the task of the scientists to expand, and
before they can expand it each scientist must accept and understand a large
part of the system. In order to be in a position to provide an expansion
a scientist must become an adept at scientific techniques, and accepted
knowledge. He has to accept the authority of large areas of science as
interpreted by his colleagues in the scientific community. They derive
their own authority from the fact that they are recognised as master
interpreters of science, and acting together with the discovering scientist
form the decision procedure of the community.

We can say then that before a scientist can attempt to expand the
systematic ideas of science he must accept a large part of accepted
scientific belief. He must, for instance, believe in the regularity of
reality, and also because science is a developing system of ideas, a system
which is continually being built on, he must accept a large part of it
as given. He cannot re-create all science again from first principles.
This then is the authority of accepted belief.

He must also in order to be a scientist, and we have stated that to be
a scientist he must be recognised as such by other scientists, be a member
of the community of scientists and accept the results of their decision
procedure, which in this case is the spontaneous development of an opinion
about a new theory. This is important for it means that to be a scientist
at all he must accept the decision procedure of the community. If he does
not he runs the danger of being forced out of the community not only
because to be a member of a community really entails an acceptance of the
community's decision procedure but because he courts with the danger of
being considered a crank or a charlatan, that is no longer a scientist.
As individual scientists are not infallible, and there is no infallible test of the truth or falsehood of their theories it is necessary for their beliefs to develop under the authority of the scientific community. Yet as we have seen progress in science can only come through individual initiative, so the authoritative element, and the necessity for individual initiative can create situations of dispute between an individual scientist and the community, and occasionally these disputes can develop into conflict situations.

A scientist expands science by developing intimations of future discoveries into full discoveries. In other words already within the systematic ideas of science there is the potentiality for future discovery. A scientist when producing a new theory has to show how it fits into these systematic ideas. His theory will be rejected if he cannot show how it fits in, and this would arise if he could not show to the satisfaction of his colleagues the development of the intimations, or that the intimations do really exist. This could be because his theory in any case will never fit into the systematic ideas of science (this we cannot know), or that at the present time it does not appear to fit in. The dispute arises because of the discovering scientist's commitment to his theory. He is certain that it does fit in and that he has produced enough evidence to indicate that it does. A rejection generally will lead to an attempt to provide more evidence, that is more links with the accepted systematic ideas of science. It can lead to a conflict situation where the discovering scientist will act as if his theory has been accepted, for instance, he will teach his theory, and continue to develop it. He will be in effect setting up a rival community to that of the community of scientists. This conflict situation is more liable to arise if a scientist concentrates so much on his one particular theory and does not produce others to confirm his membership of the community. His failure to produce other
theories means that in any case he is gradually slipping out of the community as he loses his authority. The question arises as to why this situation of conflict does not arise more often.

It does not arise more often because a rejected theory is concerned with only a small area of science, and the discovering scientist is still prepared to accept *one* main body of science. In the case of Velikovsky, for instance, his theories challenged the whole structure of science so he had to set up a rival community. But also because membership of the community is necessary in order to be recognised as a scientist. At the same time the scientist recognises that the authoritative control of science is necessary for the development of science, and that his colleagues are as much obliged to declare that which they consider to be the truth as he is.

This interlocking system of obligations is for Polanyi a major factor in ensuring the community's continued existence, for it is the system of obligations which holds the community together. As a scientist who has arrived at a discovery has passed through a passionate immersion in his research, and has been committed to each stage of his discovery, he arrives at the position of being absolutely committed to the theory he puts before the community for their acceptance. His commitment forces him to declare truthfully that which he has found out about external reality. The norm of morality is to declare a correct knowledge of reality (right reason). That is a feeling which he is certain is indicating a correct knowledge of reality, but as we have seen it is possible that he has made a mistake. He may have used an incorrect interpretative framework and this he cannot know. Nevertheless he is bound to declare that his theory is valid. His conscience, which is bound to the truth, obliges him to declare that which he believes is true even if it is an erroneous conscience.
This view of morality which Polanyi expresses is, and has to be an extreme personal conception of the moral law. It has to be because it is not possible to estimate from the outside the morality of an individual scientist. His morality depends on whether or not he has revealed truthfully the knowledge he has gained about external reality, and this we cannot know. The obligation in this instance is not to his vision of reality or his theory but to reality itself. He would be breaking this obligation to reality if he lied about the vision he had received or if he put it before the community before he had confirmed to the best of his ability that it was the truth. The obligation of the individual scientist then is to reality and it is this obligation which forces him to declare the truth as he sees it.

Two other obligations exist which are subsidiary to the primary obligation to reality: an obligation to himself as a scientist, and an obligation to other scientists. To himself as he would be denying his own task if he did other than declare what he thought was true to the community, and to the other members of the community who, because of the process of discovery, rely very much on his honesty. Taken together these two subsidiary obligations can be considered as an obligation to work in the community, and accept its decisions. They are subsidiary to the primary obligation as they are derived from it. An individual enters the scientific community and thereby accepts an obligation to reality, if he later acts against this obligation he is contradicting his original agreement and, in a sense, acting irrationally. The task he has chosen is to apprehend and reveal reality, if he does not do this he is denying his original choice and thereby giving up his career as a scientist. His obligation to himself as a scientist then obliges him to declare that which he believes to be true. His obligation to reality also leads to his obligation to other scientists, and thence the community itself for the structure of the community is necessary for reality to be revealed. It is the medium of
revelation, and provides a check on new theories which attempt to become part of the revelation. Theories have to be accepted by the community to become part of revealed reality, science, so the scientist's obligation to reality obliges him to accept the community's existence and authority. Without the scientist's obligation to the community, science could not exist as a systematic body of ideas controlled by the joint authority of mature scientists.
1. **Foundations of Academic Freedom** op. cit.

2. A similar notion to the Harvard school of social theorists.

3. As a new theory is derived from reality it has value in itself. But without accepting such a notion of reality we can say that a theory has the value of factual existence. In other words for the _me_ being we give a theory the value of factual existence. For a further treatment of this see chapter 6.

4. J.S. Mill in *On Liberty*, Everyman Edition, p. 99, writes of freedom to discuss allowing "a vivid conception and a living belief". There is no evidence that this is so, in certain instances it may in others it may not. It depends very much on the personality of the person in question. The same conclusion applies to Polanyi's scientist. Whether or not he will develop a commitment to a choice he did not make will depend on his personality.

5. Polanyi can correctly call his body of scientists a community or a 'Republic' as they have a common decision procedure. If they had not they would merely be a group of people who call themselves scientists. However if we accept the notion that scientists are fallible but that there is an impersonal test of validity what then? Strictly speaking we cannot really call them a community and indeed there would be no need for the existence of a community. In fact there cannot be impersonal tests as such for such a test will have to be made by a fallible person or persons, and they will decide whether or not they consider the test is conclusive. As the test is developed and used by fallible human beings then we cannot be certain that the test they produce is infallible. We have to rely on their estimation of the tests effectiveness in testing the validity of a theory. As they can either disagree or agree on this a decision procedure is necessary to come to a conclusion, even if it is no more than a waiting for the emergence of a compromise.


8. Hobbes uses a similar argument in the *Leviathan*. As one has rationally worked out the reasons why one should enter society and have done so it would be irrational to rebel against the ruler, a contradiction.

9. Also an obligation to himself because of Polanyi's notion of active centres in the evolutionary process. See chapter 5.
Polanyi has argued that it is the task of the scientist to try and understand a reality beyond our senses. As this is so, and it is impossible to provide criteria that will give certainty to this understanding, the scientific community has to rely on the emergence of a consensus in order to judge the validity of a theory. This notion of a consensus basing its decision on present knowledge is a reasonable method for judging a theory’s validity, as one always attempts to check a new piece of information against information one already possesses. One tries to fit the new information into the framework of knowledge which one already has, and if it does not fit into it one is naturally sceptical about its validity.

Yet Polanyi does not entirely rely on the notion of consensus to maintain the credibility of the community. He provides three connected theories in order to complement the notion of consensus. They are a theory about the commitment of the scientist, a theory of obligations, and a theory about the unity of the community.

Within his epistemology he introduces a notion of commitment to one’s beliefs, and to the truth. Knowledge he claims does to a large extent arise from this commitment, and this therefore means that the lay image of discovery arising through the pure objectivity of the scientist who exhibits cold impersonal detachment is incorrect. The scientist exhibits a heuristic passion and it is only by an emotional attachment to his research, when science becomes virtually the scientist’s life, that he can achieve knowledge. This emotional immersion in research and the resultant commitment to each stage of discovery means that the scientist becomes so attached to his theory that he is bound to declare truthfully what he has discovered.

This leads us to Polanyi’s theory of obligations. The scientist is obliged to declare truthfully what he has discovered. His conscience, and actually his task, force him to do this. Polanyi goes so far as to claim that
this feeling of certainty, or vision as he sometimes calls it, is certain
to reveal a correct aspect of reality if the correct interpretative
framework has been used. Even if the scientist has not used the correct
interpretative framework he is bound to declare what his conscience
dictates. We have seen that scientific morality for Polanyi depends
on whether or not the scientist has revealed what his conscience dictates,
and that his obligation to do this is threefold: to himself, to other
scientist (to the community), and to reality itself, and that the first
two obligations are derived from the third.

This recognition of an obligation to reality leads us to Polanyi’s third
complementary theory. The scientific community is a community which
is bound together by faith, and the mutual task of apprehending and
revealing reality. It seems that the model Polanyi produces could be
applied equally well to a theological community. For instance both
Polanyi’s scientist and the theologian are concerned with the task of
apprehending and revealing a reality beyond our senses, and like Polanyi’s
scientist the theologian is emotionally bound up with his work.¹

Polanyi’s ethics also seem very similar to the ethics of a Lutheran who
is bound by his conscience, and more strictly similar to the ethics of
William of Ockham who argued that we can never know whether or not we have
perceived God’s will but that we must follow that which we believe is
his will. As there is no definite means of knowing whether we have
arrived at the truth we must follow that which we believe to be the truth.

This is really the only answer to the problem of knowledge when we move
to the world beyond our senses, and is precisely why a philosopher such
as Karl Popper,² for instance, would argue that in this case we could not
call it knowledge but only opinion, and it is therefore urgently necessary
that we have some method of confirmation.
Of course the kind of knowledge that Ockham and Polanyi refer to is a subjective knowledge, even though we make a universal claim for it (We claim that it is objective). And being subjective or personal it certainly leaves the field open to schisms both in science and theology. Ockham in his orthodox mood would counter the tendency by arguing that we should rely on or authority or specifically on the revealed scriptures which the Universal Church had accepted. For historical reasons Ockham was bound to put great stress on authority. Polanyi makes the same move and states that personal knowledge is checked by the scientific community with their present knowledge, really inter-personal knowledge (Personal knowledge which has been accepted as objective or universal knowledge) and therefore the decision they make is justifiable, although providing no certainty. Yet his main stress is on the originality and personal knowledge of the individual scientist because it is through him that science has to develop. We have seen that within this explanation there is room for a considerable amount of dispute between the individual and the scientific community. Generally this is controlled by the community's recognition that originality is necessary for progress, by the community being bound together by a mutual faith, and by the discovering scientist's own recognition that his colleagues also have an obligation to the truth (reality), and that the test of acceptance is the only way to continue the development of a unified science. In other words he will accept the decision but continue to hold that his theory is correct, and work within the community while trying to find additional evidence that will confirm his theory.

We have seen that the method of consensus is a reasonable method for judging a theory's validity when there are no impersonal testing criteria which can give certainty. The evidence a scientist produces in support of his theory has also to be reasonable but what is accepted as reasonable evidence also depends on the community's estimate of what is reasonable.
The consensus of opinion as to what is reasonable can change. For instance, the evidence in favour of extra-sensory perception is copious but is not considered reasonable enough. The combined weakness of theory and weakness of evidence prevents extra-sensory perception from being classed as part of scientific knowledge. In the case of psycho-analytic theory we have a powerful theory which almost succeeds in achieving a place for psycho-analysis in scientific theory. It fails because the supporting evidence is not reasonable enough. E.S.P. then is well away from being scientifically acceptable but psycho-analysis is a doctrine in a community on the borders of established science. However, it is possible that the consensus as to what is reasonable will change and a theory become acceptable because the supporting evidence becomes acceptable. The evidence, for instance, of Galileo's telescope was suspect but eventually became acceptable. It may be that this idea that the reasonableness of evidence in science depends on the consensus as to what is reasonable has to be laboured. In the case of what is reasonable evidence in law the argument that it depends on present day opinions as to what is reasonable is more easily seen. For instance much of the evidence accepted as reasonable evidence at witchcraft trials would now be considered unreasonable, finger prints once considered unacceptable as evidence are now powerful evidence. To say then that a consensus is a reasonable method of testing a theory's validity, and that such and such evidence is reasonable depends on what we believe is reasonable and on what we believe other people will accept as reasonable. Yet there are certain procedures which would be considered reasonable and certain criteria by which we may judge reasonableness. For instance, to what extent is a theory internally consistent? Does an argument receive support from the factual evidence or does it seem to contradict it? If it contradicts it then this is a good reason
for supposing that it is incorrect. Is a generalisation derived from an acceptable number of instances? For instance, it would be unreasonable to say all swans are white after seeing one swan but not so unreasonable to say all swans are white after seeing a hundred swans, and even less unreasonable to say that most swans are white after seeing a hundred swans. It would be reasonable to say that I have seen only a hundred swans so I cannot really say all swans are white. But would it be reasonable to say that I have only seen 8 million swans and all are white but nevertheless I cannot really say all swans are white? It would probably be unreasonable but correct and the caution very wise. Yet a scientist who repeated the same experiment 8 million times and always got the same result but nevertheless felt that he should continue doing the experiment in case one day he got a different result would not be considered unreasonable but mad. It would also be reasonable to base one's decision on one's previous experience no matter how small if one was with a group where no one but oneself had any experience. It would be reasonable for the scientific community to base its decision on a new theory according to its previous experience in the field of the theory, as well as the factual evidence and the argument actually produced by the discovering scientist. The scientific community besides the individual scientist is the only group that can make a decision. But why does it have to make a decision, for cannot it just be said that unfortunately the knowledge held by the community is not adequate enough to make a judgment for no one is a complete expert in the particular field of the theory? It has to make a decision in order to decide whether the theory should be taught, whether further research should be financed, and because it is the body which scientists accept as their decision making body. The decision can take a number of forms, for instance, an acceptance, an outright rejection, or a suspension of judgment, and in this case funds would probably be made available for more research.
What then can we say about the notion of reasonable evidence in experimentation, when we can make a reasonable decision that is correct, a reasonable decision that is incorrect, a reasonable decision by refusing to make a decision, we can be unreasonable but correct in making our unreasonable decision, we can be unreasonable and incorrect in not making a decision? The analysis firmly brings out Hume's point about the weakness of the inductive method but it also indicates that the reasonableness or unreasonableness of a decision need have no necessary connection with the correctness of a decision. As I have pointed out this is why Popper attempts to develop a hypothetico-deductive method and why Polanyi relies firmly on faith. We can say then that a judgment of a new theory based on the generally held beliefs of the scientific community is a reasonable method, a justifiable method, for making a judgement but even so can be in error.

This then is Polanyi's picture of the community of pure scientists. He has developed theories about the nature and understanding of reality, and as can be expected these theories have largely determined his notions about the structure of the scientific community. Polanyi in fact provides a complete philosophy of science. He produces a theory about reality: an ontology. He explains how the scientist achieves this knowledge by what he calls the process of indwelling of tacit knowledge: and epistemology. He explains how this knowledge can be tested despite the fact that it is beyond appearances. It is tested by the consensus of opinion within the scientific community. However this approach necessitates an addition if it is to provide a reasonable explanation of the scientific community as it is. If it is not possible to verify or falsify a theory by some methodological test the way seems open to charlatans and to people who are prepared to introduce theories which will be acceptable to the consensus merely in order to further their own career. Polanyi is able to protect himself against this conclusion
by introducing an examination of the internal ethics of the scientific community. He provides a theory of obligation: a deontology. He also provides an explanation of how science progresses by the process of individual initiative controlled by authority.

In the real world the scientific community exhibits an internal power structure which seems to challenge the consensus image which Polanyi formulates. However, a philosophical theory is not bound by the facts but is intended to provide an explanation of them. The question is whether the explanation is adequate, and whether it heightens our understanding of the work and structure of the community. Can the explanation maintain its integrity when it is challenged by the actual workings of the scientific community?

In order to answer this question I intend to provide a brief and restricted analysis of the scientific community considering points that are most likely to discredit Polanyi's system, and seeing how the system is able to cope with the challenge.

There would seem to be four main factors which are important in the scientific community's internal power structure: the existence of an establishment; limited financial resources; the method of recognising the validity of new theories; and the natural competition which exists between people with similar skills.

For the purpose of this analysis we define members of the community of pure scientists as independent scientists who have become authorities in their own area of science. We also accept Polanyi's insistence that all members have authority but we disagree with his claim that they have equal authority. We argue that they have unequal authority, and that the structure of the community favours the older and more established scientists.

Within Polanyi's community one would expect the older members of the community to move out from positions of authority as their flair for
original research declines, and as the chores of being administrators effects their position of being masters in particular areas of science. One would expect them to remain venerated but honorary members of the community. This appears to be true of the real older statesmen but it would seem that there is a period of time between their most productive period and their virtual retirement, when they are able to retain their authority because of their control of the institutionalised positions of authority.

In the whole the older scientists have more authority than the younger scientists because, by the very nature of things, they are more likely to be entrenched in positions of authority and power. The fact of becoming established creates a tendency towards the older scientists being in positions of power although the tendency is relative to members of the scientific community and not the outside community. The older scientists are more likely to hold the posts that give control of the purse strings. They often have more time to give to administration as they are no longer attempting to carve out a career. One could even say of some of the older scientists they they have more time to give to administration as their flair for successful research has declined as they have aged. Yet even if we admit that there exists an establishment in the community which will control the institutionalised posts of authority and power within the scientific community, and through them control the purse strings, can we say that in the area of knowledge there is also a tendency towards control by this establishment? I think we can. The older scientists or the establishment will tend to favour, indeed are almost bound to favour, the beliefs and theories which they themselves hold. The consensus of opinion will lie amongst the established older scientists. They are bound to defend the ideas which they themselves believe to be true. They can defend them by four methods:
by their own authority; by control of the purse strings; by control of academic appointments; by control of publications.

The control of the limited funds available for research is probably the establishment's main weapon in protecting and developing the accepted beliefs of science. It is more likely to give major grants to the established scientists because these scientists have already proven their worth. The established scientists are able to bring greater authority to their claim for money, and are often in a position where they can bring extra-scientific pressure to bear on grants committees, for example they may be a personal friend of a member of the committee, they are more likely to be in a position where they can argue their case on a personal basis. The scientific establishment will tend to give to the younger, less established scientists only if they believe that the area of research where they will be undertaking their work will be fruitful. Likewise they will accept his theory as valid only if it fits into accepted theory. This particular fact applies equally well to the established scientist as the not so established but an established scientist is more likely to have a controversial theory accepted because of his greater authority and reputation, and because he will be more adept at scientific politics and better placed to undertake them.

Disputes arise with the attempt of the community to judge the validity of theories. The controversy that rages amongst philosophers of science as to whether or not it is possible to verify or falsify a theory is really a reflection of these disputes, and even an extension of them. The verificationist argument strictly adhered to would really rule out the possibility of science's existence for scientific statements cannot be verified beyond all possible doubt. In practice it has been weakened and developed into a theory of confirmation. Karl Popper in order to avoid the difficulties created by the doctrines of the verificationists but in wishing to retain the possibility of testing theories has
developed his own falsification concept. He finds that a theory of verification even in its weaker form fails to provide an explanation of the progress and development of science, while his method of falsification can. In other words a theory of verification cannot provide an explanation of the real world of science, and a philosophy of science must do this if it is to be a philosophy of science and not pure epistemology. Popper's explanation has become the dominant theoretical explanation of the methodology and progress of science, and certainly he is correct in thinking that his philosophy of science can provide a theoretical explanation of scientific discovery and progress, for the theory as a theory does work, and it would be possible for science to progress in the way he suggests. Nevertheless there is a considerable amount of historical and sociological evidence which suggests that his doctrine of falsification is not able to provide an accurate explanation of the real world of science, i.e. it is too far from the real world of science and at best offers an improved methodology for science. Rather than stating science progresses under the doctrine of falsification it is a suggestion that it ought to progress under this doctrine. Paul Feyerabend, for instance, produces some historical evidence which suggests that science does not develop in the way Popper suggests. He argues that Copernican theory was continually being falsified and yet continued to be accepted and proved very fruitful. He states:

"A more detailed study of historical phenomena.....may create considerable difficulties for the view that the transition from the pre-Copernican cosmology to Galileo consisted in the replacement of a refuted theory by a more general conjecture which explains the refuting instances, makes new predictions, and is corroborated by the observations carried out to test the new predictions.... while pre-Copernican astronomy was in trouble (was confronted by a series of refuting instances, the Copernican theory was in even greater trouble as it was
Feyerabend is considering a situation where the paradigms or consensus breaks down, and its replacement is not absolutely established. The replacement theory manages to stay in the field by its agreement with other new theories which are themselves not established, and by clever use of propaganda. Individually the theories could not continue but as a package they provide a strong persuasive force. Feyerabend states:

"Galileo's first publication of his telescopic findings, the Sidereus Nuncius (1610), insinuates that they prove the Copernican view. In the Dialogues Concerning the Two Chief World Systems the insinuation has become outright assertion. But when we look at the situation a little more closely we find that Galileo is unable to support this assertion by independent evidence concerning the relationship of telescopic vision to the real world. All we are given is a new and strange source of perception which occasionally shows things the way Copernicus says they are and which on other occasions produces puzzling and obviously illusory images. Using late sixteenth century evidence and theories of cognition we would have to say, strictly speaking, that both the Copernican view and the idea that the telescope, taken separately, gives a better account of the real world than the naked eye, are refuted but that these two ideas, while undermined by the evidence, are able to support each other. It is this rather peculiar situation that Galileo exploits, using it to prevent the elimination of either idea."

Even within his own argument Popper has to admit that in certain cases scientific instruments may be too unsophisticated to allow a theory to be falsified. Popper suggests that a theory should be presented in such a form that as our knowledge progresses we can test it by the method of falsification. In the meantime we must evidently estimate it by
accepted opinion until a decision as to its actual worth is eventually made by the hoped for development in instrumental technology. In any case in the Popperian system the only estimate of a theory's worth is its ability to stand up to refutation attempts which can only be made within the framework of present knowledge. Until it is actually refuted its acceptance scientific knowledge will still have to depend on the decision of the community. These sort of criticisms suggest that Popper's doctrines in their strict form are not applicable to the methodology of the real scientific community. They provide suggestions for reforming it by a more strict critical apparatus but no more.

It would seem that Polanyi is correct in arguing that an estimate of a theory's worth is made by a consensus of opinion within the scientific community. This is the finding of T.S. Kuhn, for instance, however Polanyi does not arrive at this conclusion because of an historical examination of science, although it is true that he recognised it as so independently of his philosophy, but because the notion of consensus is contained in his philosophy. It is necessary for a consensus to control our knowledge of supra sensibilia as there are no impersonal outside tests to estimate a theory's worth. It is not possible, for instance, to conclusively test our knowledge of supra sensibilia by our knowledge of appearances. Yet, as we have seen in the development of Copernican theory, it is possible that a consensus cannot arise either because the established paradigms have broken down or because none exist. In any case it would seem that the term consensus is often no more than a euphemism for the result of political interplay and propaganda.

We have argued that there can be found in the scientific community a political structure which creates a certain amount of conflict between the older established scientists, and the younger, less established
scientists. However, far from being disadvantageous to the community
this age conflict allows the community to have more flexibility than
might otherwise be the case. It allows the community to continue to
exist as one body. If we had a community where equal authority existed,
as in Polanyi's model of the scientific community, there would be no
room for age conflict. A younger scientist would be less likely to
accept an adverse decision as regards the acceptance of his discovery.
The likelihood of an extreme reaction against the decision would be
increased, and there would be a much greater tendency for the scientist
who failed to agree with his colleagues to be forced out of the community.
Whereas in a situation where a tendency towards a gerontocracy existed
he would know that the passing of time would be more likely to favour
his theory as the younger scientists, including himself, gained more
authority. He would be likely to continue to work within the community
whereas where no gerontocracy existed he may be forced out of the
community.

As we have seen it also seems to be the case that an accepted theory may
not be accepted as the same thing by the community as a whole. Quite
possibly a theory will have different connotations in different areas
of science, and furthermore an established theory may be altered by
workers in the field (as has happened with Bohr's correspondence
principle). It would appear then in modern science, as in the days
of its early formation, there need not be a consensus of opinion as to
the content of an established theory. Specialisation may have weakened
the authoritative structure of the community as there is no longer an
interlocking network of knowledge and therefore no consensus or at best
less consensus. Much more reliance has to be put on argument and
influence than on the community's real knowledge of a discovering scientist's
speciality. His theory could be no longer judged by accepted belief.
Of course it could be argued that this very fact of the weakness of a
theoretical framework (the breakdown of paradigms) would give increased power to the establishment. The argument being that if a theory is not certain then more power must be given to the established masters of the subject. Yet I doubt if this is the case. A major factor in the power of the established scientists is their position as guardians of established theory by which they judge new theories but if it becomes difficult to produce a consensus as to the content of an established theory their power is weakened, although not destroyed as they still have their own authority and experience in scientific politics.

Warren Hagstrom paints an even more startling picture of the scientific community where professors steal ideas from other departments, where provisionally formulated ideas are quickly expanded because of the pressure of publication from a career point of view, and where the ideas of Ph.D students are scooped by more experienced scientists who are able to work at a much faster rate than the students.

It would seem then that the evidence of the sociologists and historians seriously challenges the work of the philosophers of science. The work of Popper in its strict methodological form does not provide a true picture of the scientific community as it does not take into account the social relationships of its members. Yet in a weaker form as a doctrine of criticism it is really essential for the continuance of science. He effectively shows that scientific knowledge is tentative knowledge and therefore must always be open to criticism, and that the method of criticism can heighten confirmation. His is not in fact a rejection of authority as such but it is a rejection of the authority of the members of the scientific community. It is an acceptance of the authority of confirmed theories, an argument that only theories that can continue to meet criticism should be accepted, although I think it has really failed to demonstrate conclusively the
point at which a theory has failed to meet criticism. The Popperian
doctrine in this weaker form almost appears as essential to the continuance
of the scientific community. It prevents science from developing into
dogma as Aristotelian science did and of more importance at the present
time, when it does appear that the alternative doctrine of consensus
breaks down, it continues to provide or recommend the method of science
as the method of continual criticism. Even so the weakening of the
Popperian theory has its disadvantages, for instance, the notion that
a scientist need not be committed to his theory that he just has to
provide a hypothesis to which he may have no commitment creates great
difficulties when it appears it cannot be demonstrated that a hypothesis
can be conclusively falsified. Within Popper's formal theory there is,
of course, no need to take account of commitment to a hypothesis as
it is possible to conclusively falsify a theory but if, as much historical
and sociological evidence suggests, in the real world it is not possible
to conclusively falsify a theory then the mere hypothesis doctrine becomes
suspect and perhaps even dangerous. 15

Michael Polanyi's theories provide an answer as to why the mere hypothesis
doctrine is of especial danger particularly if we take up the position
that from a practical point of view a theory cannot be falsified.
Polanyi really takes up the position that scientific knowledge is tentative,
although from a philosophical point of view he avoids this by arguing
that the scientist is producing not a hypothesis but knowledge of an
aspect of reality. He can use this phraseology by arguing that reality
is inexhaustible, and that a theory which is no longer fruitful can be
altered to give us a wider picture of reality. It is never falsified
but is replaced by a better theory which expands our knowledge of reality.
What Polanyi is stating is that the scientist has an absolute belief
that he is describing an aspect of reality and that this belief can be
called knowledge. Even though he calls it knowledge he does admit that the real test for a theory is whether or not it does conform to reality and that this we cannot know but only believe. The scientist is really producing not knowledge but what we can call a committed hypothesis. This from a psychological point of view is partly the reason for the power struggle. A struggle between someone who is committed to an idea and someone who criticises it. Under Popper's non-committed hypothesis doctrine no conflict would exist as one would not mind criticism. This appears to be less applicable to the real situation. However the differences between the Polanyi and Popper theory are partly semantic and for practical purposes Polanyi does seem to be saying with Popper that scientific knowledge is tentative. Yet if scientific knowledge is tentative and cannot be tested then how can it be controlled? Polanyi, of course, introduces the notion of consensus. This may have been true for a short time in the history of science but it was certainly not always true and is not necessarily true today. As already stated the term consensus is often used as a euphemism for political interplay. However this does not mean that the scientific community is therefore left in the hands of chaos because Polanyi as we have seen has produced two other doctrines that indicate chaos may not be the only alternative. A doctrine that suggests the scientific community is bound together by faith: the community as analogous to a religious community. And a doctrine which indicates that the community is bound together by interlocking obligations. The faith of the community is that reality does exist and that it is the task of the community to discover and reveal what they themselves believe to be truths about this reality. Each individual scientist has an obligation to apprehend and reveal truths about this reality: to himself as he would otherwise denying his own task and faith, and to his colleagues
who are bound with him in this common task and faith. Likewise he, as his colleagues, has the obligation to judge theories according to his own beliefs. If he did not judge theories according to his strongly held beliefs, and if he produced hypotheses where no commitment was entailed it would be far more difficult and perhaps impossible for the community to proceed with its task.

The difficulty of testing theories or even arriving at a consensus about them means that great reliance has to be put on the scientist’s honesty, so scientific morality comes to the forefront of the existence of the community. Polanyi’s claim that the scientist is covenanted to the service of reality, and obliged to declare the truth as he sees it becomes the paramount factor in the community’s continued existence. And this far from rules out the Popperian doctrine in a weaker form as a continual criticism of all theories, for by keeping up a criticism the scientist is helping to fulfil his obligation to the truth. Likewise Polanyi’s description of the community does not rule out the political element which exists: the attempt to get allies, the use of propaganda, etc., these are expressions of the scientist’s commitment to the truth, and part of his attempt to uphold and establish the hypothesis to which he is committed. The description also allows in the attempts to steal theories, the attempts to merely further one’s career, as without the possibility of lapses obligations cannot exist. Like all theories about ethics a theory about the ethics of the scientific community must allow the possibility of a wrong or a right action. If one is to act morally it must be possible to act immorally.

It would seem then that as a philosophical explanation of the community of pure scientists Polanyi’s theory is adequate. The beauty of it is
that it is able to stand up to a powerful attack on its consensus argument; an attack which seems to demonstrate that a consensus sometimes may not exist. In spite of this demonstration the system is able to hold together because of Polanyi's other doctrines: the doctrine about the mutual faith of the community, and the interlocking obligations that arise from this faith.

Michael Polanyi in criticising the falsification doctrine points out that one falsifying instance cannot in practice falsify a theory as it may only be an apparent falsification which is soon forgotten. However, as Alan Musgrave has pointed out, 16 Popper has long since given up his claim that one instance is enough and argues that a theory is falsified after its continual failure. It does seem that the argument plays into the consensus theorist's hands. The original doctrine was logically correct for if an existential statement is produced in a negative form then it can be falsified by one instance. It can, of course, be argued that the test tubes may have been dirty, that the experimentalist was incompetent, etc. but this does not alter the logic of the argument.

If a compromise is made and it is stated that a theory cannot be falsified by one instance but only after a series of instances you are then forced to state at what point in the series is falsification achieved. The second instance, the third, the two hundredth, the millionth or what? Of course 'achieved' in this case is really the wrong word to use as the word should be 'accepted'. Under such an argument falsification is achieved when the consensus of scientists accepts that it is achieved. Thus the consensus theorists obtain a victory.

The argument has been developed incorrectly. A hypothesis if produced as a negative existential statement can be falsified by one instance, as long as the test tubes are not dirty, etc. 17 It is the case that other people may not believe that the hypothesis is falsified, and one may
have to repeat the experiment until the dunderheads accept that falsification has taken place but in fact it was falsified by one instance. This brings out two points: logically a negative existential statement can be falsified by one instance but nevertheless the falsification still has to be accepted by the scientific community before we can say that the scientific community believes that such and such a hypothesis is falsified. For instance, in the case of Paul Kammerer's midwife toad which developed horns on its hands for holding on to the female in water while mating this seemingly falsified the hypothesis that the environment cannot effect the hereditary stream. He showed the creature to biologists in Cambridge and around the world but nevertheless many still failed to give up the Weismann doctrine that the hereditary stream was inviolable, and this was in spite of Kammerer's reputation as an expert experimentalist who was especially experienced in breeding reptiles and toad like creatures. These scientist were of course correct for Kammerer's experiments were later discredited but the example does demonstrate the danger of accepting one falsification. However, it does not alter the logic of the argument that one instance is enough.

In other words Popper is unable to life science entirely out of the social relationships within the scientific community, as scientists are suspicious creatures and always ready to criticise the critics.

Polanyi argument against the falsification doctrine does not take the form I have just suggested for such an argument accepts the logic of the doctrine and admits that it can be used as a useful method but indicates that it cannot entirely remove science from the communal relations of the scientific community. In this sense the doctrine can only be considered as a proposed methodology and not as a description of how scientists operate. It is intended to be this even though some supporters of the theory believe that it is a description. Polanyi's
existential statements. This is a clever criticism as he makes use of the doctrines descriptive inadequacies when its supporters move over from prescription to description. And also that theories cannot be falsified by empirical refutations as they are on a higher level than the facts. This, as I have suggested, seems to be a hang over from Polanyi's earlier doctrine of an external reality which we could only contact by (Spinozian) intuition. Polanyi's present doctrine allows that theories must at first have been derived from the lowest level of reality, but if this is so then if a higher level theory seems inconsistent with the facts then surely this is good grounds for challenging it? Of course this may be extremely difficult as the high level theory may be so generalised (or vague?) that its connection with the lower levels of reality may be almost impossible to see but if it is not then this would be an indication that it is not a scientific theory that is being proposed. As Lerzek Kolakowski argues:

"Setting up experiments to disprove a given hypothesis is a fundamental feature of scientific morality. Ignoring it is to encourage the all-too-human tendency to facile explanation, rash generalization." 19

Polanyi would seem to be correct in recognising that when absolute certainty is impossible some sort of consensus is necessary to provide a check on excesses. Yet he goes very near to the unacceptable claim that the scientific community accepts prevalent theory dogmatically, that experimental evidence is of little importance in the judgment of a new theory, and that the actions of the scientific community are far from being objective. However, a close examination of his writings shows that he does not entirely take up these positions: accepted theory is important but the discovering scientist and the community will consider critical evidence. The community may be slow and circumspect in giving up a well thought of body of theory but is prepared to do so when there
is a considerable amount of evidence indicating that it should. If it was not prepared to do this there could be no progress in science. Likewise the scientific community does act in an objective fashion. It does not give up a theory when a few experiments seem to disprove it, and it does take account of who the experimenter is and who made the original experiments but it will give up a theory when there is good reason why it should, and it will accept a new theory when there is good reason why it should (a considerable amount of critical and experimental evidence). It is Polanyi's restricted sense and use of the word 'objective' which makes it appear he is claiming that the scientific community is not acting objectively. His analysis of the community suggest that under a normal use of the word the scientific community does act objectively.

Polanyi recognises that men are fallible but his recognition of this fact has a peculiar effect on his theory. It leads him to virtually take up an untenable position: as men are not infallible they cannot design infallible tests to test theories therefore theories cannot be tested. Polanyi's attack is not on the possibility of developing a statement that can be tested, as a statement can be produced in such a form that from a logical point of view it can be tested. His argument is aimed at induction and like Popper he accepts Hume's destruction of induction. But although an infallible test cannot be made nevertheless tests can be provided that will give good reason for using or not using a theory. This in fact seems to be Musgrave's standpoint. A theory developed in the realms of logic cannot be applied exactly in the real world but can be used as a guide. (There is really no reason why he should not accept falsification as a methodology and the fact of consensus for the two are not mutually exclusive.) It is not the case that a theory cannot be tested but only that we cannot provide infallible experimental tests. Likewise with the argument that as pure objectivity
is impossible for man then scientific decisions will not be objective. They can be objective but not purely objective for as Polanyi points out such a concept cannot be applied to man.

   "He the theologian looks at his object with passion, fear and love. This is not the eros of the philosopher or his passion for objective truth. The basic attitude of the theologian is commitment to the contents he expounds. Detachment would be a denial of the very nature of this content."

2. See *The Logic of Scientific Discovery*, op. cit.

3. Reason can be considered public in two senses: (a) its workings can be made accessible through the use of language; (b) as it is public it is open to tests which are applicable to the subject under consideration. For instance, utterances that did not satisfy the basic rules of language would be considered unreasonable so it would be necessary for a reasonable argument to at least satisfy such rules. An argument that met this consideration would still be unreasonable if it ignored accepted procedures for judging or testing something. For instance, an argument which indicated a person was judging the weight of some material by its size without taking into account its mass would be considered unreasonable.

4. Both de jure and de facto authority.

5. For example the mean average of the British Science Research Council in 1966 was 56.27, the mean average of Cambridge Professors of Science was 57.1

It could be argued that the procedures of the Royal Society committee on Biological Research would have been accelerated but for the gerontocratic tendency in the structure of the scientific community, and molecular biology would have been established before 1960.

S. Toulmin, "The Complexity of Scientific Choice: A Stocktaking, Minerva, Spring, 1964 believes that there is a tendency to gerontocracy in the scientific community. In conversation Polanyi has denied that this is so. Zuckerman and Merton in M. Riley et al Ageing and Society, 1972, suggest that the reverse is the case and that older scientists are at a disadvantage. Garfield in Nature, 1970, and Cole in American Journal of Sociology, 1971 and Zirkle, Journal of Heredity, 1964 with particular reference to the Mendel case, argue that delayed recognition of research is less common than is supposed. My own feeling is that as in all communities there is a tendency for the older members of the community to hold power but that this is as not as marked in the scientific community as other communities, and can only be upheld at all if we consider 50 years of age rather old in the scientific community.

For instance, Tswett's introduction of chromatographic techniques in 1906 was only recognised in the 1920s. It was impossible for an unknown Russian botanist to get the funds necessary to establish his techniques or challenge the authority of the established chemists.

Thomas Huxley once stated:

"You have no notion of the intrigues that go on in this blessed world of science.....merit alone is very little good; it must be backed by tact and knowledge of the world to do very much."

A complete philosophy of science must include a concept about reality: an ontology, a theory about how an understanding of this reality is gained: an epistemology, and a theory about how this knowledge is checked but it must also provide an explanation of how science has developed because science is a dynamic study.


P. Feyerabend, Problems of Microphysics in Frontiers of Science and Philosophy, R. Colodny (Editor), Pittsburgh, 1962

Hagstrom, The Scientific Community, op. cit.

It would be formally possible to falsify a theory in a hypothetico-deductive model but I am arguing that in reality science is not practiced in this way.


A theory may also be based on auxiliary hypotheses which are themselves false, an experiment which indicated a prediction was incorrect would not indicate which auxiliary hypothesis was false. (See P. Duhem, The Aim and Structure of Physical Theory trans. P.P. Weiner, Princeton, 1954 (cited in Musgrave, op. cit.)


L. Kolakowski, Positivist Philosophy, London, 1972, p. 93
CHAPTER FIVE

The Argument for Freedom in Science

Polanyi in producing his argument for freedom in science justifies his claim for freedom by reference to his ontology and epistemology but he gives further strength to his justification by introducing a special theory of evolution. This theory is a vitalist theory, and it is his claim that the study of evolution merges into epistemology.

His theory of evolution is certainly opposed to that accepted by modern science. This theory, the neo-Darwinian theory, postulates that parents can pass on to their child only that which they themselves have inherited. This genetic endowment is passed down the generations and is unaffected by anything that may happen to its carriers. This theory of the "continuity and unalterability of the germ track" was first put forward by August Weismann in 1885. Evolution is then repetitive but there can be progress. This progress can come about owing to microscopic random mutations. (Mutations are spontaneous changes in the molecular structure of the chromosomes and are random as they are unrelated to anything that goes on in the animal's environment.) Generally these mutations produce harmful effects but very occasionally there occur tiny mutations which are beneficial to the organism, and these are preserved by the operation of natural selection. Mendel had shown that if a useful mutation occurred it was not whittled away by successive blendings, as Fleeming Jenkin had postulated in a review of The Origin of the Species, in 1867, but was preserved by natural selection. In other words the fact that a gene did not blend therefore enabled a favourable mutation to be passed on undiluted to the next generation. In the 1950s this neo-Darwinian theory received further confirmation by the discovery by Crick and Watson of the chemical structure of DNA, the nucleic acid in the chromosomes which carried the hereditary information. Crick argued
that "information can flow from nucleic acids to proteins but cannot flow from protein to nucleic acid", and therefore supported Weismann's thesis that nothing that happens in the life time of a carrier can alter the genetic endowment. (Crick was arguing that information can pass only from DNA to RNA (The messenger substance) to protein and not the other way.)

This theory was and is opposed by adaptionist theorists who base their arguments on the theories of J.B. Lamarck put forward in 1809. The Lamarckians argue that acquired characteristics, meaning improvements in habits, bodily structure, etc., which the parents acquire through their attempts to cope with the environment, can be passed on to the children. Or more strictly that essential characteristics which have been acquired after coping with continual conflicts with the environment can over a period of several generations be inherited. In other words evolution is cumulative and information can pass from the body to the hereditary channel.

The Lamarckians have over the years met with little success in producing experimental evidence to support their thesis, and that which has been produced has been discredited. Even so, recently neo-Darwinism has met with some new difficulties which challenge its present dogma, although it has previously been able to meet challenges of equal danger. The Times Science Report, 26th June, 1970 concluded:

"It is too early to say what consequences may follow from the demonstration that DNA can be copied from RNA, but at least the central dogma now seems to be an oversimplification". (Cited in Koestler, op. cit.)

This made reference to three separate cancer research teams (H. Termin, Wisconsin, D. Baltimore, M.I.T., and S. Spiegleman, Columbia) who had indicated that certain viruses which cause cancer in animals, once they
had invaded the host cell, could produce their own DNA.

A. Koestler writes:

"Within roughly the same period, other important papers were published in *Nature* which some biologists consider to be the end of neo-Darwinism in its present form.....The arguments show that random mutation and natural selection alone could not have kept evolution going without some additional principle being involved, are derived from biochemistry and modern information theory."

Michael Polanyi's theory differs from both the orthodox theory and the Lamarckian theory and seems more akin to the vitalist theories of Henri Bergson and Teilhard de Chardin. He assumes a force running through the whole of the evolutionary process which at each stage of the evolutionary process strives for a higher stage of achievement until at last an unthinkable consummation is reached.

The argument develops in the following way. Life has a predestined end and at each stage of evolution there is a force, an active centre, in existence which strives to get nearer to this end, and is therefore instrumental in lifting the organism up to the next stage of evolution. (Bergson called this force the *elan vital*) The culmination of the evolutionary process in physical terms is when man finally arises from a dumb animal.

He attacks the orthodox theory in the following way he states:

"I deny that any entirely accidental advantages can ever add up to the evolution of a new set of operational principles, as it is not in their nature to do so."

This criticism has certainly received support from F.B. Salisbury in *Nature* (1969):

"Modern biology is faced with two ideas which seem to me to be quite incompatible with each other. One is the concept of evolution by natural selection of adaptive genes that are originally produced by random mutations. The other is the concept of the gene as part of a molecule of DNA, each gene being unique (specific) in order of arrangement of its nucleotides."
If life really depends on each gene being as unique as it appears to be, then it is too unique to come into being by change mutations. There will be nothing for natural selection to act on."

Polanyi is attacking the weak part of the orthodox theory that minute random mutations can lead to advantages when much evidence suggest that mutations usually will be deleterious to the organism, and that as this is so the time lag is too short to produce complex species in their present form.

He argues that the theory can be corrected by assuming an ordering principle. He states:

"The action of the ordering principle underlying such a persistent creative trend is necessarily overlooked or denied by the theory of natural selection. Its recognition would, indeed, reduce mutation and selection to their proper status of merely releasing and sustaining the action of evolutionary principles by which all major evolutionary achievements are defined."

It has to be admitted that Polanyi is right in assuming that the present random mutation natural selection theory is not absolutely satisfactory. However, it is not intended to be a law but is a developing theory which has progressively led to further discoveries and has received added confirmation from Darwin to Waisman to Mendel to Crick. Polanyi's suggestion of an ordering principle is a hypothesis which may some day provide an alternative which may overthrow or fit in with the orthodox theory. Yet it has received no experimental confirmation of its existence. He is really stating that the time lag for evolution is too small so we should assume some ordering principle which can speed up the process. However, we are no better off if we do assume such a principle, indeed, we are worse off as we would be virtually throwing away a long line of successful theorising and replacing it by a theory for which there is no experimental evidence. Like the theory of Lamarck the theory at this
level is a common sense theory which we would expect to be vindicated but as yet no vindication has come about. The natural selection mutation theory is the only theory that provides an explanation of evolution and has received confirmation. Indeed Polanyi's assumption of an ordering principle can hardly be considered a scientific hypothesis in its present form except in so far as it can be considered a plea to attempt to isolate the ordering principle, a principle for which there is no scientific evidence. In other words he is asking biologists to follow a line of research which they generally believe to be unfruitful.

However, Polanyi's theory of evolution goes much further than the postulation of a controlling principle for it is a process of continuous achievement towards an unthinkable consummation. Whereas the postulation of a controlling principle can only be considered a scientific proposal when formulated in a different way, the concept of evolution as a progression towards an unthinkable consummation can never be considered as a scientific proposal for as Polanyi says the concept of a consummation (with reality or God?) is unthinkable. It certainly cannot be tested and even within a consensus theory it is not the sort of theory the scientific community would need to have a consensus about.

Polanyi has produced then an extremely unorthodox theory of evolution but what is the function of the theory within his philosophy? It has three functions: (1) to give added support to his epistemology, (2) to support his claim that man will search for the truth, (3) to give added strength to his claim for freedom in science.

Polanyi attempts to give biological support to his theory of knowledge by arguing that epistemology is really an expansion of biology. He states:

"As we proceed to survey the ascending stages of life, our subject matter will tend to include more and more of the very faculties on which we rely for our understanding it......"
we shall find ourselves accrediting living beings with a wide range of faculties, similar to those which we have claimed for ourselves in the foregoing enquiry, into the nature and justification of knowledge; we shall see that biology is an expansion of the theory of knowledge into a theory of all kinds of biotic achievements, among which acquisition of knowledge is one."  

He then argues that there are two principles at work in animals: namely, the use of machine like operations, and the inventive power of animal life. He proceeds to examine these inventive powers of animal life:

"We start from the fact that no material process governed by the laws of matter as known today can conceivable account for the presence of consciousness in material bodies.....

A big step towards the generalization of the powers of thought downwards in the direction of morphogenetic originality is made by acknowledging the originative powers of unconscious thought. The unconscious exercise of originality is usually still prompted by a conscious effort and a judgment of a higher order, as in the case of heuristic efforts which induce discovery during a subsequent period of latency. An effort will usually be also at work in causing the reorganisation of available means for a predetermined end.

Ultimately, by dropping also the element of effort, the capacity for coherent and resourceful action can be generalised to a process of growth."  

Polanyi considers that this growth must be understood as an achievement. He states:

"The morphogenetic principle discovered by Driesch thus reveals itself as the primodial member of an ascending series of homologous processes, which cannot be understood except as the resourceful achievement of a comprehensive rightness, and everyone of which dissolves altogether in the light of any more impersonal examination."
He, therefore considers that he has shown biology to be a commitment to achievement for some ends:

"...biology has been revealed as an appreciation of commitment... commitment may be then graded by steps of increasing consciousness; namely from primordial, vegetative commitment of a centre of being, function and growth, to primitive commitment of the active-perceptive centre, and hence further again, to responsible commitments of the consciously deliberating person." 17

By expanding biology to what he calls ultra-biology Polanyi is able to allow responsible commitment to be included in his biology. This makes it possible for him to argue that biology and epistemology come to the same thing, that his theory of knowledge like biology is a study of the function of commitment. The ultra-biologist then studies how man achieves knowledge. He states:

"Biology then comes to include the accrediting of our own intellectual powers and the confirmation of our commitments within the framework of our calling. It acknowledges, in particular, our capacity for continually discovering new interpretations of experience which reveal a deeper understanding of reality, and takes us eventually to the point where the whole panorama of science unfolds for a second time within a biology of man immersed in thought." 18

Whereas biology can be considered a study of commitment evolution can be seen as a series of achievements in the course of the emergence of the human race. He states:

"In the course of evolution this series (of ascending biotic levels which can be thought of as successively rising achievements) should present itself as a series of successive existential achievements. It should show how in the course of anthropogenesis the descending lines of our ancestors have taken on by stages the full capacities of personhood and have inherited eventually all the hazardous aspirations of humanity." 19

His theory of evolution is beginning to explain the aim of all these
existential achievements. He continues:

"When man participates in this life his body ceases to be merely an instrument of self-indulgence and becomes a condition of his calling. While the first rise of living individuals overcame the meaningless of the universe by establishing in it centres of subjective interest, the rise of human thought in its turn overcame these subjective interests by its universal intent. The first revolution was incomplete, for a self centred life ending in death has little meaning. The second revolution aspires to eternal meaning, but owing to the finitude of man's condition it too remains blatantly incomplete. Yet the precarious foothold gained by man in the realm of ideas lends sufficient meaning to his brief existence; the inherent stability of man seems to me adequately supported and certified by his submission to ideals which I believe to be universal. If this be vitalism, then vitalism is mere common sense, which can be ignored only by a truculently biggotted mechanistic outlook. Evolution can be understood only as a feat of emergence."

Polanyi therefore sees the evolutionary process as moving to some end; of active centres driving man onwards. He continues:

"At all levels of life it is these centres which take the risks of living and believing. And it is still such centres which, at the highest stage of development, activate those men who seek the truth and declare it to all comers - at all costs. The emergent noosphere is wholly determined as that which we believe to be true and right; it is the external pole of our commitments, the service of which is our freedom. It defines a free society as a fellowship fostering truth and respecting the right."

For Polanyi the end of all this process of achievement is clear:

"All these centres - those which led up to our own existence and the far more numerous others which produced different lines of which many are extinct - may be seen engaged in the same endeavour towards ultimate liberation. We may envisage then a cosmic field which called forth all these centres by offering a short-lived, limited, hazardous opportunity for making some
progress of their own to an unthinkable consummation. And that is also I believe, how a Christian is placed when worshipping God." 22

Polanyi is attempting to show how his concept of biology can be expanded into a study of man's attempt to increase his knowledge. That the study of biology foreshadows the study of man immersed in thought but in doing this he shows that his epistemology is a psychological explanation of why man tries to achieve knowledge, and why he becomes committed to his beliefs. It is part of man's biological or psychological make up to strive for achievement and to become psychologically committed to the explanation arrived at Polanyi's theory of commitment within that which he calls his epistemology of course cannot provide a justification of knowledge, although it provides an explanation as to why knowledge is claimed.

He also seems to be arguing that the 'active centres' which he refers to in his theory of evolution become post noogenesis instrumental in bringing about intuitions or in his later works in organising tacit knowledge to bring about new knowledge. It is intuition which now undertakes the task of leading man to further achievement.

Also he indicates that man should search for the truth, and his theory of evolution provides an explanation as to why this should be so for evolution itself is a movement towards the ultimate truth. Man then if he does not seek the truth is forsaking his evolutionary task. In Polanyi's terminology we can say that he is failing to follow his obligation to the 'active centres'. 23

The problem for Polanyi is that neither an 'active centre' nor an 'ordering principle' have been discovered. However, he also uses his concept of evolution to support his claim for freedom in science. His argument is that the method of discovery by the process of indwelling and use of tacit knowledge within the framework of our commitments, and driven
on by the 'active centres' makes it necessary for a mature scientist to be
given complete freedom to choose and carry out his own research. An
attempt to prevent this would virtually be an attempt to prevent the process
of evolution. He then widens his argument outwards, quite legitimately
if we accept his theory of evolution, to include not only a claim for
freedom in science but for civic freedom as well. He writes:

"The whole ontology of commitment and of a free society
dedicated to the cultivation of thought by responsible commitments
of its members can in fact be built up, in this manner, as
a generalisation of biology followed by reflection on this
generalised biology."

Man should be allowed freedom in order to give the active centres the
opportunity to reach out for the next stage of achievement. The active
centres, in a sense, become our rational self, although the concept of
rationality is widened out to include not only explicit and tacit knowledge
but the emotional element contained in our commitment to search for the
truth - heuristic passion -.

His theory of evolution can be used then to give support to his
claim for freedom in science but his claim is still strong without resort
to such a theory. A scientist should be allowed freedom to pursue his
own research because interference will destroy the personal relationship
between the scientist and reality, and only a scientist who has chosen
his own research, and is therefore committed to it, can hope to contact
reality. He must be so committed to his research that he is willing
to immerse himself in it, for only by this immersion or indwelling can he
hope to progress towards discovery.

Polanyi argues that interference in science has usually no concern
for science itself. It is undertaken either for utilitarian or
political reasons. For instance, it is hoped that some economic benefit
can accrue by guiding science along more fruitful paths, or some theory
that appears particularly favourable to an ideology may receive governmental support. As the aim of science is to increase our knowledge of reality utilitarian or political interference can only alter its aim and therefore destroy it.

The previous argument, if we accept the assumption that the aim of science is to gain knowledge, then allows Polanyi to introduce his conclusive argument. A free science is the most efficient science. We have seen that if we interfere with science either for utilitarian or other purposes then we will destroy it for by definition a science orientated towards utility or used for political purposes can no longer be science. The only estimate of the efficiency of the scientific community is how efficient it is in expanding the systematic ideas of science but it is Polanyi's argument that there is only one method of expanding these ideas and this is by the initiatives of individual scientists under the authority of an independent scientific community.

Polanyi has therefore produced a number of arguments for freedom in science which are dovetailed into each other. The gaining of knowledge becomes an extension of the evolutionary process, and the scientific community is able to work because of its faith in the existence of reality and its determination to reveal it. Interference in science is condemned not only because it destroys the possibility of knowledge but because it will destroy the development of the nature of man.
Gregor Mendel published his "Experiments in Plant Hybridisation" in the Proceedings of the Natural History Society of Brunn, Moravia in 1865 but it was not rediscovered until 1900.

Philosophie Zoologique, Paris, 1809.


This fact could give the adaptionists hope but would have no effect on Polanyi's position. The adaptionists are really stressing the all importance of the environment, i.e., the environment can alter evolution, whereas Polanyi is concerned with an ordering principle that will lead man to the end of evolution. On the other hand neo-Darwinism assumes a mutation which pre-adapts an organism to its environment. Lamarck assumes a doctrine of progress ordained by God, and in this sense is close to Polanyi, but this position is not an essential part of the 'acquired characteristics' thesis or a position which neo-Lamarckians would necessarily accept.

Koestler, op. cit., p. 128.
Creative Evolution, London, 1911.
Personal Knowledge, op. cit., p. 405.
Ibid., p. 385.
Ibid., p. 385.
Ibid., p. 347.
Ibid., p. 339.
15. Driesch discovered powers of improvisation in animals, as an example of equipotentiality. Polanyi considers that these are a primordial form of originality.


17. Ibid., p. 363.

18. Ibid., pp. 373-4.

19. Ibid., p. 387.


22. Ibid., p. 404.

23. See chapter 7 for an examination of this concept within his political theory.

24. Personal Knowledge, op. cit. p. 380

25. Polanyi assumes that reality can itself be active in leading man to further discovery.

26. This does not seem to be necessarily the case but is most likely the case.


Two questions arise at this point: is it possible to expand the sort of analysis Polanyi has made of the scientific community to other communities that are engaged in intellectual activity, and is it then possible to expand the analysis into the wider political community? Polanyi believes that the answer is in the affirmative to both these questions. In *The Logic of Liberty* he sketches out how his ideas can be applied to the judicial community, and in his *Study of Man* how they can be applied to the task of the historian. In both these works, and in *Personal Knowledge* he begins to sketch out a basis for an analysis of the political community. He states:

"I shall now take it for granted that we accept personal knowledge as valid and shall proceed to develop the structure of such knowledge further in the direction which will lead us into the field of the humanities. This opens a great prospect. For I hope thus to comprise within a single continuously variable conception of knowing, both the process of acquiring such knowledge as is comprised by natural sciences and the knowledge of man himself as the seat of all knowledge; and I hope that this conception will expand even further to a comprehension of man as the source of moral judgement and of all other cultural judgments by which man participates in the life of society."

There are a number of reasons why Polanyi feels able to claim that his examination of the acquisition of knowledge in the scientific community provides a prototype model for the examination of other communities. His concepts of the scientist's task and the method of gaining knowledge is applicable to other communities, and the communities also exhibit a similar structure of joint authority valuing and to some extent controlled by their traditions. The knowledge of these communities, like that of the scientific community, is also contained in the inter-personal knowledge of their members.
Polanyi believes that the scientist is attempting to understand ultimate reality but this is also the task of other intellectual communities. The scientific community is the ideal example to show this activity because it seems more obvious that it is consciously trying to reveal the truth. This can best be realised when equal authority exists between members, and where individual members are allowed freedom under the control of traditional knowledge. In this way it is possible to build up a knowledge about reality on the base of the past members' knowledge. Such a concept is analogous to the process of evolution where, so Polanyi claims, life is moving towards an ultimate consummation with reality by building up on past achievements and failures. (Failures are important as they lead to a recognition of error and therefore the correction of it. Life then is not a continuous movement towards consummation but a zig zag path where many false starts are undertaken - a peculiar notion which must mean that the 'active centres' have at least an unconscious recognition of the whole of evolution.) This analogy may seem irrelevant but it is not to Polanyi as he believes that scientists are now the main initiators in the process of evolution. The analogy in fact almost ceases to be an analogy as the scientists by their efforts are continuing the process of evolution - pushing it on to further achievement. From such an argument we can say that other intellectual communities are also engaged in this task of understanding ultimate reality, and are also helping to further the evolution of man. The wider political community is also engaged in the same task or if it is not it should be (again a blurring of the distinction between description and prescription). Yet, as on the whole members of the wider political community are not expert enough to directly engage in the same task themselves, they should provide the conditions of freedom necessary for success in such a task, and provide the necessary funds. They should also be prepared to submit
themselves to the superior minds of the experts in the accomplishment of the task. Polanyi states, "The point is reached here at which the observer's appraisal of biological achievement turns into his submission to the leadership of superior minds." 4

Polanyi does make some attempt to distinguish between the activity of the scientist, theologian, metaphysician, etc. by reference to their methods but his claim that they are all concerned with understanding ultimate reality makes a demarcation between the different disciplines almost impossible to realise. Science becomes metaphysics, becomes theology, becomes almost any activity that moves beyond physical and chemical data. This tendency to merge disciplines is further aggravated by his denial of scientific testability.

He is able to give further credence to his use of the scientific community as the prototype community by his associated claim that the scientist is searching for the truth. (The Truth is ultimate reality). This seems acceptable in an examination of the scientific community but it is really Polanyi's claim that it is only more obvious in the scientific community and that other communities will or should exhibit the same characteristic. The reason for this is that man himself has such an obligation to the truth, an obligation to the active centre within him.

Two further arguments are then used to show why the analysis of the scientific community can be used to study other communities. Knowledge can only be gained by an individual who becomes obsessed with his work and indwells within it, and can only progress under the control of the tradition of a community, the inter-personal knowledge contained within a community. For in a situation where impersonal tests are useless consensus can be the only check on wild excesses.
Rather than using the scientific community as a prototype model it could well be that Polanyi should have reversed his argument. Perhaps he should not have attempted to demonstrate how other communities are similar to the scientific community but how it is similar to other communities. How it exhibits characteristics which can be found in other communities even though it is attempting to be objective and looks at reality in a special way. Polanyi as a former member of the scientific community probably knows more about the workings of it than of other communities but this cannot be a justification for its use as prototype. The major reason he uses it as a prototype is that it exhibits to a greater degree than other communities the characteristics he is most concerned with in developing his theory of evolution: the search for the truth, the urge for achievement by individual initiative, and its control by inter-personal knowledge or tradition.

Scientific activity then can be seen as the culmination of the process of evolution, other intellectual activities as further examples which are not quite so clear, and the free society as the necessary condition for these communities to undertake their task most effectively.

The Community of Historians

Polanyi argues in The Study of Man:

"(My position) denies any discontinuity between the study of nature and the study of man. It claims that all knowledge rests on understanding, and that in this sense knowledge is of the same kind at all levels of existence. But this position admits, at the same time, that as the subject of our understanding ascends to higher levels of existence, it reveals ever new comprehensive features, the study of which requires ever new powers of understanding. I shall readily acknowledge, accordingly, that historians must exercise a special kind of understanding. But I shall argue also that all the distinctive characteristics of the historians' method emerge by continuous stages from the progressive modification of the methods used within science."
He is arguing here that as the scientist advances from the study of inanimate matter to that of living matter, first the lower forms of life and then the study of intelligence in the higher animals, higher forms of comprehension come into play until the highest is reached with the study of man himself. His claim is that the study of the natural science and the study of the humanities is a continuous process, and that they do not form two distinct branches of understanding.

The process of moving from a study of science to the study of the humanities is reminiscent of the process of indwelling. Comprehension becomes increasingly intense within science until the threshold of the humanities is reached but the process does not end here for comprehension then becomes even more intense and complex. Polanyi attempts to illustrate this process. He states:

"Look first at the theories of physics. They deal with the ultimate particulars of nature and establish the existence of patterns, formed by them in space and time. Passionate intimations of this harmonious order are the guides of discovery in physics, and the beauty of a physical theory is the mark of its scientific value. This beauty is enjoyed by dwelling in the theory and observing its confirmation by the facts; the physicist dwells with pleasure in the patterns of inanimate nature while he turns away coldly from disorderly, meaningless collocations of particles."^6

He goes on to argue that at the next level of understanding, which he calls the "vegetative level", the structural elements of understanding are greatly enriched. On this level he includes not only living vegetative entities but machines and tools. On this level the researcher's participation becomes more intensified as he finds "new, more striking, forms of excellence and failure."^7 He writes:
"We recognized that to know a machine is to enter into its purpose and acknowledge the rationality of its operations and that to know an organism is to acknowledge the existence of an individual and appreciate its correct growth, form and function, these features being judged to be healthy or abnormal by standards which we consider apposite to an individual as a member of its species." 8

We then move on to the next level and participation is enforced to an even greater degree. This is the level where we study the deliberate activity of animals. The organism will be no longer attempting to adjust itself to its environment but will be attempting to control it. The organism therefore begins to make mistakes, and the possibility arises of the organism being either correct or incorrect in its judgments but nevertheless remaining a perfectly normal healthy organism. We therefore have a new development to consider as well as the previous alternatives of health and disease which would be our concern at the vegetative level. Polanyi argues that this phenomena of deliberative activity creates a clear distinction between the vegetative level and this new higher level.

Whereas the observation of the vegetative level takes place on two logical levels the observation of a deliberatively active animal will involve three logical levels. He gives the following example to illustrate this point:

"When I say 'the stone is rolling' this involves two logical levels, (1) one for me and my statement about the stone, and (2) another for the stone itself. Usually we think of ourselves on the higher level, talking down to the stone on a lower level. But if I say 'the sentence "the stone is rolling" is true', I need an additional, third level to accommodate the three things brought together by this utterance. There will be (1) a topmost level for myself and my utterance, (2) an intermediate level for the sentence of which I am saying that it is true, and (3) a bottom level, once more, for the stone." 9
Polanyi is arguing here that the statement 'the stone is rolling is true' brings in an element of conscious judgement by the person who is making the statement. He is trying to illustrate the point that to the observer the organism on the vegetative level makes no conscious judgments but on an animate level, as the organism takes deliberative action, there arises the possibility of the animal making an error, and this necessitates the capacity to make judgments on the part of the animal. The observer comes to realize that the animal has developed an interpretative framework by which it will attempt to judge things.

Polanyi argues that an animal who has developed an interpretative framework can make two sorts of mistakes. He gives the example of a trout who snaps at the angler's fly. In this case the trout is making an error based on a correct interpretative framework. In the case of young geese, who accept a human being as their mother, and identify other humans as part of the flock the geese judge their experience correctly but are using a wrong interpretative framework. Both these errors can be distinguished from a pathological absence of judgment, for instance in rats with part of their brain removed. There is also the possibility of a correct judgment in a correct interpretative framework giving us four possibilities:

1. an incorrect judgment in a correct interpretative framework.
2. a correct judgment in an incorrect interpretative framework.
3. no interpretative framework and no judgment.
4. a correct judgment in a correct interpretative framework.

There is in fact another possibility which Polanyi does not consider, and that is an incorrect judgment in an incorrect interpretative framework. He argues that these possibilities which can be observed in the activities of animals prefigure the sort of judgments a historian can make. For instance a Marxist will look at a historical situation from a particular
point of view. Included in his notion will be a belief that a class struggle will be in evidence, and that the state will be used as an instrument of the ruling class to maintain its power. When an actual situation is examined evidence will be found which will tend to confirm the framework. Conflict will be interpreted as class conflict, and within the legislation evidence will be found to confirm the hypothesis that legislation will be in the interests of the ruling class. Yet contrary evidence need not destroy the interpretative framework, although it will tend to make it more sophisticated and flexible. Thus Marx when examining the situation of Louis Philippe, King of the French, finds that his rule does not support the whole of the bourgeoisie as only the financial aristocracy rule. This would appear to be contradictory to his main thesis but it is coped with by calling the ruling financiers a faction of the ruling class, and not by a declaration that they represent a separate class. A statement that the non-ruling class belonged to the proletariat would have been from a Marxist point of view a mistake of category 1, an incorrect judgment in a correct interpretative framework. Marx's own analysis would be in category 4, a correct judgment in a correct interpretative framework. From a Marxist viewpoint a statement that the financial aristocracy was a faction of the bourgeoisie made by a conservative historian would be in category 2, a correct judgment in an incorrect interpretative framework. On the other hand to a conservative historian a statement made by a Marxist that the non-ruling bourgeoisie were members of the proletariat would be a mistake in category 5, an incorrect judgment in an incorrect interpretative framework.

Three distinctions can be made between the case of the historian and the case of the geese. The historian can choose his interpretative framework geese cannot. As he can choose his framework then quite clearly
it will be in conscious conflict with other interpretative frameworks, that of the geese will not be. As the historian has chosen his own framework it will be much easier for him to give it up as he knows that it consists of a set of beliefs he has consciously accepted, and believes it is the best framework to use to provide an interpretation of historical actions. When contradictory evidence appears the historian will usually try and make his interpretative framework more sophisticated and flexible but at some point he can give it up. It would be far more difficult for humanised geese to give up their framework as their commitment to it has become almost innate.

The prefiguration then seems to exist but there are essential differences. The major one is that the historian consciously makes a judgment in deciding to use an interpretative framework and therefore consciously commits himself to a particular framework. The strength of the commitment may well depend on the evidence available for alternatives. This suggests that Polanyi's belief that a historian will be absolutely committed to his interpretative framework, and then to his explanation or theory within the framework is certainly open to question.

An interpretative framework then is a group of systematic beliefs which one accepts and then uses to interpret other data. In the case considered Marxist theory is accepted and then applied to an actual historical situation. The resultant explanation will be contained within the Marxist framework, Marxist terminology will be used and conflict interpreted along the lines of Marxist theory. Only in very rare instances can the facts of the historical situation actually begin to challenge the framework.

There seems to be a close analogy between Polanyi's interpretative framework and Lakatos' "hard core" hypotheses, although Polanyi's interpretative framework would seem to be the step before the development of
such hypotheses, for instance, it would include for the scientist a concept about the uniformity of nature. Polanyi in fact fails to consider the interesting interplay between important theories and the interpretative framework. Can for instance hard core hypotheses become part of the interpretative framework, and therefore become even more inviolable. This happened with Marxian theory. The failure of the predictions of the downfall of capitalism became such a challenge to the interpretative framework that Lenin's theory of imperialism had to become part of the framework thereby making it more flexible and able to cope with developments in history.
Yet there is another prefiguration of the work of the historian and also of the scientist. This lies in the recognition of intellectual passions in the lower animals. Their harrassment at being unable to solve a problem, and their delight in a correct solution. He points out that, "We have here the incipient transcendence of self-centred individuality by a personhood striving to achieve intellectual excellence for its own sake." 12

The study of animals then begins to foreshadow the study of man's deliberative activities. And a study of these activities will show that the methods used in the natural sciences and in the study of history are part of the same process which can, as we have seen, be recognised at a lower animal level. That the study of history and the natural sciences are not two distinct forms of knowledge can be demonstrated by the following example which Polanyi gives: the study of the career of Napoleon contrasted with the method of a natural scientist.

Napoleon's career consisted of a series of actions whereas the study of scientific phenomena, for instance gravitation, comprises events. Napoleon's actions involved questions of judgment, responsibility and motives. This fact has led to the issuing of praise or blame on the part of the historian. In the case of the physicist the possibility of praise or blame cannot arise because as there are no deliberative actions but merely events the question of moral responsibility is meaningless. The distinction can be widened still more by considering that in order to really appreciate Napoleon's motives we must attempt to relive his career and his thoughts, and the conclusion we come to will depend on what sort of framework we use in doing this. Pieter Geyl, in his Napoleon For and Against, argued that in practice the appreciation of Napoleon depended on the political view of the historian, and this varied in time and place.
In this way the writing of history became itself part of the process of history. This fact certainly seems to distinguish history from the natural sciences.

However, Polanyi argues that these differences do not conclusively demonstrate a distinction. For instance, the distinction between actions recorded by history and the events which are studied by the natural sciences vanishes if we accept that animal psychology is part of the natural sciences, for the actions of animals will be studied. Another argument refers to the observer for both the historian and the scientist make value judgments. The historians, as we have seen, make moral judgments, and will also make judgments about possible interpretations deciding on whether or not a particular interpretation is consistent with other interpretations of actions in other closely related aspects of the subject. For instance, he may make a choice between different alternatives on the basis of their aesthetic qualities. The scientist, although not making moral value judgments will make similar sort of judgments. As Polanyi states:

"Each appreciates the particular comprehensive entities which form its own subject matter, and the corresponding standards of excellence form an ascending series continuously progressing towards a moral valuation of human actions."^13

The scientist will also attempt to understand the subject matter of his research by the process of indwelling, which is closely akin to the historian's attempt to study historical actions by reliving the life of the person he is studying.

Polanyi is using two complementary arguments in an attempt to demonstrate that the study of history and the natural sciences are not distinct. The first is to show that the method of gaining knowledge on the part of the historian and the scientist are the same. It is certainly
true that there are differences, for instance, the quantitative approach of the scientist is not followed to such an extent by the historian but the essential similarity lies in the indwelling of both. And Polanyi argues that without indwelling there can be no knowledge. A correct interpretation may be arrived at accidently but this interpretation would not be knowledge only a mere opinion as the observer would have no commitment to it. Indwelling produces psychological certainty in one's interpretation, and therefore a claim that one's opinion is universally valid; that it is knowledge. The second argument is to show that the subject matter of research will exhibit similarities. For instance, as the natural scientist moves from looking at inanimate matter to the study of animate matter he will begin to examine characteristics which in a more developed form are the characteristics the historian examines, for example, deliberative actions, the use of judgment.

There is still another argument within Polanyi's general framework for the historian and the scientists in making their judgments will rely on the standards and values of their respective communities.

Polanyi sees the process of understanding as a continuous process from the study of inanimate matter to the study of history, which needs greater connoisseurship and greater identification with the subject matter of the study, as it moves through the natural sciences into the humanities. The final development in this process is man eventually turning attention on himself by the study of his own history and thought.

He has used a closely analogous argument to his theory of evolution in order to indicate that the study of history and the natural sciences are part of the same task. And that the study of history needs a higher level of understanding than the study of inanimate matter in the same way that a human is at a higher stage of evolution than inanimate matter.
As the human organism is more complex than that of the amoeba so the study of man is more complex than the study of the amoeba. Even so both can be identified for certain active forces in the lower organisms become intellectual activity in man. Biology becomes ultra-biology in epistemology.

His theory of evolution can therefore be brought in to support his claim that the study of the natural sciences and the humanities is part of a continuous process. However, there is really no need to look to a theory of evolution for support in this matter for the argument can stand on its own. All Polanyi has to show is that like all intellectual activity the fruitful study of history necessitates the immersion or indwelling of the historian in the subject matter of his research. And that like the scientist the historian will approach his task with a certain interpretative framework, and will then judge the subject matter in accordance with this framework.

A historian can be either correct in his judgment according to his framework. This would mean the judgment he made was consistent with other judgments he had made within his framework. If his judgment was incorrect we would expect it to be inconsistent with the other judgments made. According to the previous analysis of the possible alternatives available to a person making a judgment the former would be alternative (4) a correct judgment made in a correct interpretative framework or alternative (2) a correct judgment made in an incorrect alternative (1) an incorrect judgment in a correct interpretative framework or alternative (5) an incorrect judgment in an incorrect interpretative framework.

The problem arises as to whether the interpretative framework used is correct but, as we have seen in our earlier analysis, the historian will use an interpretative framework that is appropriate to his
school. If he did so, and he could not exist in his school if he did not, his judgment, or claim to personal knowledge, will be judged by the inter-personal knowledge of the community of historians of which he is a member. In other words it will be judged by the consensus of opinion which exists within his own school of history.

We can therefore say that his method of achieving knowledge through the process of indwelling, and the method of accrediting that knowledge by the consensus of opinion within his own intellectual community is the same as, the scientist. But Polanyi also has a further claim, and this refers to the actual subject matter of the research. It is a claim that there is only one reality, and that this reality is made up of different levels: inanimate matter, vegetative matter, animal life, human life, and man immersed in thought which includes the study of history, the study of law, literature, and so on. There is, in fact, another level and this is man attempting to understand transcendental reality or, from a theological point of view, God.  

The conclusion is therefore that the historian and the scientist are engaged in the same task of revealing and understanding reality but at a different level, and that the subject matter of their research is the same but at a different level. Each will work within his own community which will have its own standards and traditions and study his chosen area of reality. However, as can be seen from the terminology I have used, there is a difference for whereas we can probably talk about the scientific community we cannot talk in the same way about the community of historians. We have to talk about communities of historians or rather schools of historians. Even so it does seem possible to argue that within these different schools certain skills have been produced which have proved effective in gaining historical knowledge, and that a body of knowledge has developed which can be used to judge innovations. In other
words innovations will have to fit into the inter-personal knowledge of
a school.

In this sense truth for a member of a historical school would
consist in a correct interpretation of historical phenomena in accordance
with his own interpretative framework. This is the personal knowledge
of the historian or rather his claim to personal knowledge. This claim
is accepted as personal knowledge if it fits in with the knowledge already
possessed by the school, i.e., by inter-personal knowledge. It then
becomes true as far as the school is concerned.

From this analysis we are led to argue that each school will
have its own interpretative framework to which the interpretative framework
of each member will approximate. The original interpretative framework
of the school will have arisen because different historians with similar
interpretative frameworks will have come together and decided to accept
each other's mutual authority in determining the truth. The group would
really have to develop its own decision procedure, that is accept each
other's mutual authority before we could call it a school which could be
differentiated from other schools. Indeed to the extent we can show
that a school is not governed by the mutual authority of its members then
to that extent we deny the existence of the school. New adherents to the
school would have to fit in to the style of that school. In other words
their own interpretative frameworks would have to approximate to the pre-
existing ideal derived from the original adherents.

Science, on the other hand, seems to consist of an interlocking
series of interpretative frameworks. The question therefore arises as
to why there is not a corresponding breakdown into schools of science as
there is in history, and also in theology. There seems to be three
reasons for this: (1) The subject matter of the research necessitates
a more personal involvement, so whereas in science clashes between scientists will be confined to criticisms of methodology, really a criticism of a scientist's competence, to attempts to indicate a failure of a theory to fit in with other theories, that is, an inconsistency of the theory with accepted knowledge, and mere career competitiveness, another factor will enter in the case of history. This would be an attempt to challenge the historian's interpretative framework - a challenge that would rarely happen in the case of science - for instance, a challenge to an analysis made from a Marxist point of view. (2) Scientists do not develop mutually exclusive schools based on different moral interpretative frameworks, so although there are schools of thought in the sense that there is disagreement over specific points this does not effect their whole outlook on science. It is really this moral factor in the interpretation of history that creates the schools. It would be extremely difficult for a Marxist historian to accept a Whig interpretation of history as the 'truth' all he could do would be to accept it as a Whig interpretation of history. (This is a case where historians are themselves part of the process of history) (3) The methodology tends to hold it together, for instance, the use of experimentation, statistical techniques, rules for the presentation of findings. We can say that there appears to be a general consensus as to the technical approach to the subject matter of research but this not the case with history.

Generally then with the qualifications I have given it does seem possible to apply some of the concepts in Polanyi's analysis of the scientific community to the study of history. The analysis produces a rather formal and ideal version of the actual situation but it remains a reasonable interpretation not too far from reality.
The Judicial Community

In the case of the judicial community we have the profession controlling a body of knowledge which has been built up and developed over many generations: a body of knowledge which is a common possession.

In considering common law Polanyi states:

"Consider a judge sitting in court and deciding a difficult case. While pondering his decision, he refers consciously to dozens of precedents and unconsciously to many more. Before him numberless other judges have sat and decided according to statute, precedent, equity and convenience, as he himself will have to decide now; his mind, while he analyses the various aspects of the case, is in constant contact with theirs. And beyond the purely legal references, he senses the entire contemporary trend of opinions, the social medium as a whole. Not until he has established all these bearings of his case and responded to them in the light of his own professional conscience, will his decision acquire force of conviction and will he be ready to declare it."\(^1^6\)

The act of a judge then is a responsible act based on his knowledge of the law and checked by his commitment to justice. The judicial decision is an interpretation of existing law which at the same time as reinforcing it modifies it in some respect. But it is more than this. Polanyi argues that the operation of common law constitutes a system of adjustments between succeeding judges and the general public. He states:

"Such coherence and fitness as this system possesses at any time is the direct embodiment of the wisdom which each consecutive judicial decision is adjusted to all those made before and to any justified changes in public opinion."\(^1^7\)

It would seem therefore that there is at least one similarity between science and the law and this is that both possess a systematic body of ideas which gradually change their contents. Yet there is an obvious difference in the activity of the judge and the scientist. A judge
is given a case to decide whereas a scientist chooses his own problem of investigation. But, nevertheless, the scientist like the judge accepts a tremendous area of previously established knowledge. He also takes account of prevalent scientific speculations, and this can be considered analogous to a judge who refers to precedent and statute but at the same time interprets in the light of contemporary thought. Polanyi calls this process of adjustment, which seems common to the activity of a judge and the scientist a process of consultation. He states:

"The consistent growth of law and science derives from the consultative acts by which the dynamic systems of law and science are maintained." 18

Even so although there is this consultative element in both science and justice the method of adjustment by which the scientific community comes to a decision cannot be considered entirely analogous to a judge making his decision. His decision cannot be rejected or accepted by the consensus of his peers for it remains a judicial decision whether they agree with it or not. It is true that certain criticisms can be made of the decision in the law journals and elsewhere but as such these cannot deny the decision as the scientific community can deny a discovery. The decision can, of course, be rejected by a higher court which will take into account the judges reasons for making his decision, his conduct of the trial, the precedents to which reference was made and so on.

Polanyi also argues that the scientific community is a spontaneous order backed by persuasion. He states:

"This type of adjustment is exemplified by two opposing counsel trying to win over the jury to their side. When such a discussion goes on in wider circles, each participant adjusts his arguments to what has been said before and thus all divergent and mutually exclusive aspects of a case are in turn revealed, the public being eventually persuaded to accept one (or some)
This quotation indicates that Polanyi is attempting to make a direct analogy between the administration of the law and of science. The analogy to a certain extent is acceptable as ideally the participants in a trial should act in the way he suggests but the comparison is between the activity of one trial and that of the scientific community. It is not between the activity of the judicial community as a whole and the scientific community.

If we look at the term 'spontaneous order' then it must mean that activity develops from within that order without promptings from outside. To say that the scientific community operates as a spontaneous system means that it is self controlled in its activity. As Polanyi points out we can only regard it as a spontaneous system when it follows its task of revealing reality. It can be no longer regarded as spontaneous if it follows utilitarian ends as these ends are prompted from outside the community. If this is the case then can the judicial community be considered as a spontaneously operating system when a judge takes into account when making a decision, "the entire contemporary trend of opinions, the social medium as a whole"? In other words the decision of a judge will be influenced not just by the case in hand and its relationship to the tradition of law and precedent but by an outside factor: the climate of opinion in the social world outside the judicial community.

It can be argued that a spontaneously co-ordinating judicial
system would have to ignore such outside factors. Answers to legal problems could only be arrived at by working out, and then applying the logical implications of legal rules and precedents. In this case the function of the courts would be to work out and apply along deductive lines of thought the principles contained in the law as it stood. The courts would be isolated from policy and the climate of opinion, and the sole duty of the judges would be to apply the principles contained in the law. It would be a far more easy task to substantiate a claim of spontaneous co-ordination for this type of neo-Austinian community but Polanyi seems nevertheless correct in arguing that a system of law does not operate in this way. It is fortunate that it does not as such a system of law would only work after it had already achieved a considerable degree of sophistication. The basic principles of law would have to be well established, and it would be necessary for deductions from them to be able to cope with legal problems that were likely to arise. It is probably impossible to formulate a code of law that can cope with all circumstances and this is why we need judges with interpretative powers. Even so it remains the case that a conceptual system of law can allow for the interpretative powers of judges within a deductive framework. The problem arises when it is necessary for a new principle to be introduced and this can happen even within a highly developed system of law. The necessity for the introduction of new principles arises not because of difficulties within the already existing system of law but because of developments outside the legal system. For instance, the development of trade unions necessitated the recognition that trade unions possessed legal rights.

In fact there is necessarily a continued reference to developments in society and movements of opinion. The most obvious example of this
is in the field of pornographic literature and its capacity to 'deprave and corrupt'. At different times and places literature at one time held to deprave and corrupt can no longer be considered to do so. Public morality changes, and our estimate of people's capacity to be depraved and corrupted changes also. Indeed the insertion of such vague phrases as the capacity to deprave and corrupt into legislation invites judges to take account of the moral climate of opinion. In a sense, of course, it can be argued that this must be bad law for the defendant will have little idea of whether or not the literature he sells will be classed as pornographic. The Obscene Publications Act of 1959 introduced a new defence based on the scientific or literary merit of the work, and which can be supported by expert evidence but the publisher of D.H. Lawrence's novel Lady Chatterley's Lover was acquitted and copies of Cleland's Fanny Hill were burnt. Here we have a situation where a near arbitrary element is introduced into the law itself but on the other hand it would be quite ridiculous to lay down absolutely certain rules to classify pornography, and this is recognised in the vagueness of the law which allows the court considerable leeway in taking account of the climate of opinion.

It is true that, as the legal positivists argue, laws are the rules enacted by the recognised decision procedure of the community but this does not take us very far. Laws are enacted for a number of reasons, for instance, to prevent conflict in the community, to maintain security, to achieve harmony but in the form they are produced they always need interpretation. A new law will be interpreted according to the general framework of the law but also in accordance with the situation it was intended to cope with, as well as the climate of opinion. As a law it is not only part of the legal system but also an instrument to enforce the control of the community's decision procedure. Account is
therefore taken of its social effects, and it is applied with this in mind. Within the very structure of sentencing there is included the possibility of taking account of the social climate for there are minimum and maximum sentences. In a sense we can say that the possibility of inequity is included in the structure of the law in order to make it more flexible in coping with the prevalence of criminal activity.

It would appear then that the structure of certain laws makes it necessary for judges to look to the climate of opinion before arriving at a decision. It also appears that new developments in society may necessitate the introduction of a new principle into the legal system. In this latter case the judges will attempt to fit the principle into the body of existing law as well as taking account of the developments in society that necessitated it. In the former case a judge's decision will be based on a fine balance between interpretations of the law and case precedents as well as a consideration of the social climate. A failure to arrive at a correct balance will give grounds for a successful appeal.

In a modern sophisticated system of law it is in fact unlikely that a new principle as such will be introduced, and more likely that an old principle will be adapted to include a class to which it previously did not apply. A seemingly new principle would usually be a sub-principle derived from a higher principle already existing with a system. However, from a theoretical point of view a new law cannot strictly be said to have been derived from the existing system of law but comes from the community's decision procedure. In this case it will be the legislature, and the legislature can legislate into law entirely new principles or reject old accepted ones. In practice parliamentary lawyers do attempt to make sure that new legislation is consistent with the old. But there is a definite problem here which can create a situation of dispute between
the legislature and the judiciary. The desire of the judges must be to have a completely equitable system where each part is consistent with the others. When a new principle is introduced the judges will probably attempt to fit it into the prevailing system even if they seem to be interpreting away the wishes of the legislature. In effect they are asking the legislature to think again whether or not they wish for such an innovation, which the legal profession does not like, and which is opposed to the prevailing legal system. They are therefore asking the legislature to be more explicit in expressing its wishes, and drawing its and the public's attention to the judiciary's opposition.

The judicial community is then the guardian of a system of ideas and case history which is continuously developed by the contemplation of and the extension of the notions held within it. Yet because it is closely related to the decision procedure of the community it is bound to take notice of the social climate, and is particularly vulnerable to the introduction of principles from the legislature which are contrary to the principles already contained within its own system of ideas.

As the judges do exist within their own community and are committed to the system of laws that exists, or as Polanyi would perhaps say 'revealed justice', they are in a terrible dilemma if the decision procedure legislates principles into law which conflict with revealed justice. As the new law will have passed through the formal decision procedure it is law and cannot be rejected as law by the judges. We have seen that there is the possibility of interpreting it away but if this attempt is countered by the legislature again specifying its wishes the dilemma arises. If the judges are to maintain their commitment and obligation to justice only three alternatives are available:

1. They can try and fit the new principle into the prevailing system of law but if the new principle is inconsistent with the other laws this
would be impossible. (2) They may attempt by reference to some abstract concept of justice attempt to include the new principle into the system even though it would not immediately fit into the present system of law. This would be analogous to accepting a theory that was too far ahead of the system of science as valid in the hope that it would be eventually shown to be so as science developed. This is a doubtful manoeuvre for, although an individual judge could do this and claim he was following his obligation to justice (i.e. his personal knowledge of justice), this would not be possible for the judicial community as a whole. If they did so they would be stating that the principle did fit into the present system of law, and was therefore consistent with it. In this case there would be no problem. (3) The judges could resign or perhaps remain as judges but refuse to implement the new principle. In this case they would be declaring that the law, although it had passed the necessary criteria for being considered law, i.e., it had been duly enacted by the community’s decision procedure, could not be accepted as law. And that to be a law it must not only be correctly enacted but itself must be just and consistent with the present system of law. In this case the judicial community would be claiming a certain autonomy from the rest of the community’s decision procedure, and that part of its function was to protect the community as a whole from the excesses of the legislature for the sake of justice.

This analysis of judicial activity puts us in a position to answer our earlier question: "Is the judicial community a spontaneously co-ordinating body if it takes account of social factors, and does it need to be a closed system to spontaneously co-ordinate?" The system of ideas of the judicial community is closed in the sense that it is concerned only with justice. The introduction of ideas which are not concerned with justice will tend to make inconsistent the system of ideas and destroy judicial
However, the judicial community is not closed in the sense that it is isolated from contemporary happenings, as part of its function is to take note of happenings in the world outside the judicial community and apply their system of ideas to them. Laws introduced merely for the sake of political expediency and not fitting into the system of law are analogous to the interference with science for utilitarian reasons. In other words they are an attempt to turn the judge away from his task in a similar way as the scientist is turned away from his search for the truth by utilitarian interference. The task of the judge is to interpret laws in accordance with the concept of justice inherent in the law as it has developed. In this case to force a judge to apply a law that is not in accordance with the existing system of law, i.e., to administer a law which contains a principle which is inconsistent with the principles contained in the existing system of law, is destructive of his task. As long as the legal "machine is controlled by the principles of justice laid down by the law and interpreted by the legal profession" it remains an independent spontaneously co-ordinating intellectual activity, and is analogous to the scientific community.

Yet is it possible to bring the analogy between the two communities even closer? For instance, is the scientist's search for the truth analogous to the judge's search for justice? It is part of Polanyi's argument that the scientist's search for the truth is a search for the truth about an external reality, and that the system of ideas that make up science contains the scientist's beliefs about the true contents of reality. Truth about external reality, as far as it is available, is contained within the system of ideas of science. In the case of justice, the truth about justice is contained within the system of law, interpretations and case history which make up the law. But can we consider reality
and justice separate to man which man only interprets and expresses in his two systems of ideas? The scientist is trying to say something about a reality that exists in fact, and the judges are trying to reveal and apply a principle which exists as an abstraction. For the scientist reality exists independently of himself, that is, it would still exist if he was not there, although his interpretation of it would not. For the judge justice would not exist if he, or more correctly the human race, did not exist as it is an abstraction of the human mind. Although he could argue that it is an abstraction of God independent to man, or an attribute of a reality separate to man. However, this will not make any difference to the operation of the two systems of ideas. The reason for this is that a spontaneous co-ordination operates because of the existence of inter-personal knowledge within each community. The truth about reality, for practical purposes, lies within the system of ideas of science, and the truth about justice lies within the system of ideas of the law. This is why innovations either in science or law are judged by the truth, as far as it is known, which is held within the system of ideas of the two disciplines, and why innovations have to be consistent with these ideas to be accepted.

A further similarity between the two communities lies in the scientist's and the judge's indwelling in their subject, and their commitment to the ideals and values of their discipline. It would also seem that as we have seen in our study of the scientific community notion of reasonableness can change, and are influenced very much by notions of reasonableness in the community as a whole. For instance, changes occur in what we accept as reasonable evidence so what would have been accepted as reasonable evidence at a witch trial would now be considered unreasonable.
However, these does seem to be a difference in the relationship of scientists with each other as compared with judges. Science contains a competitive element a striving for individual advance and advantage that is not so immediately apparent in the judicial community. A judge cannot advance his career by new initiatives in law but rather by demonstrating his interpretations continuity with the past. It is true that a scientist must do the same, as this is essential if his theory is to be accepted. But at the same time he will put great stress on its innovatory element. A judge is far more concerned with demonstrating the certainty of the law, its unchanging structure and stability. Science, although based on the past looks towards the future, and openly does so. Innovations are therefore stressed and applauded. The innovatory capacity of a scientist is also an important factor in the career structure of science. The good scientist achieves his prominence through his discoveries and his success in meeting criticisms. The judge does not achieve success through innovations in law but ideally through perceiving and classifying what the law states in each particular case. As this is so, with the scientist a competitive element is introduced into the process of discovery, with the judge it is confined usually to the clear expression of existing law. The judge is a reluctant legislator whereas the scientist is an enthusiastic innovator.

In making our analysis of the judicial community we have artificially created a similarity with the scientific community by considering that the judicial community's membership is confined to the judges, when in practice lawyers also form a part of such a community. There is no such division of powers in the scientific community. However, lawyers are really ancillary to the work of judges. They clarify the arguments for the judge, and their function is to help him arrive at a just decision.
For this reason the inclusion of lawyers in the judicial community cannot fundamentally alter the analysis.

In spite of the differences we have considered if we idealize the judicial community, and isolate it from other areas of the community's decision procedure it is certainly possible to apply the sort of analysis Polanyi makes of the scientific community to the judicial community.
We have seen that Polanyi's analysis of the scientific community is applicable with certain modifications to schools of history and the judicial community but the problem arises as to how it can be applied to a more diffuse community, a community which is not engaged in a distinct intellectual activity. An example of such a community is the 'moral community'.

The following analysis, however, does not attempt to fit together the ideal and the actual in the way that we could say Polanyi's concept of the scientific community does. It takes the concept of inter-personal knowledge and applies it to a moral community. In this way the following analysis looks at a moral community from a particular viewpoint: that is knowledge as inter-personal knowledge.

The reason why I use this approach is that we are not considering a non-intellectual community, and it would be difficult to claim that in practice such a community as a moral community has a distinct decision procedure acceptable to its own members. That a member of such a community not only has a commitment to his belief as to what is a moral action or principle but to the moral community as such, under the belief that moral knowledge can only develop under the control of communal or inter-personal knowledge. Indeed a whole tradition has been built up that moral knowledge is really a personal knowledge which does not need to achieve the agreement of others to be considered moral. Such a tradition achieved its peak in the work of Kant and his formulation of the categorical imperative, and a priori principle found out by pure reason. Kant gives further strength to his notion of a moral act by his concept of the 'good will'. If we believe our act is universally valid and therefore in accordance with the categorical imperative it remains moral whatever its consequences.
In the sphere of morality Polanyi also takes up a Kantian position. We are fulfilling our obligation to reality if we act in accordance to our belief as to what is true. We therefore stick to our belief as to what is true whatever the community may say about its truth. In other words we act for the sake of our duty to reality. Polanyi does not expand his concept of inter-personal knowledge outwards into the moral sphere. We cannot as in the case of science, say that we have three 'truths' - truth in accordance with reality, truth in accordance with our belief, and truth if accepted by the community - . A moral truth is then what we believe is a moral truth.

The contents of such a tradition can be challenged on the grounds that, although the principle formulated by Kant can be accepted as a basis for action, its application is far more difficult. It is analogous to stating that a rational hypothesis about appearances to be a scientific law must be universally valid, and then attempting to derive a science from such a principle. This, in fact, is Kant's own approach to science. We look for principles that are, of necessity, universally valid and then begin to build up our knowledge of appearances. Michael Polanyi would accept the belief that in science we are searching for universal laws but the difficulty of doing this in practice leads to a science developing under the control of inter-personal knowledge.

In the following analysis I apply the concept of inter-personal knowledge to the moral community while recognising that it is not an approach Polanyi has made in practice, although it is in accordance with his more general philosophical position.

I propose to approach such an analysis of this community by again looking at, in a slightly different manner, Polanyi's concept of reality and the method of gaining knowledge, and in the process examine the distinction between moral knowledge and scientific knowledge.
Polanyi assumes that the task of all intellectual activity is to obtain the truth. It is a search for a hidden reality, as we can only discover something that is already there and waiting to be discovered. But what is this reality? It appears to be everything around us, everything we know but also a reality we do not know but potentially can know. He states:

"One can discover only something that was already there, ready to be discovered. The invention of machines and the like does produce something that was not there before; but actually, it is only the knowledge of the invention that is new, its possibility was there before." 26

Our knowledge of reality does not only lie within chemical and physical interpretation but goes beyond to a higher level of interpretation. This does not apply only to the natural sciences but to all forms of understanding: "A discovery, a work of art, or a noble act, enrich the mind of all humanity. Man hitherto self centred, enters thereby on a participation in timeless and ubiquitous things." 27

Reality for Polanyi seems to include all existent things and values and all potentially existing things and values. It would appear that this reality also has a distinct structure for it is made up of different levels of existence, and that our understanding of this reality repeats the structure of reality. That is our movement from one level of reality to another in our understanding progressively reveals the actual structure of reality. This can be seen in Polanyi's analysis of evolution and his argument that biology becomes ultra-biology in epistemology but can also be seen when he refers to the discovery of a reality whose "possibility was there before".

As we have seen he argues that we move beyond the world that is immediately apparent to us by the process of indwelling. In the case of the scientist we would be moving beyond mere physical and chemical
appearances of phenomena in order to find a controlling factor. He would provide an interpretation of the phenomena, and this interpretation would be expected to reflect reality. It would provide a description of the controlling factor, and the scientist would become committed to his interpretation that it provided a correct description of reality. This interpretation would not be controlled by the phenomena, the lowest level, but guided by them and purport to be an explanation of the controlling factor which controlled them. A new interpretation would then arise guided by the original interpretation but attempting to provide an explanation of the factor which controlled the second level of reality which the original interpretation had revealed, and so on. Polanyi, in fact, believes that reality is inexhaustible so the process could go on indefinitely.

At the beginning of the process we could consider the reality that we had not yet understood as a world of unformulated possibilities, possibilities that could become factual, that is, recognised as actually existing. It could be argued that this notion of unformulated possibilities, or hidden reality as Polanyi prefers to call it, is a heuristic device used in order to increase our knowledge of the actual world. To a certain extend this is so for it is an argument that there is a reality to be revealed, and therefore there is sense in searching for it. It contains the notion that it cannot be deduced but discovered by a heuristic act, and Polanyi's term 'hidden reality' also suggests that it can be revealed when we find it. However, there does seem to be a difference between my term 'unformulated possibilities' and Polanyi's term 'hidden reality'. His term suggests it will become part of the actual world, and indeed already is but it remains hidden, where my term suggests a set of possibilities that might become part of the actual world. It could be said
that within the unformulated possibilities there lies hidden reality. However, my own phrase seems to stress to a greater degree the necessity for choice, and also contains the idea that the possibilities we are concerned with are essentially theories that may be given the value of factual existence but cannot ever become concrete reality themselves as they are beyond the world of appearances. In a sense my phrase refers to our attempt to know reality Polanyi's to reality itself. However, Polanyi would nevertheless say a discovery reveals reality whereas I would be inclined to say that it provides an interpretation of reality. Possibilities then are interpretations about the world of appearances and hope to provide explanations of the controlling elements behind the world.

The world of possibilia then consists of possibilia that will never become formulated, formulated possibilia that will never be accepted as part of the actual world, that is they will never be given the value of factual existence, and possibilia that will be considered as part of the actual world, that is they will be given the value of factual existence. As far as the scientific community goes we would say that in the last case the possibilia, or hypothesis, becomes part of scientific knowledge, and will be recognised as representing part of the real world.

It is important to recognise that at this stage the possibilia does not exist as a concrete entity because it is only a theory about the real world and in any case could also represent a higher level of reality than the world of appearances. It is a statement about the controlling elements behind the phenomenal world. Karl Popper calls it tentative knowledge but we could really say that for the time being it had been given the value of factual existence. The use of such a phraseology makes it easier to appreciate the connection between scientific and moral possibilia.
are accepted by a moral community, and similarly scientific values, or theories, are given the value of factual existence when they are accepted by the scientific community. Both are discovered by a responsible individual being led to a choice in the world of possibilia. The scientist puts his theory forward to the scientific community by proposing certain additions or modifications to present theory. His action lies in putting forward to the scientific community his theory and claiming that it is correct, although the community decides whether or not it will be accepted as part of scientific knowledge. A moral agent in acting on a moral value he believes is correct and therefore should be accepted by the moral community, is really asking the community to judge it. The community then decides whether or not it will accept the value exhibited in the action as part of the moral code of the community.

Such an analysis may seem destructive of the distinction between normative and scientific laws. In fact it is not but what it does attempt to point out is the resemblance between the gaining of knowledge in the material, or scientific, sphere, and the gaining of knowledge in the moral sphere. Both forms of knowledge are achieved by attempting to understand our experience. Moral understanding is an attempt, from a special point of view, to understand personal and social experiences by developing interpretations about them. It formulates norms of conduct, which if accepted by a group of people become part of the moral values of that community. We could say that they are given the value of factual existence within that community. This does not and cannot mean that they exist as tangible facts but they do exist as generally accepted notions of conduct within that community. In the case of science the scientist formulates an interpretation about facts. The interpretation is then put
accepted it becomes part of the scientific knowledge of the community. It is given the value of factual existence. Likewise this does not mean the theory is a tangible fact, for it cannot be. It does mean that for the time being it exists as a statement about the real world, a statement of our beliefs as to how the real world works.

What then are the differences between moral law and scientific law. Firstly we can say that the object of our attention is different. In the case of morality we examine our internal experience and our relationship with other people from the moral point of view. In the case of science we look at our experience of the material world from a quantitative view. Secondly the methodology is different. In the case of science we use a specialised methodology, we conduct experiments, formulate theories, and put them to the scientific community for acceptance. In the case of morality we formulate a concept of the moral law by considering an actions effect on other people. We consider what our attitude would be if other people followed such a precept - the creation of the Kantian categorical imperative is an obvious example of a method for arriving at a moral law - we then put it forward as a moral law and see whether the community will accept it as such.

There are apparently two other differences: (1) A scientific theory is predictive a moral rule is not. (2) A scientific theory is stating what the material world is a moral rule is stating what the social world ought to be like. But in fact these differences are not as obvious as they at first seem. A scientific theory is not always predictive as it can just be stating what is the case or rather what should be the case if the perfect situation existed. Where it is predictive it is stating that if certain conditions exist then such and such a happening will take place. It is attempting to provide an explanation about cause and effect in a quantitative way. It is really
stating that if all the conditions were perfect such will happen. Generally we can say that under perfect experimental conditions it will happen, or in the world of pure theory it will happen but in the real world it should happen. The use of probability alters the argument slightly, as it is a recognition of incomplete predictability in the real world which has forced itself into recognition in the theoretical world, because the scientist is trying to explain the real world. We could also argue that in a social situation where a moral rule is thought to apply a certain action ought to take place, and in a perfectly moral world (a Kantian intelligible world) it will happen. Only in the real world does ought apply. The distinction between the application of 'is' to facts and 'ought' to moral actions begins to break down. Although it can still be held that there is a distinction between ought to happen and should happen: what when we state such and such an action ought to happen we refer to the action of a rational agent with a responsible choice but when we state that such and such an event should take place in science we do not refer to an agent with a responsible choice.

So far we are left with three clear distinctions: our intention, the methodology, and the difference between a moral action and scientific event. There are two others, one refers to the nature of scientific theory as compared with a moral rule, the other refers to a difference between scientific and moral communities.

We have seen that a scientific theory is intended to represent reality. In our analysis we have indicated that a theory often represents a higher stage of reality which has control over a lower stage but whose limits in its turn are limited by the lower stage. This controlling element is independent of ourselves as it is part of reality and our theory merely represents it. A moral principle is derived by examining our relationship to other people, and is then willed into existence by us. The existence of morality then is entirely dependent on our own existence,
and so is scientific theory but the controlling factor which our theory attempts to explain exists independently to us. Once a moral principle is willed into existence it can control our actions only so long as we will it to control our actions - unless we fail to apply it correctly or an outside factor prevents our action. In the case of the controlling element in reality the control will happen whatever we will.

It is worth stressing again that our scientific theory only represents the controlling element in reality, and as long as the theory appears to represent it adequately we give the theory the value of factual existence. We treat it as if it is a fact, or, in Polanyi's terminology, revealed reality. This then is a fundamental difference between a moral law and a scientific law. As long as we will a moral law to control our actions it can but we cannot will a scientific law to control nature, and we cannot will a controlling element in nature to control nature as it is beyond our willing.

A difference also arises between the sort of community which controls science and the communities that control morality. Whereas scientific theory (science) exists in a tightly knit community morality does not. Scientific knowledge is really knowledge which has been accepted by the community of scientists as knowledge. A community which is made up of peers or near peers. The moral community is not of the same sort, and indeed it can be argued that there is no community of moral agents as such but a number of such communities.

It could be argued that a theological community is a moral community but this would not be correct as it is not a community solely concerned with establishing morality. A theological community like the scientific community would have a moral element in it, for instance, there would be an obligation to reveal the truth about God, but its task would be far wider.
ledge it can be argued that, although we need to speak of communities of moral agents rather than the moral community, the internal structure of those communities will be similar to that of the scientific community.

A moral rule to be a moral rule would have to be accepted by more than oneself, and a claim to moral knowledge would have to be judged by at least one's own particular community. As in the scientific community a claim to universal knowledge can only be accepted if it is recognised by other people. Moral knowledge like scientific knowledge, cannot be purely subjective knowledge but must be public knowledge, or, rather, inter-personal knowledge. In Polanyi's terminology we would say that it was a knowledge that had reached the status of personal knowledge by being accepted by other people as universal knowledge. The attempt to universalise one's proposed action is there but there can be no certainty that one has successfully universalised until other people agree that one has.

When we claim that a moral rule or action is right we are claiming that it is also right for others. If our claim to have committed a moral act is not accepted by others despite our supporting reasons for the action then the action cannot be said to be morally justifiable. It is not justifiable because either we have failed to relate our action correctly to an accepted principle of morality, or the principle we have followed is not acceptable as a moral principle to others. Its claim to universal validity is accepted by no one but ourselves. In such a case we may not give up our claim to morality, indeed our commitment to the principle will make it unlikely that we will give it up lightly, but we may attempt to provide further reasons why the principle we followed or the action we undertook was morally justifiable, and persuade other people to accept
As long as our reasoning is not accepted we will not be acting morally in undertaking the action or following the principle; we will only be claiming the principle we are following is a moral principle.

To a certain extent we will be bound by the traditional morality of our own community and, indeed, will have internalised the moral norms of our own sub-community. Our moral code will therefore be similar to other members of our own sub-community but will probably not be exactly the same as we may have interpreted norms differently, we may have internalised norms from other sub-communities, we may have internalised certain norms which conflict with our own sub-community norms, and we may have added norms of our own. Our moral code will therefore be similar to other members of our own sub-community but nevertheless our own. And because it is our own we have accepted it and on reflection, if we so willed, rejected certain parts of it. We are therefore responsible for it and responsible to it: it is our own personal morality, at least, it is our claim that its contents can be called a morality.

There is an obvious difficulty in such an analysis for, as we have seen there is no moral community in the sense that there is a scientific community. There are a number of sub-communities which have different codes of morality. Under the argument I have used I have to argue that a moral rule is only a moral rule if it is accepted by a particular moral sub-community, as a moral rule to be a moral rule that is part of moral knowledge must be accepted by somebody other than the claimant. As there is not a moral community as such but loose sub-communities with no clearly defined limits we claim it is a moral rule if one other persons accept it. We may claim universal validity for it but it does not have to be universally accepted to reach the status of a moral rule. I cannot then have a personal morality unless it is accepted by others but only a claim to a personal morality.
morality must be accepted by more than one person. Let us examine a theoretical situation.

A person claims the action he proposes is moral. That in the particular circumstances he is operating in he is obeying a moral rule which he claims has universal validity, and therefore should be applied in all circumstances that are the same. His action will be judged by the moral sub-community of which he is a member for its consistency, for instance, whether or not it is consistent with the principle he claims he is following. For its applicability, that is whether or not the principle he is applying is the right one to apply in the circumstances. For its justifiability, whether or not the principle is itself justified in terms of the moral code of the sub-community. If all these requirements are met satisfactorily then the action will be accepted as a moral action. If a requirement is not met then different possibilities emerge. If he fails to meet the requirement of consistency, that is his proposed action is not consistent with the principle he claims to be following, then either his claim is fraudulent or mistaken. If he undertook the action and his claim was fraudulent he would be acting immorally but if his claim was mistaken he would not be acting immorally. However, neither would his action be moral but perhaps he could be persuaded to see that he was mistaken, and that the action was not in accordance with the principle he claimed he was following. If the requirement of applicability was not met it would mean that the principle either had no application to the circumstances, or that the principle used was not ranked in accordance with a hierarchy of principles that was acceptable to the sub-community - that, although it could be considered in examining the
circumstances, other principles overruled it. The proposed course of action in this case could not be immoral because in applying the requirement of applicability the assumption is already being made that such a principle is acceptable to the community. It could not, however, be moral. Again as a member of the sub-community it should be possible to persuade him of his mistake. The final requirement of justifiability requires the principle as a principle to be acceptable to the sub-community. A justification would consist of showing that the principle was part of the moral knowledge of the sub-community, or that it should be accepted as part of the moral knowledge of the sub-community. A complete justification would show that the principle used was acceptable to the sub-community, that it was the right one to apply in the circumstances, and that the proposed action was consistent with the principle.

In practice the situation is far more complicated. A sub-community may be very small, and it may be inter-locked with other sub-communities. A moral sub-community may have a core of morality in common with other sub-communities but certain principles which are peculiar to itself. The case may arise where a person may belong to more than one sub-community, and at times the principles of these sub-communities may conflict. In such a case, according to our analysis, we would have to say that an action based on such conflicting principles would be immoral for one such sub-community but moral for another. From a more general point of view we would say his action was moral if it was acceptable to one of the sub-communities to which he belonged.

It does seem possible that to a certain extent, we can overcome such complications by bringing the sub-communities together. Society as a whole will be made up of a series of sub-communities, and we can expect there to be a large number of commonly held moral principles: a sort of equilibrium range of principles. The peripheral principles held by different sub-communities but not held by all will be continually put forward for common acceptance, as a moral principle always has a claim to universal
validity. And, as in the intellectual communities we have considered, there will be a body of knowledge by which to judge these claims: a body of commonly held values and principles with which innovations will have to show consistency.

However, it is not possible to take the comparison with intellectual communities much further. If we take the moral community to include all sub-communities, and develop a notion of an equilibrium core of values and principles then we have included the whole of society. In this case, unlike intellectual communities, its membership is not restricted to people with certain formal attainments. Everybody will be a member of such a moral community. Nevertheless it can be argued that it is a community for it has a certain informal decision procedure by way of a loose consensus, and it has sanctions at its command as it can criticise, and even ostracise. What it cannot do is to force members outside its own limits for it contains everyone. It is perhaps possible for a person to be shoved out of the smaller sub-communities but he cannot be shoved out of the wider community. Even so the essential similarity with the other communities we have considered is the commitment of the knower to his belief, and that moral knowledge is decided on by the inter-personal knowledge of the community or sub-communities, and that it is not a purely personal belief. In fact this argument is even stronger than with the scientific community, for instance, with science we can argue that knowledge can be knowledge if it is in accordance with reality whatever the scientific community may say - this is true but we have no means of knowing that it is knowledge, and what we do know suggests that it is not - we cannot do the same with morality. The reason for this is that we bring moral principles into existence, and, although we can argue that the criterion of there validity is their universifiability, we must also admit
that there must be some test of their universifiability. There are only two alternatives at this point. Either we state that our own decision decides on the universal validity of a principle, that our belief therefore provides a sufficient degree of certainty, or that the agreement of our fellow beings is necessary to provide a sufficient degree of certainty. It is the argument of the theory of inter-personal knowledge that the consensus of a community provides a greater degree of certainty than the belief of an individual member, and therefore provides a greater justification for a claim to knowledge than an individual belief no matter how certain.
In examining the claim of personal knowledge to be classed as knowledge we come up against a fundamental difficulty. Personal knowledge occurs after the process of indwelling, and is a belief for which we claim universal validity. Yet can this be called knowledge? In a case where a claim to personal knowledge is rejected by the scientific community to claim that we still have knowledge in spite of this rejection by the acknowledged authorities is hard to justify. Yet it is possible to argue that if in fact the claim we put forward was a correct interpretation of reality - we revealed correctly an aspect of reality - and this was rejected by the community then all along we could say we had knowledge.

This is so but it must be remembered that we can never be absolutely certain that what we believe is a correct statement about reality. In practice the theory's acceptance by the community is used as a criterion of truth, and as our knowledge cannot be certain then this is a more reasonable criterion than the decision of one man. It would be introducing an arbitrary element to give an individual the power to decide what is knowledge.

However, such an analysis can be challenged on the grounds that not only the decision of an individual will be arbitrary but so would the decision of the scientific community. The arguments could be developed by pointing out that a theory that at one time could be accepted as knowledge at another time could be considered as false. This applies not only to a theory itself but to the methodology, and procedures of science. The acceptance of theories and methodology can change over a period of time. They are therefore unstable and are always liable to be rejected by the scientific community. As this is the case any appeal to the consensus of opinion within the scientific community, and the acceptance of the
authority of mature scientists to judge a theory's validity, must be considered an arbitrary practice.

An attempt can be made to meet these objections on four grounds. (1) There is no other more reasonable method of deciding on the validity of a theory. There are only two possible alternatives for judging a theory: either the individual judges his own theory and declares that it is scientific knowledge, or the theory is judged by the authorities on the subject, and they will judge it by reference to the system of ideas which have already been accepted by the community. The first alternative would be so arbitrary that we can consider it as a non-starter, and even if we agreed that the second alternative was arbitrary, it would be far less arbitrary than leaving the decision to the individual scientist. (2) It does seem to be the case that no single theory in the system of science is certain of maintaining its position within the system, but this does not mean that every item of knowledge within the system is likely to lose its place. There is a fairly stable body of knowledge that remains stable, and although it is the case that certain items of knowledge may lose their place the majority of them will not. For instance, it is unlikely that a securely established theory will lose its place, and it will only lose its place after a series of failures and not by one dramatic refutation. Even then it is likely to remain for restricted use. A theory gradually slides out of the system of science and is not suddenly hurled out. (3) The decision of the community is not really arbitrary as it is part of a task which has continued over the centuries with a good deal of continuity in method. There is also continuity in theory. New theories are developed from the old sometimes by drawing out intimations which already exist within the system of ideas. A theory is rarely blatantly false but only inadequate, and the discovery of an inadequacy often leads the way to new discoveries in attempts
to resolve the inadequacy. In other words we can say that the system is on the whole stable, and is not subject to constant change in all its aspects because every item of knowledge does not change at the same time. The process of judging a theory by communal knowledge cannot be considered arbitrary as it is quite rational to judge a claim to knowledge by knowledge we already possess, and indeed we cannot do anything else.

These four grounds to justify the non arbitrary nature of a decision of the scientific community do seem to succeed in their task. However, they have failed to indicate that whereas the decision of the scientific community is non arbitrary the decision of the individual is arbitrary. This in fact cannot be shown for as it is quite rational for the scientific community to judge a claim to knowledge by knowledge they already possess so it is rational for an individual to do the same. An individual in judging the truth of his own theory will compare it with knowledge he already possesses as a member of the scientific community. And a large part of this knowledge will in any case be acceptable to the community. However, we are dealing with a claim to universifiability, and it is the recognition of human fallibility in dealing with such a claim that is a major reason for the formation of the scientific community. It is a belief that a claim is more likely to be universifiable or the truth if other people accept it. This is so although acceptance cannot give us certainty in its truth, although it may be able to provide us with a greater feeling of confidence in its truth. The argument gets very near to the statement that majority agreement is a criterion of truth. Polanyi avoids this by the use of such words as 'consensus' and 'general will' but even so we cannot really say that a general feeling of agreement is a criterion of truth. What we can say is that in practice general agreement is used as a criterion to decide whether or not a theory should be given the status of truth.
We have failed then to prove the non arbitrary nature of the
decision of the scientific community as compared with the arbitrary nature
of an individual decision. Both can be considered rational decisions,
although the balance of the argument seems to favour a communal decision
as we are dealing with a fallible human being's universal claim. We have
arrived at the point where it must be admitted that as we cannot have a
direct revelation of the truth the claim of both personal and inter-
personal knowledge to achieve the truth has a certain degree of justificat-
on, as both can provide reasonable claims. Yet it can still be argued
that in the case of science the decision of the scientific community is
far more reasonable, such an argument refers back to the structure and
nature of the community. If we have originally agreed that scientific
knowledge can only develop within the scientific community controlled by
the joint authority of its members, and have become a member of that
community then it is irrational - a contradiction - to argue that an
individual member can decide on the truth of a discovery. He cannot
decide himself that his theory should be taken into the body of science.

This does not mean a scientist has to give up his claim to knowledge
if it is rejected by the community. A favourable decision by the community
is necessary for a theory to be counted as part of knowledge, for it to
be given the status of knowledge for the time being, but it is not a
sufficient indication of knowledge. We have seen that the knowledge of
the community is tentative and may change, and as this is the case an
adverse decision may be reversed, so therefore a scientist is justified in
pressing his own claim to knowledge by producing more evidence and persuading
others of its truth.

As other intellectual communities possess a system of ideas, judge
claims of knowledge by reference to their system, and admit the claim of
their community to accredit knowledge then the same arguments can be used with reference to them. The argument is not so apparent when we apply it to a non-intellectual community, for instance, the moral community. However, the argument for inter-personal knowledge is again slightly stronger than an argument for personal knowledge as we are still dealing with a universal claim. This is particularly so when we consider the complications of practical morality. Yet we cannot say that it is irrational to claim an action is moral in spite of everyone else's rejection of it, as we have accepted the authority of a moral community. We certainly have not explicitly accepted such authority, although there is a good deal of experiential evidence which suggests that we do tacitly accept membership of a moral community, and do take note of its reactions to our claims to morality. At any rate in our analysis of the moral community and sub-communities we have attempted to show how the concept of inter-personal knowledge can be applied to them. And indeed if we strictly applied the concept of personal knowledge without balancing it against a concept of inter-personal knowledge we could not really write of the existence of a community.

We have argued that the moral community has an equilibrium range of morality, that is a hard core of commonly held beliefs and values or moral knowledge that can change over a period of time but is fairly stable. However, in a period of rapidly changing morality, where the outer layers of the core are in a state of flux, the decisions will certainly be more arbitrary than the intellectual communities we have examined. As the core gets smaller the possibility of a consensus or common opinion arising gets less, and there is an increased likelihood of the proliferation of moral sub-communities. Yet as this can also happen in certain intellectual communities, for instance, in the field of theology this does not make the moral community unique. I have explained this sort of happening in the Church.
with reference to the analysis I have used:

"Polanyi's model of a community bound together by faith can quite well be used as a model of church history: the unitary church, the breakaway movement, further breakaway movements, and even breakaways from the breakaways. Yet, as church history continues and doctrine is revised and altered, there again appears the possibility that an earlier breakaway movement can be accepted once more into the main movement, since the doctrine of the breakaway movement may now be acceptable to the mother church." 35

However, as the structure of the moral community is and moral sub-communities are informal it is theoretically much easier for a new consensus to arise when a period of rapid change ends, whereas in the case of the church there are further problems:

"Although a breakaway church may have a doctrine which has become acceptable to the mother church, it may well have formed a structure and hierarchy of its own. It may well be psychologically opposed to the mother church because of the traumatic experience of the original breakaway and the attempts to bring it to heel." 36

In the case of the moral community this would not be so for the original conflict would not have been institutionalised into the community's structure.
Notes Chapter Six

5. The Study of Man, op. cit. p. 72-3.
6. Ibid., pp. 73-4.
7. Ibid., p. 74.
8. Ibid., p. 74.
9. Ibid., pp. 75-6.
10. K. Marx, Brumante of Louis Napoleon.
12. The Study of Man, op. cit., p. 77.
13. Ibid., p. 80.
15. See Personal Knowledge, op. cit., p. 405.
16. Logic of Liberty, op. cit., p. 162.
17. Ibid., p. 162.
18. Ibid., p. 164.
19. Ibid., p. 165.
20. Ibid., p. 162.
21. Section 1 of The Obscenity Publications Act 1959 provides that an article is obscene if its effect is, "if taken as a whole, such as tend to deprave and corrupt persons who are likely, having regard to all relevant circumstances, to read, see or hear the matter contained or embodied in it."
22. Therefore supporting an argument such as H. Kelsen, *General Theory of the Law and the State*, Cambridge, Mass. 1947, that law should be a deductive system derived from one basic principle. In practice it is virtually impossible to isolate law from the climate of opinion.

23. A recent case supporting such an interpretation was that of Lady Duff Cooper when the Lords put aside a lower court decision that she was guilty of an offence of possessing drugs even though she did not know that the drugs were on her tenants property. The lower court decision opposed the principle of mens rea, and could not possibly be an interpretation which Parliament intended. (Sic) Also Sweet v Parsley (1970) Appeal cases 132.


25. For instance, it would be difficult to argue that a member of a cannibal tribe who declared eating people was wrong was making an immoral statement because it opposed the inter-personal knowledge of the cannibal community. We could argue however that he was making a statement which he claimed was moral but which no one else accepted. Ockham really formulated such a principle of personal knowledge when he argued we could not have a direct revelation of God and therefore had to rely on what our consciences led us to believe he wanted.


27. Ibid., p. 60.

28. This use of the term unformulated possibilities to replace Polanyi's concept of hidden reality was originally introduced in R.J. Brownhill, 'Towards a Philosophy of Technology', op. cit., p. 611.


30. It represents it in a very abstract way under the category of quantity.

31. See Langford's and Brownhill's articles in the *Journal of Religion*.

32. A similar concept of the equilibrium system formulated by Talcott Parsons.
"The social system's own equilibrium is made up of many subequilibriums within and cutting across one another, with numerous personality systems more or less in internal equilibrium, making up different equiliberated systems such as kinship group, social strata, churches etc. All enter into a huge moving equilibrium in which instabilities in one sub-system in the personality or social sphere are communicated simultaneously to both levels, either disequilibrating the larger system, or part of it, until either a re-equilibration takes place or the total equilibrium changes its form."


33. Although according to Polanyi's argument, we are nevertheless bound by our scientific conscience to declare that we have knowledge even though we accept the decision of the community.

34. A similar justification of communal knowledge is made in W.H. Walsh, "Knowledge in its Social Setting", *Mind*, vol. LXXX, No. 319, July 1971.

35. "Michael Polanyi and the Problem of Personal Knowledge", op. cit.

36. Ibid.

37. In R.J. Brownhill, "Scientific Ethics and the Community", *Inquiry*, vol. 11, 1968, much greater emphasis is placed on personal knowledge in an expansion of Polanyi's ethics of the scientific community.
Our final problem is to see how Polanyi's system of thought can be used to provide a reasonable interpretation of the wider political community. Quite clearly there are certain essential differences between the structure of the scientific community and the political community, although there are also similarities.

The scientific community has a restricted membership as it is restricted to those people who have passed through a master/apprenticeship relationship, and have eventually gained their own contact with reality. These mature scientists share authority within the community, and taken together form the decision procedure of the community. In the wider political sphere there is no restriction on membership as virtually everyone within a particular geographical area is a member of that community. Not everyone shares authority and not everyone participates in the decision procedure. It is true that in certain cases it is possible for a person to be thrown out of the political community, for they can be banished or exiled, but on the whole a political community is stuck with the members it has got. It cannot get rid of a person who continually disobeys the rules, and it cannot get rid of the intellectually inferior. This is not the case with the scientific community for as we have seen it can get rid of a person who continually disobeys the rules merely by no longer recognising them as mature scientists. As their membership and authority within the community is based on this recognition a withdrawal of it destroys their authority, and prevents them from influencing the decisions of the community.
Polanyi approaches the political community in the same way as he has approached other communities by using the concept of personal knowledge controlled by inter-personal knowledge. A person can be free to choose the action he wishes but his choice will be restricted by traditional concepts of freedom of choice.

In developing his argument he makes the assumption that man will search for the truth. Indeed that man has an obligation to search for the truth. He derives this assumption from his evolutionary theory that man has within himself an 'active force' which is striving for achievement, and an eventual consummation with reality. Yet our experience tells us that man often is not concerned with the truth, and may be far more concerned with searching for a life of pleasure or idleness. All that Polanyi can argue is that if such an active force or an active centre exists then man should have a tendency to search for the truth. A further complication arises as we can never be certain that we have gained the truth but only believe that we have, and this belief may not be shared by others. We have seen that in the intellectual sphere communities are developed in the hope that communal beliefs will prove more certain than individual beliefs, and that in the non intellectual sphere communities can be said to exist also, and that individual beliefs will be judged in both cases by inter-personal knowledge. However, the paths to the truth are numerous and not certain so much leeway has to be given to individual initiative. In this way a large degree of freedom is necessary as it increases the likelihood that the truth will be obtained but it must be controlled freedom or anarchy will reign. It is therefore restricted by the inter-personal knowledge of the community.

This again brings us to the problem we met in the previous chapter as to why communal knowledge should provide a greater degree of certainty than
personal knowledge if the truth cannot be known. We have seen that if we generally agree on certain things we develop a stronger feeling of its certainty. We have more confidence in it. The development of communal knowledge as a structure we can build on also can provide us with a feeling of progress, combined with continuity. The wish for certainty can be ameliorated by the seemingly certain structure of stable ideas contained in the tradition, and can be used as a base to reach out into the unknown. Speculation is controlled by tradition and in this way we can seemingly prevent our knowledge from becoming arbitrary and chaotic. The conclusion must be that communal knowledge will tend to provide a greater degree of psychological certainty and therefore that which we call knowledge will usually progress under its control.

For Polanyi then a free society will be one which fosters a search for the truth, and that recognises that an individual has an obligation to do so. He states:

"The free society - of which a free scientific community naturally forms a part - can be defended only by expressly recognising the characteristic beliefs which are held in common by such a society and professing that these beliefs are true. The principal belief - or should I rather say the main truth - underlying a free society, is that man is amenable to reason and susceptible to the claims of his conscience. By reason are meant here such things as the ordinary practice of objectivity in establishing facts and fairness in passing judgments in individual cases. The citizens of a free society believe that by such methods they will be able to resolve jointly - to the sufficient satisfaction of all - whatever dissension may exist among them today or may arise in the future. They see an inexhaustible scope for the better adjustment of social institutions and are resolved to achieve this peacefully by agreement."

It can be seen that Polanyi is using a number of traditional liberal arguments to support his claim to freedom and strengthening them by his
evolutionary theory. His liberal argument develops as follows. Man, who is a rational agent, has an obligation to himself to search for the truth, and if we fail to allow him to do so by not giving him freedom we are failing to treat him as a rational agent and are not recognising the claims of his conscience to control him in this search. At this point Polanyi moves away from strict liberalism for if we are not to have intellectual anarchy man must work within a community. He should be free to pursue the truth in his own way but if his claim to the truth is to be accepted as such by others the community must make an affirmative decision. This does not mean an individual then has to give up his claim to the truth as this would be telling him to disobey his own conscience but that he should accept the community's right to make the decision. In the community as a whole we can say that rational man should undertake reasonable actions but if an action is to be reasonable it must appear to be reasonable to to others. In a free society man will undertake free reasonable actions controlled by a traditional concept as to what constitutes a reasonable action.

However, we have seen that experience tells us that not all man are bound by their conscience, are reasonable, or search for the truth. There may be a communal inclination to do so (really a species inclination to do so) but not everyone will have such an inclination. But such people cannot be forced out of a political community and it may be that the normal pressures of tradition are not successful in achieving compliance. In such a case the tradition of inter-personal knowledge will have to be backed by the law and ultimately by force. Again this does not mean a person who is following his conscience will be forced to disobey his conscience. He can continue to follow the usual methods of dissent as long as he does not go outside the wide framework of the law. We can say then that the law will
reflect the tradition, shared values,\(^3\) or what we call the inter-personal knowledge of the community.

Polanyi in writing of the free society states:

"The ideal of a free society is in the first place to be a good society; a body of men who respect the truth, desire justice and love their fellows. It is only because these aspirations coincide with the claims of our own conscience, that the institutions which secure their pursuit are recognised by us as safeguards of our freedom. It is misleading to describe a society thus constituted, which is an instrument of our consciences, as established for the sake of our individual selves; for it protects our consciences from our own greed, ambition, etc. Morally, men have to live by what they sacrifice to their conscience; therefore the citizen of a free society, much of whose moral life is organised through his civic contacts, largely depends on society for his moral existence. His social responsibilities give him occasion to a moral life from which men not living in freedom are debarred. That is why the free society is a true end in itself, which may rightly demand the service of its members in upholding its institutions and defending them."\(^4\)

As in such a society the laws and institutions will reflect the consciences of its members, their shared values, there can be no conflict between the state and the individual for the, "the institutions which secure their pursuit are recognised by us as safeguards of our freedom." The law of such a society bring to our attention obligations which we have forgotten, "it protects our consciences from our own greed." The laws as they are derived from our consciences supplement its attempt to control any failure to recognise our obligations.\(^5\)

The free society then becomes the just and moral society where excesses in individual initiative are controlled by the operation of the community's conscience through the law and through the process of socialisation. The law becomes not opposed to man's morality, as some liberals suggest,\(^6\) but derived from it, and acts to remind us of, and to stimulate our
obligations. Polanyi is in fact putting forward the argument for constitutional freedom with the proviso that the law and the institutions should mirror the shared values of the community.

He is also introducing a specific theory of political obligation with the statement, "It is only because these aspirations coincide with the claims of our own conscience, that the institutions which secure their pursuit are recognised by us as safeguards of our freedom." The ideal society for Polanyi is where individuals and intellectual communities recognise their task of searching for the truth, and where the political institutions reflect this intention, and allow its free pursuit under the control of communal traditions. Yet only rarely does such a society exist. It is ideal because it coincides with the claim of our own consciences at the peak of their development. In other words the institutional structure will reflect communal shared values, and if it does not reflect these values then we have no political obligation to support it. However even if the ideal is not achieved we may still have an obligation to support the political institutions if they reflect the shared values of the community. The obligation arises because the political system by mirroring the shared values achieves extrinsic value because on the whole it values the things we value. It allows us to pursue the 'truths' we believe in.

This also tells us when a political obligation can lapse. If laws are constantly being passed which we find repugnant. Laws that are opposed to our values then this can gradually build up until we realise that the political system is no longer providing the conditions necessary for the survival of our values. As its value was derived from allowing and mirroring the values we valued if it fails to do so then it can no longer have any value for us. We therefore do not have a duty to submit
ourselves to it or obey it.

We can say that an individual no longer has a political obligation to a system when it no longer values the things he values. This would be an analogous situation to a scientist who found the scientific community not only rejected his theory but rejected other things he cherished, for instance, his methodology, or the pursuit of the truth replacing it, perhaps by the pursuit of utility.

Grounds for rebellion would arise not when an individual citizen but the vast majority of citizens felt that the political system no longer nurtured, or even provided a threat to the existence of their values. Rebellion would be justified if the government blatantly rejected the shared values or inter-personal knowledge of the community.

Similarly to my analysis of the moral community Polanyi believes that, although it may not be possible for a community's tradition - the communal way of life - to become systematised in the way we find with intellectual communities, it is possible for that tradition to show coherence. It should therefore be possible to use it as a basis to judge a government which rejects the tradition. He states:

"A country in which questions of conscience are generally regarded as real, and where people are on the whole prepared to admit them as legitimate motives and even to put up with considerable inconvenience or hardship caused by others acting on such motives - such a country is a free country.

These contacts with transcendent obligations may reach high levels of creativity. They may inspire prophetic announcements or other great innovations. In some fields - as in science, in scholarship or the administration of the law - this will contribute to the development of an intellectual system. In this case we can observe a process of definite self-co-ordination. But all contacts with spiritual reality have a measure of coherence. A free people among whom many are on the alert for calls on their
conscience, will show a spontaneous coherence of this kind. They may feel that it comes from being rooted in the same national tradition; but this tradition may well be merely a national variant of a universal human tradition. For a similar coherence will be found between different nations when each follows a national tradition of this type. They will form a community of free people. They may argue and quarrel yet will always settle each new difficulty in the end firmly rooted in the same transcendent ground.\textsuperscript{10}

It would seem then that it should be possible to use a tradition to criticise governmental action and even to justify rebellion if a government continually fails to act in accordance with the tradition. However, such an act of rebellion can only be a very rare occurrence. We have seen that law is derived to a large extent from the core values or fundamental traditions of the community. It has been developed systematically within its own sub-community but even so remains in contact with communal traditions. It is possible that as the tradition alters the law itself will not alter to the same degree. In this way there does arise the possibility of conflict between the shared values of the community and the law. If we use Polanyi's phraseology we can say that the law may not coincide with the conscience of the community — the communal General Will. More probable, however, is the situation I have considered when examining the judicial community where laws do not coincide with the existent system of law. As we have seen the reason why this can be so is that a law to be a law has to pass through the formal decision procedure, and if it does so it is a law even if it does not coincide with the existent system of law. The judiciary following its obligations should fight against such laws, and would be in a far better position to see the 'illegality' of the laws than the general public. Yet if the judiciary did forsake its obligations or was overruled then it would be up to the public to reject the 'illegal' laws, and the government that instigated
them on the grounds that they were not only inconsistent with what had
been previously accepted as law but were opposed to the shared values
of the community. They were inconsistent with the inter-personal
knowledge of the judicial community and the inter-personal knowledge of
the community as a whole. It would be difficult to justify such an
action for the shared values of the community are not systematised although
they are coherent. Nevertheless reference would have to be made to
them to prove the 'illegality' of the new laws. 11
A Traditional Society

Polanyi is proposing a liberal society where the excesses of individual initiative are controlled by tradition and the law. An attempt, for instance, to extend the area of individual freedom will be controlled by the social pressures within one's own sub-community, the community as a whole, and ultimately by the law. Initiatives can be allowed but only as far as they are able to gain acceptance. Polanyi states:

"Can we face the face that, no matter how liberal a free society may be, it is also profoundly conservative?
For this is the fact. The recognition granted in a free society to the independent growth of science, art and morality, involves a dedication of society to the fostering of a specific tradition of thought transmitted and cultivated by a particular group of authoritative specialists, perpetuating themselves by co-option. To uphold the independence of thought implemented by such a society is to subscribe to a kind of orthodoxy which, though it specifies no fixed articles of faith, is virtually unassailable within the limits imposed on the process of innovation by the cultural leadership of a free society...... we must also face the fact that this orthodoxy, and the cultural authorities which we respect, are backed by the coercive powers of the state and financed by the beneficiaries of office and property." 12

Polanyi uses the word "tradition" as a word to cover not only specific systems of thought but less specific, for instance, the tradition of the moral community, and the political mode of behaviour in a community as well as the scientific or legal tradition. From a theoretical point of view it does seem possible to place the different modes of thought into communities or sub-communities exhibiting inter-personal knowledge and operating under the control of their members. The members of the different communities judge initiatives by the knowledge they already
possess, i.e., by traditional knowledge. Society under such an analysis becomes controlled by tradition, meaning the traditions of these communities. Although we can break down this concept of tradition into the traditions of the different sub-communities in the wider community this would not be entirely faithful to Polanyi's philosophy for as we have seen tradition has a certain coherence. In fact it is possible to distinguish between three meanings of the word tradition: (1) The tradition of a sub-community, for instance, the tradition of the community of scientists meaning not only science but the methods of science and the obligations of the scientists. (2) The joining together of all the traditions of the sub-communities into the communal tradition. (3) The core tradition of all the sub-communities, that is the tradition they have in common. Under Polanyi's concept of the ideal society this would include the transcendental obligations to reality (the truth), the operation of individual initiative under the control of authority, the judgment of initiatives by inter-personal knowledge. Indeed it is the commonly held core values which gives coherence to the tradition.

Two questions seem important in considering the concept of a traditional society combined with the notion of a free society: Is it possible to create a free society before the tradition of that society has sufficiently matured? And is it possible that a society that is not free can nevertheless be following tradition if we accept Polanyi's notion of man searching for the truth?

Polanyi argues that it is not possible to create a free society unless the tradition is one which allows the existence of such a society. In writing of the French Revolution he states:

"In the course of the seventeenth and eighteenth centuries British public life developed a political art and a political doctrine. The art which embodied the exercise of public liberties was naturally
unspecifiable, the doctrines of political liberty spread from England in the eighteenth century to France and thence throughout the world, while the unspecifiable art of exercising public liberty, being communicable only by tradition, was not transmitted with it. When the French Revolutionaries acted on this doctrine, which was meaningless without a knowledge of its application in practice, Burke opposed them by a traditionalist concept of a free society.  

Polanyi is arguing here that, although it may be possible to withdraw certain elements within a tradition to make an ideology, the ideology cannot be effectively applied in practice because "the unspecifiable art of exercising public liberty, being communicable only by tradition was not transmitted with it." He is using two arguments; the first is that we cannot include within an ideology the tacit part of a tradition as this can only be understood by experience within a tradition. The second is that it is really an impossible task to place an alien tradition or knowledge into a community which already possesses its own inter-personal knowledge. It is impossible because the new knowledge will not be consistent with the old and will therefore be unacceptable. If a community is to be a free community it will have to wait until its own tradition allows the possibility of freedom.

The answer to the second question is now apparent. A society that is not free may nevertheless still be following its own tradition, and any attempt to create a free society is bound to fail unless it consists of a gradual attempt to move such a society along the paths of freedom. It must also be admitted that it is theoretically possible for a tradition to move away from that of a free society. As for Polanyi a free society is a society where man is best able to pursue the truth this would apparently be a situation where man had forsaken his commitment to and search for the truth, and had forsaken his evolutionary task. But as he points out, "The widely extended network of mutual trust, on which the factual consensus of a free society depends is fragile." Although conversely it could be
argued that as we can never be absolutely certain that we have achieved the truth our belief in the capacity of freedom to provide the necessary conditions for its search may be mistaken.

There are obvious difficulties in such an analysis as the communities considered are not mutually exclusive. A member of an intellectual community will also be a member of a moral community and a political one, although probably not a member of another intellectual community. For this reason it is possible to envisage clashes between different traditions. For instance, a clash between the tradition of the scientific community and the political community. The search for the truth undertaken by the scientific community may clash with contents of a political ideology supported by the political community. The necessity for freedom in the pursuit of the truth may also challenge the structure of the state. It may also be the case that the contents of the traditions of the different sub-communities are so much in conflict that very few core values emerge or that certain core values are overruled by powerfully supported peripheral values. In such a case it is extremely difficult for a communal tradition (under the third meaning of the word) to arise and we can say that there can be no coherence in the tradition and that there can be no community.

Polanyi avoids these possibilities in his ideal society by assuming that the political institutions will be derived from and support the same values as the intellectual communities, which will themselves be derived from the shared values of the members of the community as a whole. He also assumes that in any society there will be an inherent tendency for the structure of the state to mirror the shared values of the community as a whole. A revolution can never bring into being a new set of values but can only return the state to a position where it reflects the existing
shared values of the community. Revolutions if they are to be at all successful must aim at a return to the tradition which had been forsaken by the overthrown government.
In this section when I refer to the community of politicians I mean not only the elected politicians but public servants in general. People whose work is specifically to serve the public interest.

An expansion of Polanyi's theories into the sphere of politics brings our a similarity between his work and the work of Michael Oakeshott, although in many respects the similarity is only superficial for Polanyi's ontology and epistemology is very different from that of Oakeshott. Like Oakeshott he denies the possibility of transplanting a tradition from one society into another because at best the tradition transplanted can only be an abridgement of the real tradition. It cannot, for instance, include the experience of operating within the tradition. This leads us to another similarity for a politician must be experienced in a particular tradition in the same way, "that only a man who is already a scientist can formulate a scientific hypothesis". Polanyi also seems to agree with Oakeshott that politics is "the activity of attending to the general arrangements of a set of people whom chance or choice has brought together". This means for Polanyi that politics provides the required framework for the operation of a free society.

Yet following our adaption of Polanyi's concept of communities or sub-communities operating under the control of inter-personal knowledge we are led to argue that a community of politicians will exist with their own professional ethic and activity. The tradition that they will be specifically concerned with is that of their own sub-community but in the ideal situation this tradition will reflect the shared values or political traditions of the community as a whole. As it cannot be claimed that the community of politicians is concerned with an area of scholarship, as it
is not a strictly intellectual activity, its tradition will not be systematised, although it will be coherent. One of its functions will be to see that the public institutions it controls and the political activity it engages in reflects the changing traditions of the whole community. Like Oakeshottian politicians they will be concerned with pursuing intimations within their own sub-communal and communal traditions but their task will be far more active than this. They should attempt at certain times to lead the tradition, to reach out for new revelations of reality. The reason why this is the case is that the Polanyi politicians have an end to aim for whereas the Oakeshottian politicians have not. They sail "a boundless and bottomless sea; their is no harbour for shelter nor floor for anchorage, neither starting-place not appointed destination".\textsuperscript{18} As man for Polanyi is engaged in a process of evolution striving towards an ultimate consummation then the task of the politicians must be to provide the necessary conditions for the continuance of this striving within the limits of the prevalent political tradition. But it must also be their task to provide the community with a freer society in order that this striving has a greater possibility of achievement.

Like the members of the other sub-communities we have considered the politician is trying to understand an aspect of reality. He has an obligation to the tradition of his own sub-community as well as a duty to provide initiatives to indicate where the tradition should go. He has then to use Polanyi's terminology, an obligation to the reality that has already been revealed as well as to the reality that has not yet been revealed. This can be expressed in a more orthodox manner by saying that he has an obligation to act in accordance with what he believes is in the public interest. His claim will be checked not only the community of politicians but by the wider political community which have a vested interest in the activities of politicians.\textsuperscript{19}
Although from a theoretical point of view the Polanyi type politician has end end to aim for whereas the Oakeshottian politician has not, in practice the distinction is not quite so clear. The paths to the final end are not known and are presumably numerous. The hope for the politician as he pursues his intimations is that by following the tradition or at least by keeping within the bounds of the tradition he is keeping an 'even keel' towards an unknown destination. The theoretical reason for the difference is not only grounded in Polanyi's concept of the final end but that whereas Oakeshott argues that man can only continually turn back on his own thoughts and examine this activity, for Polanyi man is reaching out for a hidden reality. Whereas Oakeshott's politician continually pursues intimations with a tradition - he can do nothing else - Polanyi's politician will be active in providing initiatives beyond the tradition even though this activity will be controlled by the tradition. He has after all transcendent obligations.

Yet in considering the tasks of the politician can it be said that the sort of decision he makes can be compared with the scientist's search for the truth? Can it be said that the politician is concerned with obtaining a political truth?

Political decisions like all decisions are choices amongst alternatives and it may be possible to call the best alternative a political truth. Polanyi seems to accept a similar argument when considering the scientific community. A scientist makes a choice between different possibilities, and is psychologically certain that the choice he makes is the truth. If the choice or decision is accepted by the scientific community it is considered the best available decision at that time. In other words for the time being it is given the status of truth. Of course there is a great difference in the development of a political decision, although it could be claimed that
this difference is only one of degree. A politician may have little time
to indwell in a problem and so would not arrive at the feeling of certainty
which Polanyi claims is characteristic of the scientific discoverer, and
is essential for the theory of personal knowledge. This is partly in the
nature of political decision making where decisions are often made in a
short space of time and on inadequate data. Yet the politician is an
expert at making a decision quickly on inadequate data. He may be wrong
but because of his experience he is more likely to come to the right
decision than the inexperienced man.

Consider the case of a minister making a decision in the sphere of
industrial relations. He will go through the process of analysing and
examining different courses of action, as well as taking into account the
opinions of his colleagues and advisers. His decision, in a sense, may
not be his own, as the decision he would have liked to make on the merits
of the case may differ from the decision he does make when he takes into
account wider considerations. Nevertheless it will be a decision he has
arrived at after immersing himself in the problem of the case. His decision
will most probably be a compromise decision which arose out of the particular
circumstances he was operating in. After taking into account the attitude
of the employers, the unions, his colleagues and advisers, and of the
economic situation his decision will, hopefully, be the best one in the
circumstances. It is the decision his political expertise and indwelling
in the problem led him to but not one to which he is necessarily committed.
It is a decision made on the emergence of a compromise. He has made a
decision that he is not entirely keen on for the simple reason that a
decision has to be made, and he also has to take responsibility for it.
An entirely different situation to a scientist making a discovery.
It is part of a politician's task to look for a compromise solution, a solution which all sides will accept in a dispute. His task is to try and lead the disputants to a compromise that will, as far as possible, further the public interest. Of course it is open to him to resign if he is forced into a position where he believes he cannot uphold that interest. A position where he is forced to make a decision which goes against his political conscience. A decision which if made would break his obligation to serve the public interest.

The decision then can only extremely euphemistically be called a political 'truth' but is a practical attempt to serve the public interest. And by the public interest in this sense we mean to uphold certain principles and values, for instance, those of justice and fair play which are inherent in the tradition of the political community, and at the same time prevent the development of conflict situations which would harm the community.

Yet although it appears the politicians task is a practical activity where decisions can only euphemistically be called the truth this is only part of his task. He has the function, in what we can call the constitutional sphere, to recognise and expand the principles and values inherent in the tradition, and in this sphere his task is similar to the task of the members of the other communities we have considered. The constitutional sphere is the theoretical sphere or sphere of pure politics, and it is here that we can give inter-personal knowledge the status of truth, and say that the politician is concerned with the apprehension of political truths. In its two-fold activity the community is not only concerned with the development of principles but the application of them. The politicians task then can be characterised as the apprehension and expansion of the principles inherent in the political tradition, and the application of these principles to the field of everyday politics.
Although we can claim that this analysis is consistent with Polanyi's general position it can be questioned whether we can in fact write of a community of politicians, or consider that in such a community a situation of inter-personal knowledge exists for if it does exist then there must be a coherent and fairly stable body of ideas which can be used to judge innovations.

It does seem that in the case of Britain we can talk of a common political tradition. This is seen for instance, by the consensus expressed in the Beveridge report where there was general agreement that governments should take action to prevent poverty and unemployment. Polanyi argues when examining the possibility of consensus:

"It might be argued that the passing of new laws is rarely unanimous, and also that in society at large civic values are not universally shared in the way in which scientific values or even artistic values are. But the difference is only superficial: the clash of contending opinions is perhaps more marked in civic matters, but even so it is restricted to contemporary affairs. Few of the innumerable social reforms carried out in Britain during the past 150 years would be repudiated today by an important minority." 23

It is the commitment to the core values or traditions of a society that prevents its destruction when contemporary clashes of immediate policy seem unsurmountable. In Polanyi's ideal society so long as their remains the commitment to the values of a free society then a failure to achieve unanimous agreement over a particular matter is unimportant. The continuance of a free society is of much greater importance than the outcome of single disputes. 24

Conversely, if it can be shown that there are no shared values or coherent political tradition, then a situation of inter-personal knowledge cannot exist, and there can be no community, even though there may exist a state of structures designating a geographical area as such a community.
In examining the progress of a potential scientist to maturity who shared authority in the community of scientists we saw that he had to pass through a period of apprenticeship. Only after he had made his own contact with reality was he able to move beyond this apprenticeship and become an independent scientist. The same argument can be used with reference to a politician. He needs to serve an apprenticeship before becoming a fully fledged politician. By watching his master and by following his example he unconsciously picks up the techniques of the art of politics, and techniques that may not be explicitly known by the master himself. By submitting himself to an authority he eventually becomes competent enough to become an authority himself. He can be taught rules of procedure, and methods of approaching problems but can only become sufficiently adept at the political art when he uses them in actual situations. In other words by experiencing real politics he can develop a tacit knowledge about politics, and only when he has developed this can he be considered a competent politician.

Polanyi argues that, "Education is latent knowledge of which we are aware subsidiarily in our sense of intellectual power based on this knowledge". He means by this that if we are educated we will achieve a feeling of mastery over the subject with which we are concerned. He states:

"We are clearly aware of the extent and special character of our knowledge, even though focally aware of hardly any of its innumerable items. Of these particulars we are aware only in terms of our mastery of the subject of which they form a part".

He is arguing that we are aware of our mastery over the subject matter of our enquiry but we are unable to specify what this mastery entails as it
contains a large degree of knowledge of which we are only subsidiarily-aware. For instance, a master cricketer can say which stroke should be used and describe the technicalities of the stroke, but he cannot say when and how to employ the stroke except in vague terms about the right ball, the right height, and the right timing. When to use the stroke and how to use it effectively can hopefully only be learned by studying the master in practice, and by one's personal experience.

In Polanyi's sense then to be educated means to have the ability to control one's subject. In the intellectual sphere it means to have developed the conceptual power to recognise not only instances of things we know but new instances of things we know and fit them into our framework of knowledge. Polanyi states:

"(The) function of our conceptual framework is akin to that of our perceptive framework, which enables us to recognise ever new things as satisfying to them. It appears likewise akin to the power of practical skills, ever keyed up to meet new situations. We may comprise this whole set up of faculties - our conceptions and skills, our perceptive framework and our drives - in one comprehensive power of anticipation". 27

He goes on to argue that it is the mark of the educated mind to constantly add to its conceptual framework by assimilating new experiences. He states:

"Thus our sense of possessing intellectual control over a range of things, always combines an anticipation of meeting certain things of this kind which will be novel in some unspecifiable respects, with a reliance on ourselves to interpret them successfully by appropriately modifying our framework of anticipations". 28

The aim of political education then like all education is to build up a knowledge of the subject matter and to become adept at applying it in new situations. This knowledge of politics will be to a large extent a subsidiary or tacit knowledge of which the politician knows he possesses but which he cannot specify. This knowledge will provide a framework
for him to approach new problems, to attempt to understand and provide a solution for them.

The politician is immersed in the political tradition of his community and has built up his own concept of that tradition, as well as his own method or style of coping with problems. A political decision then is derived from a politician's conceptual framework as it arises because of his attempt to cope with a new problem by comprehending it through his conceptual framework. At the same time it arises out of the political tradition of inter-personal knowledge of the community of politicians. This is because the individual politician's conceptual framework has arisen because of his experience of and practice in that tradition. It will also be checked by other politicians within that tradition, and also, as we have seen, by the general public.

We have argued so far that a politician like the scientist will learn his task first by imitating a master, or rather he will learn through experiencing his work under the guidance of a master, until he is able to become an established politician on his own account. The politician will be versed in the community of politicians style of politics and political tradition, as well as that of the community as a whole. However the political tradition of the society Polanyi is mainly concerned with is that of a free society, and in a free society politicians are not entirely entrusted with the preservation of that freedom as their failure to follow their obligation to the values of a free society concerns not only themselves but everyone within that society. Where immoral scientists tend to destroy the scientific community immoral politicians destroy not only people trust in the community of politicians but can destroy the freedom of the whole community. It is for this reason that it can be argued that all members of the wider community should be educated in the values of a free society.
Yet if we accept the notion of tacit learning then we can expect that people by merely living in a free society will learn the values of that society and their practical application. But a free society has been achieved only after a certain stage of the communal tradition has been reached. Society need not stay at the point where freedom was achieved but can continue in other directions. Freedom is not a strong plant and needs to be protected and nurtured. If we believe that freedom is most conducive to the development of man in his intellectual and evolutionary task, as Polanyi does, then it would seem necessary that this should be spelled out. That the members of a free society should be systematically taught "the ways of thinking, speaking, and judging" that are followed in a free society.

However, we have seen that the politician's method of going about things is a reflection of the political tradition in the community as a whole. The politician's values are derived from the milieu in which he was brought up. The task of the politician is to provide, or rather preserve, the framework of a free society by drawing out the intimations within that tradition but also to attempt actively to expand it. In other words part of his task is to put a free society on a firmer footing. It does seem possible to do this by educating all members of the community in the values of a free society but Polanyi continually argues against indoctrination. Is it possible that we can educate the members of a society with such values without indoctrination?

Throughout his works Polanyi has argued that education in a free society does not subordinate intellectual activity to the dictates of a central authority but allows it to develop under the control of the different disciplines. Within these disciplines there exists an obligation to serve the truth. Indeed the core tradition of all the sub-communities considered is this obligation to serve the truth and the political tradition will also contain such an obligation. The political framework in a free society will reflect such a tradition it will not create it. Polanyi states:
"From these institutions we can pass on to the ideal of popular government by extending their principle to the cultivation of civic thought. If therefore opinion concerning civic matters is allowed to take shape by the same principles which effectively sustain the freedom of individual thought, civic thought will also grow freely and the power wielded by it will be the power of free thought. This is what would happen in an ideal free society."33

In other words the constitution of a free society will reflect the shared values of the community, and the state will become instrumental in serving such values.

The role of the state in such a society therefore becomes clear. It is to provide the conditions necessary for the development of these values by preventing political indoctrination and by fostering the development of the numerous intellectual disciplines controlled by their own authority.

In political education its role is negative as it is to prevent indoctrination by the inculcation of ideologies, and in doing so to allow the imbibing of the prevailing tradition by experience. By fostering love of truth, respect of intellectual excellence, and by fostering the standards and values of the intellectual communities education will be providing the pupils with the necessary learning for a free society, as for Polanyi an ideal free society will be a reflection of such values. On the other hand if politicians directly tried to inculcate these values by state action they would fail because they themselves would be making an abridgement of the tradition. They would be creating an ideology that would itself be a pale image of the living tradition of the community in its development.

This does not give an entirely passive role to the politician in the sphere of education for much activity would be needed if the required educational aims were to be maintained. It is very easy for an educational system to be turned towards a concentration on vocations rather than maintaining its concern for the truth. Material ends are far more concrete than transcendental ideals. But it is Polanyi's claim that it is these transcendental ideals that a free society must follow or it will destroy itself.
NOTES CHAPTER SEVEN

1. Logic of Liberty, op. cit. p. 29.

2. J.S. Mill also has this concept of a free moral man who will search for the truth.

3. This is not always the case, for instance, a law which states we should drive on the left hand side of the road has no connection with morality but is nevertheless a necessary law.


6. For instance, T.H. Green, although his ideal society, like Polanyi's, is a society where laws will reflect the consciences of its members.

7. I use the term 'political obligation' rather than 'moral obligation' partly because when we write of the institutional structure and the actions of politicians we are writing about the political sphere, and partly because the term 'shared values' refers to rather more than moral values. It includes for instance, the traditional way of going about things in the political sphere.

8. See appendix for a further consideration of political obligation.

9. As far as the analogy with the scientific community goes this would be a situation where the vast body of scientists recognised that the scientific community had turned its back on the pursuit of the truth and was concerned with the pursuit of other values. In such a case there would be no rebellion but the scientific community would cease to exist.

10. Logic of Liberty, op. cit. p. 46


12. Personal Knowledge, op. cit., pp 244-5.

13. Ibid., p. 54.


17. Ibid., p. 2.

18. Ibid., p. 15.

19. Polanyi argues that we should submit to the superior minds of the intellectuals in their specialised sphere and thereby be lifted up with them to the next stage of evolution. However, unlike this case of intellectual communities the general populous has no reason to submit to the superior minds of the politicians as they are engaged in a specialised activity which nevertheless can be understood by most people, and their actions in any case have a direct effect on other people. They should therefore be cautiously watched if not suspiciously watched.

20. A discussion on merits will involve the absence of threats and inducements. Each party to a dispute will try and reach an agreement on what is morally the right division what policy is in the interests of all or will promote the most want satisfaction. See B. Barry, *Political Argument*, London, 1965, p. 87.

21. A scientist does not declare a discovery until he is committed to it for a scientific decision does not have to be made. Compromise has no place in scientific decision making.

22. As we are examining the sphere of practical politics the phrase 'as far as possible' is legitimate as decisions are often compromises between different interest groups. Bernard Crick, *In Defence of Politics*, London, 1964 argues for the necessity of compromise in democratic politics but if compromises are to be obtained and principles retained then casuistry becomes of major importance. See, for instance, Dorothy Emmet, *Rules, Roles and Relations*, London, 1966, p. 50 who discusses the importance of casuistry in practical politics.

24. Such a situation is analogous to a situation I considered when examining the scientific community. A situation might arise where no consensus appeared but even if such an event did occur a commitment to the task of science, and the tradition of the scientific community could keep the system going. Such an analogy emphasises the point that whereas in the scientific community the method of spontaneous co-ordination is valued as a decision procedure because it is the most efficient method for allowing the scientist to undertake his task so the decision procedure of a free society is valued in the same way. It is valued because it is thought to be the most efficient method for man to follow his task, although the actual institutional structure of a free society will depend on the tradition from which it has arisen.

25. Personal Knowledge, op. cit., p. 103

26. Ibid., p. 103.

27. Ibid., p. 103.

28. Ibid., p. 103.

29. For instance, Heath, Maudling, Boyle originally working under the guidance of R.A. Butler.


36. By indoctrination I mean a conscious attempt to inculcate certain values of a particular political or moral flavour without criticism. Indoctrination is tied up with the notion of active inculcation. I do not think we can class the unconscious inculcation of political or moral values as indoctrination otherwise all education concerned with moral or political values could be classed as indoctrination and sometimes are.

33. Personal Knowledge, op. cit., p. 222.
Polanyi's philosophy has two basic characteristics: like all educational theories it recognizes the importance of experience in the learning process, but puts particular stress on the notion of tacit knowledge and argues that knowledge develops in a community. It is only by working within a subject or an area of practical skill that one can develop the necessary tacit knowledge for mastery over it. And it is only by working within a community that one can develop acceptable tests for testing knowledge. By the very nature of knowledge there must be a knower, and therefore all knowledge will contain a subjective element. Knowledge is always a subjective belief and can only approach the status of objectivity when the knower claims it has universal validity. Objective knowledge in this sense is subjective knowledge which has universal validity. But how can we be certain that a claim to universifiability is correct? We can perhaps develop certain tests but these tests are themselves developed by people who claim that they are impersonal tests indicating the validity or not of theories. We need tests to indicate the infallibility of tests, and so on ad infinitum. A characteristic of the scientific community is not that it progresses under the control of impersonal tests but that it formulates much more formal criteria of acceptability than most other communities. It is Polanyi's major claim then that the scientific community like all other communities will progress under the control of inter-personal knowledge.

Indeed unless there is a body of generally shared beliefs we cannot really say that there is a community. Intellectual communities all have a systematic body of shared beliefs and this is a characteristic of such communities. Although non-intellectual communities may not have a body
of systematic beliefs they must at least have a body of shared beliefs which are coherent to achieve the status of being a community. These beliefs, as in the case of the intellectual communities, will be used to keep a check on innovations.

It is apparent how the concept of tacit knowing and inter-personal knowledge fit together for only by working within the tradition of a community, and acquiring the necessary tacit knowledge can one become a master practitioner. The concept of learning by experience strengthens the hold of tradition.

These two insights of Polanyi are insights that have been recognised by other conservative theorists. They seem to accept implicitly, at least, the notion of communal or inter-personal knowledge. They would also argue that there is a certain coherence in such knowledge and it can therefore be used to judge innovations. The argument is simply that in the sphere of knowledge we can only judge innovations by knowledge we already possess, and to be acceptable a new proposal must somehow be consistent with such knowledge. Laws to be just laws then should reflect the communal tradition: our inter-personal knowledge of ethics and social relations, and our traditional way of going about things. It is as ridiculous to legislate laws into effect that are far beyond the tradition as it is to attempt to plant a liberal society into an illiberal society. Burke's attack on the French revolution took up this position. It is an argument that states that it is nonsensical to plant one tradition into another for if it is successful it can only destroy the tradition of such a community. Such an implantation cannot happen until the right stage in the development of inter-personal knowledge has been reached: a tradition grows it cannot be inculcated.

Alongside such a concept of communal knowledge is the belief that there is always an inherent tendency for the framework of the state to
reflect the traditions of society. Unless the state does so there will be a condition of tension between state and society. Such an occurrence can create a revolutionary situation and a rebellion could take place but the rebellion would not be one aimed at the introduction of new values but aimed at a return to the tradition: an attempt to force the state to reflect again the shared values of the community. Under such an argument we cannot talk of revolution bringing about profound change. It can only come about at the right time, in the right place, and in accordance with the tradition. 2

The most vulnerable part of Polanyi's philosophy, when applied to the political community, is his belief that man is searching for the truth, and aiming at a specific end. However, when we realise that for him in practice truth is expressed in the communal tradition and the movement towards the final end lies in such a tradition, the position is far from outrageous. In practice it is stating no more than we are committed to things we believe in - we give them the status of truth. -, and attempt to create a society in accordance with these beliefs. In other words we will be committed to certain values and, as society is made up of individuals with such commitment, it will tend to reflect in its formal structure the shared values expressed in the commitment.

Society under such an analysis will be evolving and evolving towards something better. If we accept the notion that communal knowledge expresses the truth, and that a later stage in the development of that knowledge expresses a greater aspect of the truth then society must be progressing to something better. At least Polanyi assumes that a society that has a greater grasp of the truth is better than one which has less. In this case truth is what we believe but if it is then surely our beliefs will be continually evolving and there will be no final end. It is at
this point that Polanyi's concept of external reality becomes of special importance and forces itself into his political philosophy. We have seen that for practical purposes truth has to be what we believe but this is not the real truth. The real truth is that which is in accordance with reality and this we cannot know. All along the most we can hope for is an achievement of right belief - a belief which is in accordance with reality - but at the end of the process of evolution we do know. Our beliefs do not coincide with reality they become reality. At the end of evolution there is a knowledge of the Platonic Forms. Yet within Polanyi's philosophy this notion of the final end and therefore of progress towards it has to be a matter of belief. If we turn the notion of inter-personal knowledge on to this belief we can say that it is a belief which is not accepted by the scientific community. Indeed it is a notion they would not consider but it is a notion acceptable to a Christian theological community, and a proposal which they would certainly consider to be a theological one.

In the case of the concept of external reality we can say that there is a certain justification for the use of the term when talking about science. We can, for instance, argue that our attempt to formulate theories is an attempt to formulate theories which symbolically represent controlling factors behind the world of appearances, and that these controlling factors do exist independently to ourselves. It is far more difficult to justify the claim that we can talk of a reality independent to ourselves when we are considering morality and politics. A political truth or a moral truth can only be a belief which we hold. Its existence depends on our existence. The only way we can avoid such a conclusion is to state that political and moral principles exist in nature or that they exist in the mind of God and it is our task to reveal them.
Polanyi, in fact, uses the words 'reality' and 'truth' as blanket words to cover scientific truth, historical truth, a correct moral principle, justice and the public interest by doing this he is able to achieve a unity in knowledge that may well not exist. The unity that is there lies in man's understanding of them, and not in their existential unity.

As a political philosophy his ideas enable a very precise form of conservative philosophy to appear. It is a philosophy of an evolving society where evolution is controlled by tradition, and the support of governments is dependent on their following tradition. I have argued that it is a joining together of liberal and conservative theories. This is the case for liberal ideas have become an important part of our political tradition. More specifically it is a re-statement of British conservative philosophy: a Burkean concept of change.
1. It is possible to produce a closed system that will give certainty, for instance, Popper's hypothetico-deductive system.

2. The reason for Hegel's attack on revolutionary theorists was not because of the danger of their success but because of their failure to see the stupidity of undertaking a task doomed to failure. Marx really agreed with the analysis. The revolutionaries were to be 'midwives of progress', a significant term, and their hope was to speed up the process of evolution in the same way as Hegel's heroes. They could not change its direction.

3. Both approaches would be legitimate in examining Polanyi's political ideas.
APPENDIX

A Theory of Political Obligation

Polanyi has produced quite a specific theory of political obligation, although he does not enter into the details of its operation, for this reason I have included the following analysis in an appendix. It is, I believe, consistent with Polanyi's general position, although the detailed arguments are my own, for using the clues he has given it does seem possible to formulate a more comprehensive theory.

A.P. d'Entreves\(^1\) thinks that there are two basic models of political obligation: a Benthamite model and a Rousseanian one. Professor Hart\(^2\) points out that two ideas can be considered central to a Benthamite model. Firstly a man will have an obligation to conduct himself in a certain way if in the event of him failing to do so a pain or loss of pleasure ensues. Pain then becomes a constitutive part of obligation. Secondly there are a number of sources from which pain arises, and these sources will constitute the different sanctions which are characteristic of different obligations. For instance, if we have sanctions from a religious source we have a religious obligation, if they come from a political source we have a political obligation. Bentham argues in the Fragment of Government, "Political duty is created by punishment: or at least by the will of persons who have punishment in their hands, persons stated and certain political superiors".\(^3\) Bentham is arguing here that the sovereign is a political superior in so far as he controls power and is therefore the source of political obligation.

In fact Bentham's reasoning seems faulty. The word 'source' is important here but the obligation of a person to himself to avoid pain has a previous existence. The obligation becomes a Political obligation when the source of the threatened pain comes from a political superior. This is really a Hobbesian physical obligation: a prudential avoidance of physical pain.
Rousseau puts an opposing view in the Social Contract. He states, "Force is power and I fail to see what moral effect it can have. To yield to force is an act of necessity, not of will - at the most an act of prudence. In what way can it be a duty? Let us admit that force does not create right, and that we are obliged to obey only legitimate powers". 4

If Bentham's reasoning had not been faulty he could have virtually accepted Rousseau's position. Bentham's argument should in fact be that one has a duty to oneself to avoid pain not to one's political superiors. The political superior's simply recognise that one will try and avoid pain and so create sanctions in order to get compliance. The mistake Bentham has made is to tie in the source of the threatened pain with duty to oneself incorrectly. It is not a political duty which is being created by the political superiors threat of force but it is that one's duty to oneself is being triggered off by the threat of pain derived from a political source. The only obligation that Bentham has in this case is to oneself. A government is not made legitimate because it possesses force or are we obliged to obey an illegitimate government except in Bentham's sense. If it uses force we have a duty to ourselves to avoid it but no duty to the government arises.

If Bentham had formulate his theory in the way I have suggested then it would not be absolutely distinct from a Rousseaunian theory of political obligation. Rousseau uses the word 'obligation' in the correct manner for the word is a normative one meaning that something has value and therefore should be obeyed, protected or submitted to. Bentham if his analysis had not been faulty would have had this meaning in a restricted sense - oneself is of value and therefore should be protected -. 
We can conclude then that the fact that a government has a political power and therefore force at its command is not a ground for arguing that one has a duty to submit to it. We only have a duty to submit to it if a particular value is given to the government, or unless we feel that the political system of which the government is a part is desirable. Force by itself does not create obligation.

Polanyi takes up a Rousseauian stand in considering the concept of obligation but it is questionable whether or not we can really call the obligation he is referring to in the Logic of Liberty when he states "these aspirations coincide with the claims of our own conscience" a political obligation. The quote suggests he means we have a moral obligation to obey a government which follows such aspirations. This is so but we also have a wider obligation because a political system can exhibit or allow more than just moral aspirations. Our shared values contain more than moral values as they contain values relating to modes of procedure and the traditional way of going about things. They include far more than the traditional moral values of the community, for instance, political values as well as values from other points of view, e.g. religious, aesthetic, prudential. A political obligation arises because the state also values these things.

Yet when does a political obligation arise in practice? We can say, for instance, that we have a moral obligation to obey the state if it on the whole values the morality we follow, that we have a religious obligation to obey it if it allows our religious practices but when do we have a political obligation? A political obligation is really an allegiance to a political system rather than an acceptance of every rule which the system contains. In analogy with the scientific community the scientist accepts the mode of procedure inherent in his community, and that all members are obliged to be truthful. This does not mean that he has to
accept every item of knowledge in the system of ideas, and there would
be no progress if he did. It does mean that he will accept the decision
of the community even if he disagrees with it, and cries within the
community to get the decision altered. His obligation to obey the
scientific community is because it values the things he values, and makes
it possible for him to pursue the things he values in the way he wants.
In the case of the wider political community, if we had a political
obligation to it, we would value its method of going about things, perhaps
the institutional structure of the Queen in Parliament, or perhaps the
method of compromise. We would value the system and not necessarily
particular items in it or particular laws. We value a political system
because it enables other things to exist which we value. Its value is
derived from its ability to provide the conditions necessary for our way
of life. That is, it allows us on the whole to value the things we want
to value, and provides conditions to increase the likelihood of things
we value existing.

We have accepted that to say that we have an obligation to something
means that we value it and therefore it should be obeyed, protected or
submitted to so a political obligation arises when we begin to value the
political system. It can be seen to have arisen when, in spite of the
fact that the specific action it undertakes is against an important item
in our value systems, we still feel a duty to obey it. This means that
we value the system itself rather than the individual items it enacts, and
we value it on the whole because it provides the conditions necessary for
our way of life. The obligation can really be seen to have arisen when
we begin to give the system the benefit of the doubt when it seems opposed
to our values. This means that the state has as far as we are concerned
has begun to transcend the items within its own structure and has become
for us an entity in itself which we value.
The analysis tells us also when a political obligation will lapse. If laws are being constantly passed which we find repugnant and which are opposed to our own values then this can develop until we realise that the state is no longer providing the conditions necessary for the survival of our values. As its value was in the first place derived from its extrinsic worth in allowing the things we value, if it no longer has this extrinsic worth, it is no longer of value to us. We therefore no longer have a duty to submit ourselves to it or an obligation to obey it.

In Polanyi's case, as I have indicated in the main thesis, if the political system fails to provide the condition of freedom necessary for the pursuit of the truth then our political allegiance and obligation to it no longer exists. In other words if the political system moves too far away from the moral and political traditions of the community or if it fails to "coincide with the claims of our own conscience" we no longer have an obligation to obey it.

I have expressed this notion of the political system failing to "coincide with the claims of our own conscience" as a failure to provide the conditions necessary for our way of life. More generally we can say that if a political system allows the continued existence of our way of life or if it, more specifically, furthers it then we have an obligation towards it as it values the things we value, and enables us to follow our obligations to these values. If it does not do either of these two things then it is difficult to see how an obligation can exist.

At this point it is necessary to explain my use of the term way of life. I mean by the phrase a set of value systems each of which belongs to a different point of view, for instance, moral, religious, aesthetic. If it is possible to know a person's way of life it should be possible to tell two things. It should tell which system of values will be relevant
in a particular case, and which system will take precedence in a conflict. In order to illustrate this and the inter-play of different value systems consider the case of a Welsh nationalist who blows up a bridge, and the Judge who conducts the case.

Four value systems seem important here for the Welsh nationalist:

1. The legal system, how far, for instance, does the nationalist value the legal system? (2) Political values, for instance, do political values overrule legal ones? (3) A moral value system, for instance, the immorality of blowing up other people's property. (4) A prudential value system: how far do political values overrule prudential ones, and in this case the danger of punishment? It can been seen that it would seem that his political value system takes precedent over others.

In the case of the judge we are able to catch a glimpse of the communal way of life. Three value systems seem important: (1) The value of the integrity of the legal system, that rules must be applied and be obeyed. (2) The value of the communal moral system (according to Devlin a judge must uphold morality). That it is not only illegal but immoral to blow up other people's property. (3) The community's political value system, and especially the value of compromise which is an important value within it.

Legal justice must been seen to be done so the Welsh nationalist after the evidence has been heard is found guilty, and given a sentence within the range laid down by the law. The legal system is therefore satisfied as the judge has followed his obligation to apply the law. Morality has also been satisfied for the person who broke the moral code has been caught and punished. But at this point morality is of further importance. How immoral is the act of blowing up other people's property? The conclusion may have some bearing on the sentence.
Political values also enter at this point, and in particular the value of prudence. Is the act isolated or is it part of a larger plot, will the Welsh nationalist be made a martyr and therefore further his cause if he receives a long sentence, will a long sentence lead to further acts of violence as a way of protest, or will it be a deterrent? A careful weighing up of these questions changes a possible sentence of 3 years to one of 6 months imprisonment. Legality and morality have been upheld but prudential considerations have qualified the sentence.

What has happened in this case is that within a communal way of life there is a hierarchy of value systems: some value systems in certain instances are considered more important than others. Occasionally only one value system may come into play, for instance, in considering the beauty of a picture one's aesthetic value system is used but sometimes more than one value system is relevant, and to know a person's way of life will tell you which system will take precedence. Indeed if we really knew a person's way of life we would not only know which value system would take precedence in a conflict but which value within a system would take precedence.

We are now in a position to see in greater detail when a political system will be valued. It will be valued if it allows us to follow our way of life or if it furthers our way of life. It may be that certain governmental actions offend our moral values but we may accept them as they agree with our prudential system. On the otherhand they may agree with neither but we will still accept them if generally governmental actions agree with our way of life. Theoretically it seems that three things can disturb this acceptance: (1) Actions are pursued which threaten our way of life. (2) Actions are pursued which are opposed to important values within an important value system within our way of life. (3) Alternative political systems seem more attractive because
(a) Our own political value system on the whole allows the existence of our way of life but another will actually further it; (b) our own political system does not favour our way of life, another one allows the existence of it; (c) our own political system does not favour our way of life another one will further it.

When one has a political obligation to a system one need not be concerned with every detail of legislation, or political action. However, if legislation or political action continually goes against the contents of one's way of life then one's obligation begins to waver. In other words if governmental action indicates that the set up no longer allows or values the things one values then quite obviously the value that was inherent in the political system no longer exists. However, this cannot provide a justification for rebellion as in this case rebellion would be based on the subjective whim of one man, as well as being foolish from a practical point of view.

Under this analysis of the concept of the way of life if the government on the whole does not favour the communal way of life, communal values or inter-personal knowledge of the community, a general withdrawal of political obligation can take place. In such a case there would sufficient justification for a rebellion.

In practice in spite of a political system's failure to take note of the communal shared values we might still decide it is the best of a bad bunch. We would be ranking it favourably with the others available even though we graded it against the ideal as of little value. In this case we may have a duty towards it in conflict with other systems. It could also be the case that although we think that the system is fairly bad we nevertheless recognise that there are certain change mechanisms within it that can lead to improvements and are prepared to give it our allegiance for that reason.
We can say then that an individual no longer has a political obligation to a system when it no longer values the things he values, except for the qualifications given. Grounds for rebellion can be found when not only an individual but the vast majority feel that the system no longer preserves or even threatens the existence of their values.
APPENDIX NOTES


5. P. W. Taylor, Normative Discourse, Englewood Cliffs, N.J., 1961 uses the term "way of life" in the same way as I have.

6. P. Devlin, "The Enforcement of Morals", Proceedings of the British Academy, 1959. Although he would claim that behaviour thought to be immoral and therefore opposed to the public conscience could be considered to be against the public interest.
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Michael Polanyi and the Problem of Personal Knowledge

R. J. Brownhill

Thomas A. Langford's article, "Michael Polanyi and the Task of Theology,"¹ raised a number of important questions about the work of Michael Polanyi and the validity of a visionary method of arriving at the truth, or an understanding of absolute being. Yet, I believe that Polanyi has gone some way to grapple with the problems that Langford raised.

Polanyi, particularly in his book *Personal Knowledge*,² produces a model of a community bound together by faith, whose unity is further strengthened by the fact that all members of the community have the joint task of apprehending external reality and revealing to the rest of the community the knowledge they gain. In other words, the community is made up of people with the same belief and the same intention: all members of the community believe in the existence of external reality, and all intend to apprehend and reveal aspects of this reality. The community which Polanyi is explicitly concerned with is the scientific community: the "Republic of Science."³ However, Langford is quite correct in recognizing that the model produced can be applied to any community that is bound together by faith and a belief in transcendent being. Indeed it can be legitimately argued that the theologian and the scientist, in Polanyi's context, are both concerned with the same task of apprehending and revealing a hidden reality.

Why is this? How can it be possibly said that a scientist and a theologian are involved in the same task? The answer depends on the definition of nature. Polanyi completely rejects the Kantian concept of nature as a Newtonian nature and defined by Kant as "the conformity of appearances to law in space and time." Kant gives us, in the first

place, space and time as forms of appearances; and then the world as
the whole of appearances; and then nature as the conformity of appear­
ances to law. This is the nature Kant is talking about, and I believe that
this is the nature that Michelson is talking about when he rejects
Polanyi's works as "not history but the observation of nature in its
separation from history." Michelson seems to believe that it is Kantian
nature Polanyi is referring to. He states: "Scientific knowledge is
symbolic knowledge and involves forms of human understanding.
Immanuel Kant long ago discerned this from the way Newton worked.
Every startling observation of natural processes has begun in an artful
intellectual model. . . . Scientists do not wait passively for objects to
impress themselves. Symbols created by their active intellect initiate
the exposure of nature." Michelson continues: "The self knowledge
which Cassirer and Kant found implicit in every scientific cognition
does not at all resemble the self knowledge extolled by Socrates' oracle.
The self which participates in structuring the world of nature is not the
same self which demands that life be significant. Symbolic forms to be
historically significant and thus to clarify . . . the faith and under­
standing of historical religions must originate in the question of the
meaning of man and not simply in general forms of human apprecia­
tion." Yet it is precisely this Kantian concept of nature which Polanyi
rejects, and the question of the meaning of man is precisely the problem
Polanyi is grappling with. To state that Polanyi's "personal knowl­
dge" "is disqualified because it does not begin in the personal
question about the fundamental meaning of life" seems to me to be a
complete misunderstanding of Polanyi's aim and work.

5 Ibid., p. 37.
6 Ibid., p. 38.
7 The vitalist theory of evolution which Polanyi produces in *Personal Knowledge*
and elsewhere: the movement of a super-mechanistic element through the history of
man, and its development into man's intuitive faculties where epistemology and
biology become the same thing is certainly an attempt to understand the meaning of
man in history and in thought. Again Michelson's statement that "Nature is the
structure of a reality which man cannot enter personally because he has already held
it off at an impersonal distance" (Michelson, *op. cit.*, p. 26) is a view that is entirely
contradictory to Polanyi's position. The answer to this disagreement is that Polanyi's
nature is Michelson's history. Michelson fails to see that for a scientist like Polanyi
nature is not "dehistoricized" because "meaningful communion with them is inter­
rupted by making them objects of detached investigation." In fact, just the opposite
is the case. The scientist gains a much closer communion with nature; and, far from
being a detached investigation, his research is an intensely emotional and personal
commitment.
Michael Polanyi and the Problem of Personal Knowledge

The nature that Polanyi states the scientist is trying to contact is not a mechanical nature but a Platonistic nature. In Kantian terminology, Polanyi's scientist is trying to gain a knowledge of the reality of the thing in itself. He is concerned with the real meaning of things and not with their appearances.

Now Kant has attempted to demonstrate that we cannot have a knowledge of things in themselves, since all knowledge must originate in the experience of our senses, and a thing in itself is beyond the experience of our senses. Our knowledge according to Kant is knowledge of appearances; and, in order to gain knowledge of things in themselves, we would need to have intellectual intuitions, which we cannot do because our intuitive capacity is confined to our senses. Science then does not and cannot give us a knowledge of the thing in itself but only an increasing knowledge of appearances. Kant does not deny that there is a super-sensible reality, but denies that we can have a knowledge of it. It is at this point, however, that Polanyi, following in the tradition of Liebniz, parts company with Kant and insists that we can, and in fact do, have an intuitive knowledge of super-sensible reality. He states:

To say that the discovery of objective truth in science consists in the apprehension of a rationality which commands our respect and arouses our contemplative admiration, that such discovery, while using the experience of our senses as clues, transcends this experience by embracing the vision of a reality beyond the impression of our senses, a vision which speaks for itself in guiding us to an even deeper understanding of reality—such an account of scientific procedure would be generally shrugged aside as out-dated Platonism: a piece of mystery-mongering unworthy of an enlightened age. Yet it is precisely on this conception of objectivity that I wish to insist in.

Polanyi states that in order to cross this gap between the experience of our senses and super-sensible reality we must make a logical jump: "the plunge by which we gain a foothold at another shore of reality." And the plunge is taken by our intuition.

However, this may be so, but is the reality which the scientist is attempting to apprehend the same reality as the theologian is trying to apprehend? Or, to repeat Langford's question, "Is a religious vision more comprehensive than a scientific vision?"

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8 This is the position in the Critique of Pure Reason. In the earlier Dissertation, Kant allowed knowledge of the thing in itself.
9 Personal Knowledge, pp. 5-6.
10 Ibid., p. 123.
The answer to this is extremely difficult, for Polanyi does not entirely take up the Platonic solution of the two worlds, which, in Kant, for instance, are phenomenon and noumenon. He accepts that we gain knowledge of appearances, but he claims that we are only apprehending the lowest level of reality. In other words, the attempt of mechanistic science to break things down to physics and chemistry only gives us an understanding of the lowest level of reality and cannot in any sense give us a knowledge of ultimate reality. Polanyi states: "What is most tangible has the least meaning and it is perverse to identify the tangible with the real. For to regard a meaningless substratum as the ultimate reality of all things, must lead to the conclusion that all things are meaningless. And we can avoid this conclusion only if we acknowledge instead that deepest reality is possessed by higher things that are least tangible." 11

Polanyi believes then that our knowledge of appearances signifies only the lowest level of reality and that we can progress to a knowledge of a higher level of reality—to super-sensible reality—only by the use of our intuitive faculties.12 The method of bringing our intuitive faculties, or the tacit coefficient of knowledge, into play in this respect is, so Polanyi claims, "by relying on our awareness of them [particulars] for attending to the coherent entity to which they contribute." 13 He continues: "We may say for example that we know the clues of perception by dwelling in them, when we attend to that which they jointly indicate; and that we see the parts of the whole forming a whole by dwelling in the parts. We arrive thus at the conception of indwelling." 14 This then is Polanyi's epistemology. We "indwell," or we immerse ourselves, in the clues of perception to gain a knowledge of the whole. This does not mean we concentrate on the particulars and that this gives us a knowledge of the whole, but it means we assimilate the particulars, we make them part of ourselves, and only then can we gain a knowledge of the whole. For instance we cannot learn to drive a car merely by reading an instruction book. We must practice each operation

12 This is, of course, Kant's position—we can only gain knowledge by intuition—but he denies we can have intuitions of super-sensible reality. Polanyi's intuition is more like Henri Bergson's, and indeed his writings are similar to Bergson's in other respects, e.g., his vitalistic notions.
13 "The Modern Mind" (see n. 11 above).
14 Ibid.
Michael Polanyi and the Problem of Personal Knowledge

until it becomes second nature to us, and only then can we say that we can drive a car.\textsuperscript{16}

Yet this may demonstrate how we progress from the lowest level of reality to the next level; but how can we, when we have a knowledge of the whole, progress to a still higher level of reality? We can only do this by heightening our "indwelling." Polanyi produces the example of speech to demonstrate in an allegorical way the progress from one level to another. He states: "The first level, lowest of all is the production of the voice; the second, the utterance of words; the third, the joining of words to sentences; the fourth, the working of the sentences into a style; the fifth and highest, the composition of the text.

The principle of each level operates under the control of a higher level."\textsuperscript{16}

Polanyi points out that each level is subject to dual control: by the laws that apply to its elements in themselves and by the laws that control the comprehensive entity formed by them. And this multiple control is made possible by the fact "that the principle governing the isolated particulars of a lowest level leave indeterminate their boundary conditions for the control by a higher principle."\textsuperscript{17} He indicates that, for instance, voice production leaves largely open the combination of sounds to words, which is controlled by a vocabulary; whereas a vocabulary leaves largely open the combination of words to form sentences, which is controlled by grammar; and the sequence continues. He states: "Consequently, the operations of a higher level cannot be accounted for by the laws governing its particulars forming the next lower level, for example, you cannot derive a vocabulary from phonetics, and you cannot derive grammar from a vocabulary."\textsuperscript{18} This analogy may give us some idea of how we progress from one level of reality to another and why in fact we are able to progress in this way. At any rate, it would seem that Polanyi intends that his scientist should not be concerned merely with appearances but, like the theologian, should attempt to apprehend ultimate reality. However, as in Tillich's depth of reason, for Polanyi reality is inexhaustible, and it does not seem possible that the scientist can apprehend the whole of reality.

\textsuperscript{15} An idea similar to that of Michael Oakeshott, the political philosopher, about the education of rulers (see the chapter on "Political Education" in P. Laslett (ed.), Philosophy, Politics and Society (Oxford, 1956).

\textsuperscript{16} "The Modern Mind."

\textsuperscript{17} Ibid.

\textsuperscript{18} Ibid.
This type of epistemology, which is symptomatic of Polanyi's later works,\textsuperscript{19} seems to be an attempt to bridge the gap between the sensible world and the super-sensible world by the process of "indwelling" and by the gradual movement of the knower to a knowledge of a mainly hidden reality, rather than leaping over it. It appears to be an attempt to overcome the problem of the \textit{chorismos}, the coming apart of the two worlds, which was so apparent in \textit{Science, Faith and Society}\textsuperscript{20} and also, to some extent, in \textit{Personal Knowledge}. It is a problem that not only faced Plato but, for instance, still faced Liebniz in his attempt to unite Platonism and Aristotelianism. Liebniz clearly took up the two-world theory by his distinction between the realm of nature and the realm of grace and his attempt to reconcile them by the doctrine of the pre-established harmony; and Kant himself took up the distinction between the two worlds but failed to solve the problem.\textsuperscript{21} But Polanyi's insistence that we move gradually from our knowledge of appearances to a knowledge of super-sensible reality by the process of "indwelling" seems to be a direct attempt to overcome the problem of the \textit{chorismos}. He sees the distinction and the problem, and attempts to provide a solution. Certainly there remains a gap to be crossed in the movement from one world to the other, but the necessity for "the plunge" no longer exists. Rather than the Spinozian type of intuition,\textsuperscript{22} which Polanyi needed up to the time of \textit{Personal Knowledge} in order to apprehend external reality, he now postulates the intuition of "supersensibilia" as a workaday skill;\textsuperscript{23} the tacit coefficient of knowledge.

It may be asked whether in this case Polanyi is considering a visionary approach to the grasping of reality. I think he is, but his epistemology is now much more sophisticated and acceptable. He is not advocating the visionary method of Swedenborg,\textsuperscript{24} for instance. His vision is not a

\textsuperscript{19} The work \textit{Personal Knowledge} seems to be the highest point of his philosophy, where there is an obvious and wide gap between the sensible and super-sensible world; but already in this work there are indications that he is moving away from this position.

\textsuperscript{20} \textit{Science, Faith and Society} (London, 1946). The book has been republished with a new Introduction (Chicago, 1964), wherein Polanyi summarizes the developments in his ideas.

\textsuperscript{21} Paul Tillich in \textit{Systematic Theology}, Vol. I (London, 1955), clearly saw the danger of the two worlds splitting apart and the domination of our own world by appearances (technical knowledge).

\textsuperscript{22} An intuition with an intrinsic quality of rightness about it.

\textsuperscript{23} See M. Polanyi, "The Logic of Tacit Inference" (address to the International Congress for the Philosophy of Science, August 25, 1964).

\textsuperscript{24} See E. Swedenborg, \textit{Heaven and Hell} (London, 1909).
vision in the sense that it is a picture of reality, for he uses the term in a metaphorical sense. It is a vision in the sense that it is a very strong feeling of the imminence of reality. We first have a feeling that we are near to apprehending reality, and as we continue to “indwell” in our research the feeling becomes stronger until we are absolutely certain that we are apprehending an aspect of reality, and this certainty “deserves to be called a vision.”

Now that we have some knowledge of Polanyi’s epistemology and his meaning of the terms “vision” and “reality,” we are in a position to answer another of Langford’s questions: “How can one adjudicate between rival visions or how a rival vision may be related to another must be answered.” The answer is that rival visions do not occur to the visionary. If we look at Polanyi’s concepts of indwelling and the planes of reality, we will see the reason for this. The visionary is at first immersed in his research and gains an inkling of reality: the first vision. He continues his immersion until a second insight arises: the second vision. This process is continued until an absolute vision of reality is reached. However, at each stage there is only one vision: one insight that deserves to be called a vision. It may indeed be the case that a vision on a higher plane of reality may contradict a vision on a lower plane, but this is because the vision on the lower plane only revealed a smaller aspect of reality, and the new vision is a higher synthesis. Only to the outsider can there be a contradiction, for the process of revealing the planes of reality prevents the appearance of a contradiction to the visionary. He knows why and how he has arrived at his new vision.

Even so, in Polanyi’s example of a community bound together by faith, the “Republic of Science,” it is true that different scientists have different visions of reality. In other words, there are contradictory discoveries. But the reason for this is that behind appearances there exists the thing in itself, and this is organically linked to the whole of reality. One discovery in a particular area of research may contradict another in the same area because it is, if it is true, revealing a different aspect of reality. A knowledge of the whole of reality would indicate that no contradiction in fact existed.

Yet a major question still remains, for how can we know whether a vision is true when we cannot test it by the experience of our senses, and can we really call a vision knowledge at all if we cannot test it?

Kant's answer to this double-barreled question would of course be that we cannot know that our knowledge of a thing in itself is true because it is beyond sense, and we cannot for this reason call it knowledge. Tillich has suggested that we can test ontological knowledge experientially by the life process, but this is not a strictly realistic proposition. We could perhaps test it in infinity, although this is questionable, since it could be argued that super-sensible reality is outside space and time; but, in any case, a test in infinity would be beyond comprehension.

It is for this reason that Polanyi insists that a member of his Republic shall be an utterly moral man, completely obliged to tell the truth about the aspect of reality he has apprehended, and entirely responsible for, and committed to, the discovery he has made. Yet even this morality and personal commitment, which all members of the community accept that the discovering scientist has, does not mean that his vision will be taken into the Republic's body of ideas. Before the Republic accepts a new vision it is judged by the other members of the community who will judge it by the visions the community has already received and accepted: it is judged by accepted belief. Only if it fits into this knowledge which the community already has will it be accepted. Naturally this process may slow down the revealing of reality, as it is well within the bounds of possibility that a new vision may reveal an aspect of reality well away from that already known by the Republic. Therefore only at a later stage in the history of the Republic, as the knowledge of the Republic advances, will this vision, if it were true, be accepted. However this process of acceptance does at least guard against the dishonesty of charlatans, or even people who have arrived at a wrong vision because of an incorrect interpretative framework.

Polanyi, then, not only produces an important theory of how we can gain a knowledge of super-sensible reality, but his model of a community bound together by faith can quite well be used as a model of church history: the unitary church, the breakaway movement, further breakaway movements, and even movements away from the breakaways. Yet, as church history continues and doctrine is revised and altered, there again appears the possibility that an earlier breakaway movement

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27 The reason for this is that, if a visionary has followed through the process of indwelling and moved up the planes of reality, he is certain to arrive at the truth; he is certain to achieve personal knowledge. If he has not arrived at the truth after this process, the only other alternative left is that he has used the wrong interpretative framework and his knowledge therefore remains subjective knowledge.
Michael Polanyi and the Problem of Personal Knowledge

can be accepted once more into the main movement, since the doctrine
of the breakaway movement may now be acceptable to the mother
church. Polanyi's Republic is a model of this type of happening. There
are certainly other problems, since, although a breakaway church may
have a doctrine which has become acceptable to the mother church,
it may well have formed an administrative structure and hierarchy of
its own. It may well be psychologically opposed to the mother church
because of the traumatic experience of the original breakaway and the
attempts to bring it to heel. Nevertheless, Polanyi's model still appears
of fundamental importance and use in understanding the development
of the different churches, while his epistemology appears to be the first
attempt to set out in a rational and detailed way our approach to
"supersensibilium." 28

28 The writings of Tillich, for instance, which are similar to Polanyi's in a number of
ways, never really give a detailed analysis of ontological knowledge. And one of the
important aspects of Polanyi's work is that he has indicated that this type of knowl-
dge can really only function in a like-minded community.
"SCIENTIA,"
REVUE INTERNATIONALE DE SYNTHÈSE SCIENTIFIQUE

R. J. Brownhill

TOWARDS A PHILOSOPHY OF TECHNOLOGY

Extrait de "Scientia", - Novembre-Décembre 1969
VOL. CIV, N. DCXCI-DCXCII
AU LECTEUR

Monsieur,

« Scientia » est, en 1969, dans sa 63ème année de vie, ayant repris pleinement sa fonction traditionnelle de synthèse scientifique vraiment internationale.

Qu'il nous soit permis, à cette occasion, de rappeler les considérations que suggère l'histoire de soixante-trois ans de publication de la Revue.

Lorsqu'en 1907 un groupe d'amis et de collègues fonda « Scientia », elle se présenta au public avec un programme dont les points principaux étaient les suivants:

1. La production scientifique actuelle — énonçait le programme de 1907 — est aujourd'hui plus que jamais caractérisée par le fait qu'elle est circonscrite à des disciplines diverses, quant à leur objet et aux méthodes de recherches. C'est contre cette tendance à la spécialisation à outrance que « Scientia » veut justement réagir, cherchant à unir les efforts des savants, à élever la vision des buts scientifiques au dessus de toutes formes particulières de la recherche. C'est dans ce but que la Revue s'adresse à tous ceux qui excellent dans un domaine quelconque afin qu'ils concourent à cette œuvre, laissant de côté, pour un moment, le langage technique usuel, pour agiter, de la façon la plus accessible, quelque problème général, que d'autres, avec autant de liberté et d'indépendance, éclaireront sous d'autres points de vue.

En un demi-siècle le monde de la pensée et de la science s'est transformé profondément en ce sens qu'il a réalisé un grand progrès vers l'unité. Les différences qualitatives de la matière ont disparu; il s'est opéré une vaste fusion des disciplines physico-chimiques et une révision des problèmes de l'astronomie et de la géographie physique; et c'est encore dans le sens de l'unité que procèdent les développements de la recherche biologique.

Mais devant cette tendance à la synthèse et à l'unification de la pensée scientifique, les exigences de l'investigation ont cependant développé à l'infini des méthodes et des langages techniques particuliers qui rendent peut-être encore plus difficile la compréhension réciproque des savants. D'où le fait que la nécessité d'un organe de synthèse scientifique comme « Scientia » se fait sentir aujourd'hui, non moins qu'il y a de cela soixante-trois ans, et son programme et son action, s'ils ne préconisent plus, comme alors le progrès unitaire scientifique, mais le reflètent, ont toujours pour but de rendre réciproquement compréhensibles les conceptions et les principes généraux qui se basent sur des procédés techniques et se servent de langages techniques non moins éloignés les uns des autres qu'ils ne l'étaient jadis.

C'est dans sa compréhension des exigences des temps, dans la continuité de son action, que repose la raison du succès de « Scientia ».

La Revue publie toujours le Supplément en français, afin que ses articles, qui sont tous publiés dans la langue de leurs auteurs, puissent être lus et compris même par qui ne connaît que la langue française.

La constitution d'un large Comité Scientifique de la Revue, dont font partie des savants illustres dans les domaines les plus divers de la science, reflète, en le confirmant à nouveau, le programme de « Scientia », qui est de considérer les diverses disciplines scientifiques comme les branches d'une science unifiée, de s'adresser aux savants de tous les pays afin qu'ils deviennent les collaborateurs pour une recherche solidaire de la vérité, unissant ainsi les esprits dans une aspiration supérieure, dans une haute vision du monde matériel et spirituel, qui est aussi prémisse et gage de concorde et de paix.

C'est au nom de ces idéals et de ce programme, que nous avons la confiance de pouvoir vous compter vous aussi parmi les abonnés de « Scientia », contribution pour nous précieuse, acte de foi dans la collaboration, dans la coopération, dans la confraternité des savants, des hommes de science, des personnes cultivées de tous les pays.

LA DIRECTION
TOWARDS A PHILOSOPHY OF TECHNOLOGY

Modern technology can be included in the Kantian definition of science. The distinction Karl Popper makes between science and metaphysics is considered arbitrary, and his definition of science far too wide. Yet Popper's belief that scientific knowledge has to consist of possibilities is accepted. It appears that there is a continuous flow from metaphysical speculation to practical use. As metaphysics no longer lays the ground for science the scientist himself has to become a specialized metaphysician, and because science has not effectively laid the ground for technology the technologist has had to become a scientist. Two forces appear to be at work: a drive for instability and an urge for stability. The intuitive speculations of the metaphysician-scientist have to be stabilised by critical reason, so the intuitive approach of Michael Polanyi has to go hand in hand with the critical approach of Karl Popper, yet because scientific knowledge remains only possible the final step in creating stability has to be the attempt to convert the knowledge to practical use. Metaphysics, science, and technology can be considered as a unity made up of different levels in an attempt to apprehend and finally master nature.

Applied science or technology has taken second place to pure science in our cultural heritage. Applied science has remained essentially of utilitarian value with little intrinsic value. It has not been allied with any great intellectual movement, or has a firm place been found for it in the body of philosophical tradition.

The eminent philosopher/scientist Michael Polanyi follows a common attitude towards applied science when he declares that pure science is concerned with furthering knowledge and applied science is «tied to the market place». Yet Polanyi has a particularly unusual attitude towards pure science, as he conceives that the task of the pure scientist is more than an attempt to further knowledge. It is an attempt to grasp and reveal ultimate reality: a reality that is not accessible to our senses as it is external to us, and is partly hidden from us. He states:

«To say that the discovery of objective truth in science consists in the apprehension of a rationality which commands our respect and arouses our contemplative admiration: that such discovery while using the experience of our senses as clues transcends this experience by embracing a vision which speaks for itself in guiding us to an even deeper understanding of reality — such an account of scientific procedure would be generally shrugged aside as outdated Platonism: a piece of mysterymongering unworthy of an enlightened age. Yet it is precisely on this conception of objectivity that I wish to insist in».

As it appears, therefore, that we cannot rely on our normal senses

to apprehend this reality we have to rely on the "tacit co-efficient" of knowledge, our intuitive faculties, before we can draw back the veil and reveal the hidden reality as it really is.

Polanyi, it would seem, has rejected the traditional Kantian concept of the task of the pure scientist, as an attempt to gain an increasing knowledge of appearances. Polanyi's scientist is certainly concerned with gaining a knowledge of appearances but his main task is to go beyond the mere appearance of reality, and to understand reality as it is. In Kantian terminology he is attempting to gain a knowledge of the thing-in-itself. Kant tried to show that it is not possible to gain a knowledge of things-in-themselves as all knowledge has to originate in the experience of our senses, and unfortunately a thing-in-itself is beyond sense. Kant declared that knowledge necessarily has to be a knowledge of appearances. If a knowledge of a thing-in-itself is to be obtained it can only be obtained by intellectual intuitions but this is impossible as our intuitive capacity is confined to our senses. It is not possible for a pure scientist to gain a knowledge of things-in-themselves but only an increasing knowledge of appearances.

In rejecting Kant's view of intuition Polanyi is able to argue that the pure scientist is able to gain a knowledge beyond sense. Science appears as an attempt to understand ultimate reality, and the task of the metaphysician or theologian seems inherently similar to that of the pure scientist. And in his rejection of the Kantian view of science Polanyi also kicks down, or at least ignores, the barrier Karl Popper has attempted to build between metaphysics and science by his criteria of falsifiability.

Yet if, as Polanyi apparently argues, the scientist is concerned with obtaining a knowledge of things-in-themselves we are entitled to ask, "How can we know whether the knowledge of a thing-in-itself is knowledge or mere belief?" Or, more specifically, "How can we test our knowledge?" We certainly cannot test out knowledge of things-in-themselves by our knowledge of appearances. Paul Tillich faced the same problem when considering ontological knowledge, and suggested a solution could be provided by testing this sort of knowledge by the life process: a difficult task for finite humanity. Another possible solution is to test or at least judge a person's knowledge of supra sensibilia by other people's knowledge of supra sensibilia. This could allow confirmation but neither verification or falsification. In other words the intuitions of one member of an intellectual community are judged against the intuitions which other members of the community

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1 This expression is used in M. Polanyi, The Modern Mind: Its Structure and Prospects, lecture delivered at Bowdoin College, Brunswick, Maine, October, 1964.
2 This is Kant's argument in the Critique of Pure Reason.
3 See R. J. Brownhill, Michael Polanyi and the Problem of Personal Knowledge, Journal of Religion, Vol. 48, No. 2, April, 1968. In this paper an analysis is made of the relevance of Polanyi's theories to the theologian.
have obtained and accepted. If a new vision or intuition fits in with these accepted intuitions it is confirmed and taken into the body of knowledge which the community possesses.

This, in fact, is Polanyi's solution. A pure scientist, who has arrived at an intuitive knowledge of reality, will put his theory before the scientific community and they will judge it by the scientific knowledge they already possess, and only if it fits into this knowledge will the scientific community accept the theory as being confirmed.

Polanyi's concept of science represents a view of pure science which many of the founders of the Royal Society would have accepted but it belongs to a very old tradition which can be designated Pythagorean. Pythagoras argued that, «Everything is disposed according to numbers» and Plato thought that numbers were the essence of harmony and that harmony was the basis of the cosmos and of man. He argued that movements of harmony «are of the same kind as the regular revolutions of the soul». This philosophy of numbers was further developed in Hebraic, Gnostic, and Cabalist thought and the alchemists were also much influenced by it. J. E. Cirlot\(^1\) argues that the same basic universal notions were found in oriental thought, and gives the example of Lao tse, «One becomes two; two becomes three, and from the ternary comes one — the new unity of the new order — as four». He argues that modern symbolic logic and the theory of groupings go back to the idea of the quantitative as the basis for the qualitative.

On the other hand a more orthodox writer on science, Michael Oakeshott, rejects the idea that science can give us a knowledge of ultimate reality, and the notion that a veil has to be drawn back to reveal a hidden and external reality. Pure science for Oakeshott is an attempt to bring stability to our perceptions but in order to do this it must leave our perceptions behind. Oakeshott states:

«Science may be said to begin only when the world of perceptible things has been left on one side, only when observations in terms of personal perception have been superseded.... Scientific knowledge is not 'organised common sense'; it is a world of knowledge which begins to exist only when common sense and its postulates have been forgotten or rejected. Experience becomes scientific experience when it is a world of absolutely communicable experience. Scientific experience is based upon a rejection of merely human testimony; its masterconception is stability.»

The scientist achieves this absolutely communicable and stable experience by considering nature under the category of quantity. He states:

«Nature, matter or what is experienced in science are nothing

\(^{1}\) See M. Ghyka, Philosophie et mystique du nombre, Paris, 1957.
\(^{3}\) Oakeshott, M. Experience and its Modes, Cambridge University, 1933, pp. 109-170.
other than the world considered under the category of quantity, because the method of science is incapable of elucidating any other world, and the method of science is restricted in this way because the world sought is a world satisfactory to the purpose of scientific experience, a world of ideas before all else common and communicable.

Polanyi's pure scientist considers that he is revealing the rationality found in external reality, and Oakeshott's pure scientist considers he is examining the world under the category of quantity in an attempt to give stability to our perceptions but both recognise that their task is to expand the systematic ideas of science. And both seem to include the notion that the quantitative can lead to the qualitative, which is a notion derived from the Pythagorean tradition. It is these beliefs which bring Polanyi and Oakeshott together, as both consider that the aim of pure science is to further knowledge, and that any attempt to introduce the aim of utility into pure science would bring about its destruction. Pure science must be allowed to pursue its own ends without any re-orientation towards utility. The conversation of the community of scientists must not be interrupted by material consideration.

These two views of pure science, the Pythagorean view and the neo-Kantian view, which Polanyi and Oakeshott represent have had interesting results in the Western world. They have led to the belief that pure science is in some respects a better pursuit than applied science. It is a more worthwhile study as it is allied with the intellectual traditions of the West, and is a more stimulating study for it is concerned with the expansion of abstract ideas for their own sake and has no concern for the sordid money grubbing of the market place.

Polanyi's position is, of course, far more traditional than the neo-Kantian stance of Oakeshott as it recognises the Pythagorean inheritance, and re-introduces metaphysics as a respectable occupation. The new metaphysician appears under the guise of a scientist. Polanyi's scientist attempts to understand ultimate reality or the Kantian thing-in-itself and the scientific norm of testability is thrown out of the window. Whereas it would, in a sense, appear to be possible to test our knowledge of appearances, the possibility of testing our knowledge of a thing-in-itself would appear remote or at least suspect. For the

1 Ibid., p. 100.
2 This attitude to applied science has a long history in the Western World, for instance, we find in Plutarch's Life of Marcellus: "These machines (for the defence of Syracuse) he (Archimedes) had designed and contrived, not as matters of any importance but as mere amusements in geometry. Eudoxus and Archytas had been the first originators of these far-famed and highly prized art of mechanics, which they employed as an elegant illustration of geometrical truth, and as a means of sustaining experimentally, to the satisfaction of the senses, conclusions too intricate for proofs in words and diagrams... But what with Plato's indignation at it, and his invective against it as the mere corruption of the one good of geometry, which was thus shamefully turning its back upon the unembodied objects of pure intelligence to recur to sensation, and to seek help (not to be obtained without base supervisors and deprivations) from matter: so it was that machines came to be separated from geometry, and neglected by philosophers, took its place as a military art."
individual the certainty of knowledge has to be confirmed by a commitment to a belief, so St. Augustine's doctrine *credo ut intelligam*\(^1\) reappears as a doctrine of scientific method.

Oakeshott is a slightly unorthodox Kantian for he would agree that the possibility of gaining a knowledge of a thing-in-itself is remote. He would even go along with A. J. Ayer and speculate on the possibility of the thing-in-itself existing at all, and certainly he would reject as outrageous the suggestion that scientific knowledge can give us a knowledge of ultimate reality\(^2\). At the best pure science can only give us a restricted knowledge of appearances: a knowledge which has been developed under the category of quantity. Yet pure science remains a branch of philosophy, perhaps not the paradigm of philosophy which many neo-Kantians seem to indicate but at least a powerful branch of philosophy well within the neo-Kantian tradition.

In both cases science is allied with respectable philosophical traditions. It is this fact which has made pure science as compared with applied science so attractive to the Western mind.

However, the theologian Paul Tillich has tacitly recognised that the neo-Kantian attempt to move science away from its Phytagorean inheritance has not only split the intellectual world but has 'de-naturised' or 'de-historicised' modern science, as well as doing the same for much of modern philosophy. The de-naturisation of science has meant that science has become primarily concerned with techniques, and the development of systematic quantitative ideas about appearances. It has no concern for ultimate reality. Tillich has attacked modern science and modern neo-Kantian philosophy as 'controlling knowledge' which he declares «transforms the object into a completely conditioned and calculable thing... controlling knowledge objectifies not only logically (which is unavoidable) but ontologically and ethically »\(^3\). He states that the philosopher, in the wake of English empiricism, tries to maintain a detached objectivity and feels no different from the scientist, unlike the theologian who «is not detached from his object but involved in it »\(^4\). Tillich states:

« He (the theologian) looks at his object with passion, fear, and love. This is not the eros of the philosopher or his passion for objective truth. The basic attitude of the theologian is commitment to the content he expounds. Detachment would be a denial of the very nature of this content »\(^5\).

Polanyi, of course, has met this criticism by arguing that in practice scientists do not work in this way\(^6\). He rejects the concept of the detached objectivity of the scientist, and has replaced it by insi-

\(^1\) I believe so that I may understand.
\(^2\) See Oakeshott, op. cit., p. 214. *The world of scientific experience in virtue of its explicit character is a world of supposals, an abstract and incomplete world of experience.
\(^3\) Tillich, op. cit., p. 109.
\(^4\) Ibid., p. 21.
\(^6\) Polanyi, M. *Personal Knowledge*, op. cit., p. 3.
stence on the heuristic passion of the scientist who is committed to his discovery. By returning to an older tradition this type of neo-Kantianism is as much scorned by Polanyi as by Tillich. It is as if neo-Kantian science is downgraded to the position of an applied science. This for our purpose is fortunate for we can make no claim that applied science is concerned with understanding ultimate reality but we can make a claim that applied science meets all the formulations of a science. That in fact applied science can be admitted into the neo-Kantian formulation of a science. In order to do this we will first examine the threefold division Polanyi makes when discussing science.

He divides science up into pure science, technically justified science, and systematic technology. He argues that there is not a profound difference in the logical development of pure and applied science as both are concerned with the development of systematic ideas. They differ for Polanyi in the following respects. Pure science is concerned with revealing ultimate reality. Technically justified science is concerned with that part of pure science which can bring great utilitarian benefits, e.g., the study of coal, but has little relevance to the main body of pure science. Systematic technology is the study of a technology which has developed systematic ideas of its own, e.g., electronics. It can be seen then that for Polanyi applied science consists of technically justified science and systematic technology, and that these differ from pure science by the fact that the main reason for their pursuit is their utility, whereas pure science is pursued in order to apprehend ultimate reality.

If we do not go along with Polanyi's claim that pure science is attempting to reveal ultimate reality, and ideally I think it is not, we have to accept the lesser claim that it is concerned with furthering knowledge. We may believe its concern for furthering knowledge is not its sole concern but at least it appears that it is one of its concerns. It would seem that as the structural make up of the three classifications of science are the same that they themselves must be the same. Yet it is still possible to argue that the difference continues to lie in the aim of these sciences. Applied science continues to be mainly concerned with practical problems and in this way differs from pure science. However, this is not so as applied science is not dealing with specific problems. The concept of systematic ideas suggests that these ideas exist outside particular problems. The problems dealt with need only be related to each other by the fact that their solution is provided

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1 See a discussion of the relevance of these ideas to the planning of science in R. J. Brownhill, *A Critique of Michael Polanyi's Theories on the Organisation of Science*, Higher degree thesis, Manchester University, 1966.


3 Polanyi's scientist is trying to apprehend « inexhaustible reality ». If this reality is inexhaustible we can assume that no other reality of the same nature can exist. As Polanyi argues that there is only one reality we can assume that the scientist is attempting to apprehend ultimate reality. Unlike Oakeshott's scientist Polanyi's scientist would never be able to complete his work, and necessarily would be forced to become a metaphysician.
by relating them back to the same system of ideas, while the actual system of ideas has an independent existence of its own. It may be true that in the case of systematic technology the systematic ideas have been created in the first instance by the examination of particular problems of a similar type until generalisations have been made about a group of these particular problems but this could also refer to pure science. But a major way of expanding systematic technology is by the expansion of the systematic ideas themselves without relating them to concrete problems. One can therefore create new theories by generalising about particular problems or by expanding the logic of the systematic ideas without relating them to any problems. The same can apply to pure science and in the case of technically justified science a particular area of pure science is being studied in the hope that eventual practical benefits will arise from it. The development of this particular area of pure science takes place in the same way as that of systematic technology. The logic of the system can be expanded on its own or the ideas can be expanded in the process of providing a solution to particular problems. As these systematic ideas, according to Polanyi, are part of pure science (although according to Polanyi not a very important part) we are expanding pure science in the same way as we expand systematic technology.

As the structure, the development and the nature of the ideas of pure and applied science are the same, as both are attempts to increase our knowledge of appearances, we are entitled to wonder how a distinction within the neo-Kantian tradition can be made between them. Both are furthering knowledge and both are attempting to understand appearances under the category of quantity in order to bring stability to our perceptions. I do not think a distinction can be made within this tradition, as a distinction would have to refer back to the Pythagorean tradition. Polanyi can make a distinction successfully, and argue that the ideas of systematic technology have no intrinsic value for the pure scientist, and that the ideas of technically justified science have only minimal intrinsic value for the pure scientist. This argument would be sound if we accepted Polanyi's argument that the pure scientist is attempting to grasp ultimate reality but an argument such as this cannot be used effectively by a philosopher like Oakeshott. As both applied science and pure science study appearances there can be no difference in their intrinsic value. Oakeshott's defence of pure science against utilitarian interference would suggest that he had accepted the Pythagorean tradition of the qualitative nature of quantity or failed to see that applied science can be included in the Kantian concept of a science.

It would seem that we can include applied science as within the
Kantian definition of a science as the applied scientist is attempting to gain an increasing knowledge of appearances. Certainly the applied scientist does this but surely he does more than this? He is trying to gain an increasing knowledge of appearances for the purpose of controlling our environment, whereas it has been argued that the pure scientist tries to gain an increasing knowledge of appearances for its own sake. This would be the argument that the pure scientists pursue their task because they believe pure science has intrinsic value and applied scientists pursue their task because of the extrinsic value of applied science. As we have shown that within the Kantian view of science there is no difference between pure and applied science the distinction must lie in the task of the pure and applied scientist. The applied scientist undertakes the same task as the pure scientist in understanding appearances but then has the other task of applying this knowledge. In practice this distinction cannot always be made as an applied scientist, although expanding knowledge with the intention that it will be of use may not actually apply the knowledge himself. This is why the term ‘fundamental research’ is often used to refer to the development of the ideas of pure and applied science, and the term applied science is used to refer to the application of these ideas to solve specific problems. This seems to be a tacit recognition of the fact that there is a difficulty in distinguishing between pure research and much of modern applied research, for instance, in the field of electronics. The old distinction between formulating ideas and the application of them has to be expressed in a different form. The line has to be redrawn below areas that would have previously have been considered the domain of application. Within this new area of fundamental research only a fine line can perhaps be drawn between pure and the new applied sciences, and the distinction could be made by referring to the scientist’s intention. However, I cannot see how this distinction can be made as there seems to be no particular reason why a pure scientist should not pursue his task for the sake of knowledge or with the hope that this knowledge will eventually be useful. Likewise, there is no reason why an applied scientist working in the field of electronics should not pursue his task without reference to utility. He may be entirely engrossed in the task of expanding the ideas for their own sake.

This analysis could lead us to define an applied scientist as a person who is solely concerned with applying fundamental research. Ideally this would be a useful definition but unfortunately it would not be correct in all cases, and traditionally areas of fundamental research have been classified as belonging to applied science.

The great value of applied science is that it has enabled us to gain a greater control over our environment. This value is itself derived from the fact that it has enabled us to have a greater stability in our
existence. It has enabled us to consolidate our present level of material
well being, and has even enabled us to move to a higher level of ma­
terial well being. This in its turn has enabled us to have the leisure to
pursue speculatory activities. Simon Rottenburg has argued that
we can conceive of pure science as a luxury commodity that we are
better able to consume as our leisure increases. In other words that
as we move rapidly away from a subsistence level economy we are
more able to provide for purely speculative activities. This notion
again seems to include the concept that pure science is pursued for
its own sake, and that if it is pursued for this reason in a materialistic
society it must be thought of as a leisure activity. This would be ac­
ceptable if pure science was pursued for this reason. Yet I think we
can challenge this tradition that the task of the pure scientist is to
further knowledge merely for its own sake. It certainly is a tradition
that has powerful adherents. It was the ancient Greek tradition and
has been continued by such diverse writers as Oakeshott and Polanyi
but it does not seem to have been the intention of the founders of mo­
dern science to further knowledge for its own sake. Descartes con­
structed his theories to make us «lords and possessors of nature».
Francis Bacon intended that we should control nature. The intention
seemed to be to provide a continuous flow from theory to practical
use. This was certainly a major reason for the creation of the Royal
Society.

In our analysis we have seemed to reject Polanyi's notion that
it is the task of the pure scientist to apprehend ultimate reality or
the Kantian thing-in-itself. Ideally I think we would be correct in
this rejection as it is not the task of the scientist to apprehend thing­
in-themselves but the task of the metaphysician/philosopher. Ideally
we could say that it is the task of metaphysics to lay the ground for
science. Metaphysics lays the ground for a further apprehension of
reality, and the task of the scientist is to stabilise this extremely un­
certain knowledge. (This is a different argument to Oakeshott's as I
am not arguing that it is the task of the scientist to stabilise our everyday
perceptions but to stabilise metaphysical speculations). Eros is sta­
bilised by reason. Yet as Popper has pointed out the ideas of meta­
physics no longer lay the ground for science. Science has had to in­
creasingly undertake the task itself. Philosophy in recent years has
attempted to do almost the same thing as science, and in attempting
to clarify our knowledge of appearances has abdicated the major part
of its task.

1 Rottenburg, S. The Warrants for Basic Research, Minerva, Vol. V, No. 1, Autumn,
1966.
2 See M. Purver, The Royal Society: Concept and Creation, Routledge and Kegan Paul,
London, 1967. She points out that Bacon was concerned not with immediate practical use
but with the eventual control of our environment through greater knowledge. She states:
"It was the discovery of laws that was at the heart of Bacon's concept of science, not pro­
ficiency in utilitarian skills" (p. 3). Technology in Bacon's time would be no more than the
crafts but modern technology has become a science in Bacon's sense.
We can conceive of science as a stabilising factor in our understanding of reality. It is an attempt to make more certain and concrete the speculations of metaphysics. In this sense it is closely allied to technology which ideally is an attempt at stabilising to an even greater extent our theoretical knowledge by making it practical. We can say that it is of the same nature but on a different level. It is all an attempt to master reality: to make ourselves « lords and possessors of nature ».

The ideal function of technology, then, is to stabilise the theories of science but again, as in the case of metaphysics and science, science has not provided enough theories to allow technology to pursue its task effectively. Technology has had to become a science in order to provide enough theories of the right type. It is no longer parasitic on science but has necessarily become part of science, as science has become part of metaphysics.

In order to give more strength to this concept of our understanding and eventual mastery of reality with first technology merging into our study of appearances and then science, the study of appearances, merging into speculations about things-in-themselves we have to deny the Kantian division between the world of phenomena and noumena.

In this sense we are conceiving of things-in-themselves as a world of unformulated possibilities, possibilities that can become factual. We can conceive of them as similar to a prime number after $n$, a number that may eventually be known. Of course it could be argued that by doing this we are in practice denying the existence of the noumenal world, as we are stating that the noumenal world can become the phenomenal world. In other words the concept of the noumenal world is a heuristic device to further our knowledge of appearances. This seems acceptable as long as we realise that under this concept of the noumenal world made up of unformulated possibilities possibilities exist that can become part of the world of appearances but need not necessarily do so. This leads us to argue that the noumenal world is made up of at least two levels: unformulated possibilities and formulated possibilities.

Ideally the task of the metaphysician would be to formulate possibilities, and the task of the scientist would be to try and confirm that the possibility were part of appearances. Karl Popper with his criteria of falsifiability tries to provide a method for heightening confirmation. In practice the scientist himself has to operate as a metaphysician, partly because metaphysicians have abdicated their task but also because the extremely complicated and technical nature of the speculations required prevent a non-scientifically trained philosopher from particularising his speculations enough to satisfy the needs of a scientist. Ideally scientific knowledge, if it is to be a completely stable know-

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1 We could, in fact, make further divisions and argue that the noumenal world consists of unformulated possibilities that will never become formulated, unformulated possibilities that will become formulated, formulated possibilities that will never be considered part of appearances, and possibilities that will eventually be considered to be part of appearances.
ledge of appearances, should meet the test of some methodological norms. In practice, as Polanyi and Thomas Kuhn have pointed out, theories do not have to meet a strict test but merely have to fit into the prevalent beliefs of the scientific community to be accepted as part of scientific knowledge. Yet even if the scientific formulations of Popper were followed by the scientific community scientific knowledge would remain in the strict sense noumenal knowledge (in the way I use the term), because it would always be made up of possibilia, and could never be absolutely verified.

Popper in formulating his theory of falsifiability follows two important steps. Firstly he argues that a scientific theory must be arranged in a falsifiable form, in order that the next step can be taken, which is the falsification test. He states:

« A system is to be considered as scientific only if it makes assertions which may clash with observations; and a system is, in fact, tested by attempts to refute it ».

Popper meets a difficulty here for the case can arise where a certain statement can belong to science as it is testable, i.e. it can be refuted, whereas its negation is not testable. He gives the example of the universal laws of science:

« I recommend... that they should be expressed... in a form like 'There does not exist any perpetual motion machine'; that is to say, in the form of a negation of an existential statement. The corresponding existential statement — 'There exists a perpetual motion machine' — would belong, I suggested, together with 'There exists a sea serpent' to those below the line of demarcation ».

Popper argues then that the negation of an existential statement is a scientific statement, while an existential statement is metaphysical. He is not, of course, arguing that one is meaningful and the other is not as this would not be logical.

Popper's suggestion does not seem to be entirely acceptable as why should we assume that metaphysics is made up of meaningful but untestable statements? And if we negate them why should they suddenly become scientific statements? This for us is not a problem as we make no attempt to take up a two world theory. The noumenal world is a world of possibilia, and the possibilia move to their realisation as appearances as they are confirmed or stabilised. Popper's method is useful as it heightens the possibility of confirmation but it greatly

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1 Kuhn, T. S. The Structure of Scientific Revolutions, University of Chicago, 1964.
3 Ibid., p. 357.
4 Metaphysics has included, and can include negations of statements. Richard Rolle states in his Incedium Amoric: 'Thou askest what God is? I answer shortly to thee: such a one and so great is He that none other is or ever may of like kind or so middle. If thou wilt know properly to speak what God is, I say thou shalt never find an answer to this question. I have not known, angels know not, archangels have not heard. Wherefore how wouldst thou know what is unknown and also untaught? ' This view is an expression of the doctrine of the via negativa of Pseudo-Dionysius.
widens the scope of science if all negated existential statements are to be scientific. All possibilia could in theory belong to the scientific task if they were produced in a negated form. Unfortunately, however, because of the impossibility of absolute verification the world of appearances can never be reached. This peculiar situation is really recognised by Popper. He does not argue, as many people seem to assume he argues, that on this side of the fence is scientific knowledge which has been tested and that on that side metaphysical speculations which have not been tested. The reason why this is so is because of his criteria of falsifiability. A theory can only be said to have been tested conclusively when it is falsified, and as it is falsified it cannot be part of scientific knowledge. Popper would admit that if we are going to define science as a body of conclusively tested knowledge then science cannot exist. Popper's powerful barrier lies between possibilia and non-possibilia. His earlier barrier between what he terms metaphysics and science cannot be adequately supported on philosophical grounds but has within his system great utilitarian value in enabling the later barrier to work.

The division between metaphysics and science has to appear as one of degree, and every barrier that is put up has to be to some degree arbitrary. I think we are really left with the philosophically unsatisfactory answer that science is what the scientific community is prepared to accept as scientific knowledge. Popper's barrier between metaphysics and science would appear to be arbitrary but the judgement the scientific community would make under the Kuhn/Polanyi argument would not be arbitrary. It would be based on the reasonable test of estimating a theory's validity by comparing it with theories that have already been accepted. It would be accepted if it did seem to fit in with this knowledge. If Kuhn and Polanyi are correct it would appear that some criteria does exist in practice to distinguish between noumenal knowledge and so called phenomenal knowledge, although it certainly can be argued that the criteria provide no certainty, and that the criteria itself is continually changing.

By being accepted as part of scientific knowledge metaphysical speculation becomes more stabilised and appears more certain. Its position as knowledge is stabilised and if this knowledge can be used for practical purposes it becomes even more stabilised as it has received greater confirmation. Logically I have to argue that under my concept of the noumenal world science remains a form of noumenal

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2 Scientific knowledge, as it remains possibilia, is not concrete fact as, for instance, a table I thump may be but is fact in the sense that we designate it to be a scientific fact. We, for the time being, give it the value of factual existence. Factual existence in this sense appears as a value which we give to a theory, and the positivist's clear distinction between fact and value is challenged.

3 Karl Popper in his *Logic of Scientific Discovery*, op. cit., p. 777 seems to recognise the fact that a theory, although put forward in a refutable form, need not be part of science, as it is too far ahead of the prevailing science, *the testable science* of the day.
knowledge, and its greatest confirmation comes about when it can be used to control the phenomenal world.

Metaphysics, science, and technology for analytical purposes can be divided but modern day metaphysicians are quite likely to be scientists, modern scientists certainly need to be metaphysicians, while modern technologists need to be scientists and thence metaphysicians. All are involved in the task of comprehending nature for the sake of mastering our environment. The method of conquering our environment has to include a combination of emotion and reason. Polanyi's notion of heuristic passion and commitment is as necessary as Popper's doctrine of criticism. Emotional commitment to research provides the possibilia and gives the incentive to their support and criticism. Eros and logos are both necessary for understanding and controlling our environment. One provides the speculations, the progress, and the other provides the stability. Technology fits firmly into our philosophical heritage as it is the final step in the progress of the logos¹.

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¹ Technology can be considered as the last step in the progress of the logos but like science often expands because of man's intuitive capacities. See H. H. Rosenbrock, Control: Past, Present and Future, The Radio and Electronic Engineer, Vol. 37, No. 1, January 1969, p. 31.
Sommaires des fascicules de 1968

JANVIER-FÉVRIER


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DISCUSSION:

SCIENTIFIC ETHICS AND THE COMMUNITY

THE APPLICABILITY OF POLANYI'S CONCEPT
OF ETHICS IN THE SCIENTIFIC COMMUNITY TO
THE COMMUNITY AS A WHOLE

Michael Polanyi, in considering the scientific community, rejects scientific detachment as a norm of science. He believes it is only by an emotional immersion in one's research that one can understand reality and achieve discovery. The norm of morality within this community appears as a correct revelation of reality: a norm, which, when expanded to the community as a whole, appears as right reason. A reason which is confirmed by emotional commitment to its truth but is judged by other people's concepts of right reason. A model is produced to illustrate an individual's value system under the 'logic of commitment'.

Michael Polanyi, in formulating his explanation of the scientist's method of discovery, entirely rejects scientific detachment and pure objectivity as norms of science. He states when referring to the lip-service paid to objectivity:

> It goes without saying that no one — scientists included — looks at the universe this way... Nor should this surprise us. For, as human beings, we must inevitably see the universe from a centre lying within ourselves and speak about it in terms of a human language shaped by the exigencies of human intercourse. Any attempt rigorously to eliminate our human perspective from our picture of the world must lead to absurdity.¹

This is quite an acceptable argument. Pure objectivity is ruled out by the very process of knowing but it can still be argued that the scientist must attempt to be as objective as possible. The way he can achieve this objectivity is by being emotionally detached from his work. Only by this emotional detachment can the scientist avoid the taint of subjectivity entering his work.

Professor Polanyi argues, however, that a scientist cannot be emotionally detached from his research. It is the very emotional attachment which leads to discovery. He states:

> Intellectual passions do not merely affirm the existence of harmonies which foreshadow an indeterminate range of future discoveries, but can also evoke intimations of specific discoveries and sustain their persistent pursuit through years of labour.²

The emotional attachment of the scientist to his research is, for Polanyi, a necessary consequence of the process of gaining knowledge. It is only by 'indwelling'³ in his research and by making his research virtually an extension of himself that the scientist can begin to gain knowledge.
Polanyi believes that it is the task of the scientist to gain a knowledge of external reality. He envisages this reality as being made up of different strata or 'planes of reality' and it is the scientist's task to apprehend these planes of reality. His task then is not to gain an increasing knowledge of appearances — the traditional Kantian concept of the scientist's task — as appearances are only the first level of reality, but to gain a knowledge of the reality beyond appearances, or in Kantian terminology 'the thing in itself'. He rejects the Kantian claim that we cannot have a knowledge of supersensibilia, and claims that by the process of indwelling we can move gradually from our knowledge of appearances to an increasing knowledge of supersensibilia.

The knowledge we gain of supersensibilia cannot be tested experimentally by our knowledge of appearances. Indeed it cannot be tested at all as by definition it is beyond sense. The only estimate of truth for the individual scientist is his own certain feeling that the knowledge he gains is the truth. At each stage in the understanding of reality he must be committed to the belief that he has arrived at the truth before he can move on to the next stage of achieving knowledge, for it is only this commitment which confirms truth is truth. At the end of this process the scientist must be absolutely committed to the belief that the theory he puts forward to the scientific community is a correct statement about external reality.

The scientist, then, arrives at discovery because of his passionate immersion in his research and his commitment to each stage of discovery: the antithesis of the supposed scientific norms of detachment and pure objectivity. A discovery appears in one sense as an emotional trauma brought on by a sustained emotional achievement.

Polanyi's scientist is therefore bound to declare truthfully the knowledge he has gained about external reality. Without this commitment to the truth the scientist cannot have knowledge and the scientific community is not able to function. The norm of morality in the scientific community is to declare a correct knowledge of external reality. That is a feeling which he is certain is indicating a correct knowledge of reality, and this vision or feeling must be accurate or a wrong interpretative framework has been used. Unfortunately a scientist cannot know that he has used a wrong interpretative framework so he is bound to declare that his theory is valid. His scientific conscience obliges him to declare that his theory is true even if it is an erroneous conscience. He is morally bound to declare what he in good faith believes to be right.

Morality is of paramount importance in Polanyi's community of scientists as, within Polanyi's philosophical framework, it is not possible to verify or falsify a theory. Every scientist in the community must believe that all other scientists are moral men who are obliged to declare truthfully the knowledge they gain of reality. If scientists did not believe this scientific progress could not be made as they would not be able to build on others' theories. In fact the community could not function.

This does not mean the community will automatically accept a theory when it is produced, as it knows that an incorrect interpretative framework could have been used. It will judge the worth of a theory by seeing if it fits
into accepted knowledge, and only if it does fit into this knowledge will the community judge the theory to be true. In other words the community will judge a theory by deciding whether or not it fits in with the visions individual members of the community have received and which already have been taken into the body of ideas which comprise the scientific knowledge of the community.

The view of morality which Polanyi expresses is an extreme personal conception of the moral law, and has to be for it is not possible to estimate from the outside the morality of an individual scientist. His morality depends on whether or not he has declared truthfully the vision he has gained of external reality, and this we cannot know. Yet the scientist is not acting entirely on his own initiative, for his decision as to the worth of a vision depends on a two-way flow between himself and reality. The scientist then has an obligation not to the vision of reality as such but to the reality itself. He would be breaking his relationship with reality if he lied about the vision of reality he had received, or if he declared his vision before he had confirmed that it was an accurate vision of reality. A scientist therefore puts a theory forward not as a hypothesis but as a statement of the truth. If he did otherwise he would be breaking his obligation to reality and therefore breaking his own moral code and the code of the scientific community.

In any case the process of gaining knowledge, the emotional attachment of the scientist to each stage of discovery, and the scientist's commitment to his final theory make it impossible for the scientist to present his theory as a hypothesis. He cannot at one and the same time state, 'I am certain this theory is true but it may not be, please judge its truth'. He can and according to Polanyi does state, 'I know this theory is true, you can consider it as a hypothesis but whatever you decide I am still committed to its truth'.

Polanyi's theory of morality in the scientific community raises two interesting questions: (1) How far is it bound up with a concept of external reality? (2) How far can it be used as a model of morality outside the scientific community?

Polanyi certainly believes that external reality has an existence independent of man. It is neither a projection of our own minds nor a heuristic tool. The scientist is dedicated to a belief in this reality and to its service and is committed therefore to the knowledge it gives him. The scientist's morality is a supra-personal morality as far as the community is concerned, but it is not in fact, as it is reality which demands the morality, and it is reality which in the end reveals what form morality will take. Yet a non-revelationary morality exists in Polanyi's framework of revelationary morality, while his concept of morality in the scientific community is applicable to the community as a whole, as its essence is commitment to that which we believe is right.

We can summarize the concept as follows:
Right is what we believe to be right. Even if we are wrong and we believe we are right we must declare we are right, for if we did not we would be acting against our moral code. Rightness is a correct statement about a reality we believe exists. The key word is 'believe', and if external reality
does not exist we are still committed to that which we believe is right. However in this case we cannot be wrong as our belief is the only criterion of truth, whereas if an external reality does exist our belief is the criterion of truth for us, but its agreement with reality is the real criterion of truth. Even so we could be wrong if in a particular situation we have wrongly interpreted our own moral code — the same situation as when the wrong interpretative framework has been used in the scientific community. In other words we have failed to logically relate a particular situation to our own moral code. It would indeed be surprising if we had a moral code which could be easily applied to all situations. The problems we may have to judge by our own moral code may create paradoxes, and our own moral code may not itself be stable.

If we follow some modern social theorists11 we can say our moral code is created by internalizing the moral norms of the community, or more particularly by internalizing the norms of our own sub-group. Our moral code will be similar therefore to other members of our own sub-group, but will not be the same as we may interpret the norms differently, we may have internalized norms from other sub-groups — this will be related to our proximity to the (Weberian) ideal member of the group — we may have internalized some community norms which may conflict with our sub-group norms,12 we may have added norms of our own. Everyone is to some extent a deviant from the ideal member. Our moral code, therefore, will be our own, although similar to other members of our sub-group. Yet because it is our own we are ourselves responsible for it and responsible to it; it is our own personal morality.

We can expand Polanyi’s concept of morality under the ‘logic of commitment’13 to the community as a whole in the following way:

There are certain values to which we are absolutely committed at our arrival at adulthood. Besides this absolute commitment to certain values there lies a range of values to which we are committed to a lesser degree. We can say we have a diminishing commitment to other values. Even so these values can be considered to be part of our moral code and only under pressure will we relinquish our commitment to them, whereas we would never relinquish our commitment to certain values. As we move along the line of our value system we will perceive that there are values to which we may or may not be committed. Our moral code at this point will reflect our degree of commitment and be unstable. We can represent our moral code by the following diagram:

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The vertical line represents absolute commitment, the diminishing horizontal lines represent values to which we are committed, the length of the line representing the degree of commitment, i.e. a longer line representing greater commitment than a shorter line. The sign $\int$ represents the dividing line between commitment and non-commitment. The circles represent values to which we may be committed, and the diminishing areas enclosed in the circles represent the likelihood of commitment, the size of the area
indicating the degree of likelihood. The sign > represents the point beyond which are values to which we will never be committed, and the signs × values to which we will never be committed.

The dividing line / can fluctuate between — and o, the signs representing commitment and non-commitment, but cannot occupy the same space as notation |, absolute commitment, as this would be inferring commitment and non-commitment are the same thing, which would be nonsense. We would at least be committed to a morality of non-morality. The sign / cannot occupy the same space as sign > although it can be next to it. This is because sign > really represents death. The signs × are values which exist for other members of society or which in theory can exist. As they are beyond the sign > we can never be committed to them as they are values to which we are not committed at the time of our death.

What can we make of this theory of morality which makes an individual a moral legislator, a legislator who in the process of his legislation has passed through an arduous emotional experience which has given him a considerable emotional attachment to his legislation, especially if we reject the notion of a reality with an independent existence of its own? Are we not indicating a situation of moral anarchy? The answer is in the negative for an individual's moral code is to some degree representative of the norms of the community and his own sub-group. An individual's actions will enable the sub-group and society to judge his moral code, and they will judge it by the code they themselves uphold. An individual, therefore will never be allowed to deviate too far from the norms of his sub-group and society without socialization and social control techniques being brought to bear on him. Our moral code is our own, and is based on our own beliefs, but it operates within the authority of the community. A conclusion which agrees with the morality apparent in Polanyi's community of scientists and in point of fact with the theory of morality inherent in the views of the Harvard School of social theorists.

R. J. Brownhill

NOTES
2. Ibid., p. 143.
3. The term 'immersion in our research' could probably be used in place of 'indwelling'. Polanyi describes the process thus: 'We may say for example that we know the clues of perception by dwelling in them, when we attend to that which they jointly indicate, and that we see the parts of a whole forming a whole by dwelling in the parts. We arrive thus at the conception of indwelling,' ("The Modern Mind. Its Structures and Prospects", lecture delivered in October 1964 at Bowdoin College, Brunswick, Maine)
4. This is Kant's claim in the Critique of Pure Reason. In his Dissertation he believes it is possible to have intellectual intuitions of the thing-in-itself.
5. This is similar to William of Ockham's concept of morality where the norm of morality is right reason.
6. Polanyi states: ‘Our knowledge of reality has then an essentially indeterminate content: it deserves to be called a vision.’ (‘The Creative Imagination’, paper delivered at Oxford, August, 1965) Because of the process of indwelling, the scientist's final vision or discovery must be true. It can only be wrong if the wrong interpretative framework has been used.

7. It is valid if it coincides with his personal knowledge of reality, and as this is the only knowledge of reality he has, he is bound to declare his knowledge is the truth.

8. The community can only judge a theory to be true. The community is not absolutely committed to its truth as the discovering scientist is. They can only state that from their present knowledge it appears to be true, and therefore they will take it into accepted knowledge.

9. Polanyi believes that before a deep knowledge of reality can be gained there must be a two way flow between subject and object.

10. Polanyi states: 'Having relied throughout his (the scientist's) enquiry on the presence of something real hidden out there, the scientist will necessarily rely on that external presence also for claiming the validity of the result that satisfies his quest.' (‘Creative Imagination’, op. cit.)

11. Especially the Harvard School, and in particular the theories of Talcott Parsons. Both Freud and Durkheim would have agreed, although for Freud the moral code of the boy would be gained by internalizing the super-ego of his father. Parsons believes the process of internalization of norms can continue throughout life.

12. The obvious example is in the economic sphere where the action of an individual entrepreneur, following the accepted code of his group, may conflict with the interests of the community, e.g. to stop investing in the time of a recession thereby deepening the recession and helping to prevent future economic growth.

13. It is not certain that Polanyi's theory of morality can be expanded in this way. It could be argued that the word 'commitment' means absolute commitment and a lesser degree of commitment is not commitment but something else.

14. This is a similar position to the existentialists', particularly Sartre.

15. The same situation as in the scientific community where a scientist's theory must fit into accepted knowledge to be accepted. An attempt to gain support for a rejected theory could lead to a restriction of research facilities or, if the theory was considered to be of special danger to the structure of accepted knowledge, an attack could be made on a scientist's claim of professional competence and integrity. The ultimate weapon could be prevention of publication. See, for instance, De Grazia's book *The Velikovsky Affair*, London, 1966.

16. Techniques of socialization and social control such as ostracism, disapproval by word of mouth, and even imprisonment.
Situational Method: An Experiment

BY R. J. BROWNHILL
The situational method of teaching social philosophy was used in combination with an orthodox lecture programme in a 4 term experiment during 1968/9 at the University of Surrey, England, following a two term pilot experiment the previous year. The situational method was taught to and practised by a first year intake of Human Relations degree students. This article includes an analysis of the methods used with an estimation of the success of the experiment.

The first year social philosophy lecture programme is a combination of the history of social philosophy combined with a more detailed analysis of some of the important concepts which philosophers deal with, such as concepts of justice, freedom, etc. A direct attempt is made to see how philosophers formulate principles and attempt to justify them by reference to their value systems. During the period of the experiment a unifying theme was provided in the lecture programme by Karl Popper’s distinction between open and closed societies. The theme orientated the students to take an interest in the structure of different societies and provided a useful adjunct to the experiment and the situational method of teaching social philosophy.

There were 48 students in the first year intake and they were divided into four groups of 12. Each one of the groups conducted a project where the situational method was applied. The projects were concerned with: the ethics of drug legislation, selectivity and the welfare state, student participation in government with special reference to the universities, and censorship and legislation. The projects were chosen because of their immediate relevance with the likelihood that imminent government action would take place in the area of the four topics. This had the twofold result of heightening student interest and taking advantage of the copious material that was likely to be available for student perusal.

The method is intended not only to teach social philosophy but to train students to analyse practical problems by recognizing and formulating different principles for action inherent in the situations themselves, for instance, by examining the arguments used by the participants in the public debates on the different situations. This enables students to realize that social philosophy

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3. For instance, the British Home Secretary’s arguments in refusing to put into effect the proposals of the Wootton Report on drugs.

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is not only an academic subject but has vital practical applications as well: that reference to principles and values are continuously being made in the sphere of practical politics.

During discussions on the situations emphasis was put on the necessity to justify proposed courses of action by reference to principles and values and that these principles and values had themselves to be justified in accordance with the hierarchy of preferences in the structure of our value systems. This led to a gradual recognition that legislation in a democratic society has to give considerable recognition to the customs and traditions of that society. Legislative action need not agree with majority feeling but cannot be too far ahead of it. It has to be justified by appeals to important values within that society. This recognition brought out the realization that within a democratic society compromise is a value of great importance and can itself be justified by reference to a major principle in our society which is that the democratic process must be kept in operation. The possibility of compromise expressed in the public debate was most noticeable in the 'selectivity and welfare state' project. Superficially there appeared to be a clear distinction between the proposals of the two major British political parties but a break down of the arguments into principles and values showed that in practice the political lines were blurred. The same principles and values were being referred to and were often given the same ranking, although certain symbolic language was being used to emphasize ideological differences. For instance, the term 'the universality of the social services' has a strong symbolic political appeal to the left in British politics but in all cases considered it did mean in practice selectivity of sorts.

The projects consistently brought to the forefront conflicts between authority and individual freedom and between paternalism and the possibility of individual responsibility and initiative. The students put much stress on J.S. Mill's concept of self regarding actions but this was found to be inadequate to cope with the problem of drug addiction. From the analyses undertaken in the projects it would seem there are serious deficiencies in liberal theory when put into practice as compared with Marxist or conservative theories. The reason for this may be that both conservative and Marxist theories have organic concepts of society and in an interlocking system of ideas

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4Paul W. Taylor in his *Normative Discourse*, Prentice-Hall, New Jersey, 1961, uses a similar method to justify ethical decisions.
7It could be argued that Mill's concept of self regarding actions would allow one to take drugs as long as one did not break an obligation to an assignable individual. However, drug addiction could destroy one's reasoning ability so Mill's assumption of a rational individual would no longer be correct. Could the state interfere under the notion that the individual could no longer see that he had a duty to himself and was not in a position to develop himself to the fullest? Or would we have to leave him because of the self regarding argument?
8Modern conservative theories are very much influenced by Burke and Hegel and both have organic concepts of society. Marx is also derived from Hegel and continues to have this concept. Indeed Marx attacks Feuerbach for moving close to the nominalist concepts of the Utilitarians.
Situational Method

it is much easier to enmesh a challenge and render it harmless. Organic concepts of society are often of the 'closed society' variety, although they need not necessarily be of this sort. An Aristotelian or a Hegelian society is of this sort but they are not closed in the sense that they are completely stable as, for instance, Karl Popper would say Plato's Republic is. However, they are closed within their own potentiality and it is not possible for them to develop in any direction. The important point about conservative and Marxist theories, and both are in the Aristotelian tradition, is that they have a framework of ideas which is able to meet internal attacks by reference to different parts of its own system: in effect by circular arguments. Liberal theories on the other hand are not of this type and in a sense have to rely on their own effectiveness and persuasiveness and not on the consistency of the whole system.

The deficiencies apparent in Mill's theories on application led students to examine much closer the work of Mill and other philosophers to see how they themselves would cope with actual problems. It led them to realize that the philosophers studied in the lecture programme were often dealing with real problems in their own society, and that sometimes the arguments they produced were attempts to overcome difficulties within their own philosophical tradition.

The use of the interrogatory style on the part of the teacher and its use by the students themselves helped students to formulate points more effectively because of the necessity to provide justification for their arguments. It often had the effect of heightening a student's commitment to an answer because he had worked out justificatory procedures and reasons to support the principle he had formulated. The commitment of a student to his answer, to a particular principle, then led to an attempt to justify further a principle when it appeared that it had been successfully challenged. The interrogatory style created a situation where before a principle was put forward some reasons for its support and application would already have been worked out. A student would not put forward a principle arbitrarily, and therefore would have some commitment to it. The questioning of the teacher and the other students would produce the reasons for the principle and lead to a quest for further justification thereby heightening commitment even further. It could, on the other hand, bring the student to realize himself the weakness of his own arguments, and thereby weaken his commitment to a particular principle. The attempt was to make a student decide for himself the strength of a particular principle. In other words test his own arguments for consistency and establish other principles and values referred to in a hierarchy of preference; to find out what value he put on different justificatory arguments and

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9See K. Popper, op. cit.
10Hegel in a sense brings Aristotle up to date. See H. Marcuse, Reason and Revolution for the development of this argument.
11An example of this is J.S. Mill's introduction of the concept of self regarding actions to find some area where an individual is free from governmental interference. Under Bentham's 'greatest happiness' principle any action can be interfered with if it gives the majority happiness.
12See N. Haines, op. cit.
on the principle itself, and to develop some notion of the value society would put on the principle and justification by examining the public debate.

The situational method very soon brought out an important facet of questions about principles qua principles, and this is that one cannot talk about the truth of a principle but only about its reasonableness, the reasonableness of its supporting justificatory arguments, and the results of adopting and following it. A principle in ethics and social philosophy cannot be absolutely true or even barely true, but only absolutely reasonable or the most reasonable for the circumstances in which it is going to be applied.

The situational method as a method for heightening student participation in democracy was successful in that it put students in a situation where they not only had to comprehend and analyse the arguments of the participants in the public debate but had themselves to operate within a democratic structure: a structure where anyone could challenge their arguments and ask for justifications for different procedures. The decision orientated projects, where the students were requested to consider themselves as legislators who had to arrive at a decision even when a decision was extremely difficult, enabled them to recognize one of the problems of operating within a democratic society. Far from being a spontaneously co-ordinating system as, for instance, David Ricardo's static laissez faire model of an economy or Michael Polanyi's model of the scientific community was, a democratic society needed a tremendous effort, and commitment to its procedures to make it work. Consensus does not arise automatically and often only arises because of the participants' recognition that compromise has great instrumental value in keeping the system operating.

The situational method then is a method for initiating students into democratic procedures. It teaches the vocabulary of public discussion as well as the methods of this discussion. In other words it is a "deliberate and systematic introduction to the ways of thinking, speaking, and judging which are called for by critical situations." It is an introduction to the know how of government which Oakeshott so much insisted on for the potential ruler. In order to be entirely successful at inculcating democratic procedures the method should be consistently used in schools. At university level it certainly increases student interest in political problems and democratic procedures and develops them as mature adults already participating in democracy.

A useful by-product of the method may be found in its use for management training. A number of recent studies of large firms have shown they have a distinct resemblance to political structures. The method would provide

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13This is the major aim of the situational method.
14In R. J. Brownhill, Scientific Ethics and the Community, Inquiry, Vol. 11, 1968 an attempt is made to see how the ethics of the scientist in Polanyi's scientific community could be expanded to an ethic for an individual in the outside community and what this would entail for the individual and society.
a training-in-committee procedure, a method for elucidating and solving problems in industrial relations and above all provide a training in a method of decision making which orientated the decisions to the application of values inherent in our own society.

In the field of academic philosophy the situational method provided a useful adjunct to orthodox teaching methods. It enabled students to recognize that all of the important branches of philosophy were related and in the final analysis were relevant to practical application. The method increased the students' understanding of the work of social philosophers and heightened their interest when it became clear that they were ultimately concerned with actual problems arising in society. It provided insights into the problems of formulating and defending concepts in social philosophy, for instance, a concept such as political obligation. Has the term a different meaning to different philosophers, what sort of justification do they provide for their concept, to what extent is the justification tied up with the rest of their philosophy, is it connected to the type of society they live in or is it an ideal? Perhaps the major contribution the method gave to the teaching of social philosophy was that it gave an increased apprehension of the use and formulation of principles, and practical experience in ranking them in order of individual preferences and public preferences.