The personalist epistemology of Michael Polanyi

La epistemología personalista de Michael Polanyi

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Abstract: Uniquely among personalist philosophers Michael Polanyi was an internationally recognised scientist, and so able to tackle scientist reductionism and objectivism on their chosen ground of natural science, by showing that it requires throughout the personal participation, commitment and judgement, often tacit, of the scientist, as does all our knowing and action. For this he formulated his central conception of the essentially tacit integration of subsidiary details *from* which we attend and use as clues to apprehend the 'comprehensive entities' and to perform the 'complex actions' *to* which we focally attend. Thus he restored the scientist to his science and the person to the world in which he lives. Science is a deeply personal pursuit, as are all disciplines, and reductionism and objectivism, to the extent that they are actually practised, would destroy and civilisation with it

Keywords: : Polanyi, reductionism, science, tacit integration.

Resumen: Un caso único entre los filósofos personalistas Michael Polanyi fue un científico reconocido internacionalmente, por lo que pudo hacer frente al reduccionismo científico y al objetivismo en su propio terreno, las ciencias naturales, mostrando que estas requieren la participación personal, el compromiso y el juicio, a menudo tácito, de los científicos, al igual que nuestro conocimiento y acción. Por eso formuló su tesis central de la integración esencialmente tácita de datos subsidiarios que usamos como claves para "entender" las "entidades integrales" y para llevar a cabo acciones complejas en las que nos centramos de modo especial. De este modo, restauró al científico en su ciencia y a la persona en el mundo en que vive. La ciencia es una actividad profundamente personal, al igual que todas las disciplinas, y el reduccionismo y el objetivismo, en la medida en que son realmente practicados, destruirían la ciencia y la civilización.

Palabras clave: Polanyi, reduccionismo, ciencia, integración tácita.

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1. Introduction

Michael Polanyi (1891-1976) has much to offer to personalist philosophy: in epistemology, ontology, philosophies of mind, history and science, and politics and economics. This article will concentrate on the core elements of his personalist, fallibilist and fiduciary philosophy, as articulated in his *magnum opus*, *Personal Knowledge*[1], which sums up his prior work, save in economics and in most of his defence of freedom in science and life generally[2]. That core conception is tacit integration and nearly all his later publications summarise and then further apply it to one or more spheres of knowledge and life. Those new to Polanyi may find it better to read one of his later books before turning to *Personal Knowledge*[3].

It is important to note that his work is not like that of most academic Anglophone philosophy, but usually describes an arc from some troublesome feature of modern life, via its philosophical presuppositions to tacit integration and its implications as the answer and then to a detailed application of them. Hence he did not write separate volumes on the 'philosophies of', save that of history in *The Study of Man*. And that, along with his citing of many examples from daily experience and the practice and findings of both pure and technological sciences, especially the experimental psychology of perception, *Gestalt* psychology and Piaget's 'genetic epistemology', along with only brief references to other philosophers, probably accounts for their neglect of his work.

Although almost all philosophers of a personalist inclination have acknowledged that scientist reduction in its several forms is destructive of our knowledge of ourselves and thus ultimately of civilisation itself and the natural sciences with it, few of them appear to have tackled it head on. What makes Polanyi so significant for personalism is that he was an internationally recognised physical chemist at the head of his

[1] M. Polanyi, *Personal Knowledge,* London, Routledge, Chicago, University of Chicago Press, 1958.

[2] See M. Polanyi, *The Logic of Liberty*, *Free Trade,* London, Routledge; Chicago, University of Chicago Press; 1951; and M. Polanyi, *Full Employment,* London, C.U.P., 1945; 2nd ed. 1948; and Pts I and II of M. Polanyi, *Society, Economics and Science*; and, for his wider philosophy before *Personal Knowledge*, M. Polanyi *Science, Faith and Society,* London, OUP, 1946, 2nd ed. U. of Chicago Press, 1964; of which there is a Spanish translation *Ciencia, Fe y Sociedad*, Madrid, Taurus Ediciones, 1961, and online at www.quedelibros.com/13343Ciencia-Fe-Y-Sociedad.html

[3] He published 218 scientific papers, many of them in collaboration: see Scott's and Moleski's biography, listed below. A summary of his non-scientific work along with an outline of a biography, with some details of his political experiences in Hungary, Germany and Russia, and his work in defending the freedom of science in Britain and abroad, is available at www.britishpersonalistforum.org.uk/polanyi.pdf

profession as a full professor at the Max Planck Institute in Berlin and then at the University of Manchester, and so had a thorough knowledge of scientific research from the inside, unlike his critics such as Karl Popper and his acolytes. Hence he could show that natural science itself cannot fulfil what lies behind scientist reductionism, namely, what Polanyi calls 'objectivism': that only a body of detached, impersonal and thoroughly tested knowledge, uncorrupted by any element of personal judgement and decision which would render it 'subjective', is really knowledge and attained in physics and chemistry to which all other intellectual disciplines should conform. In its place he aims to show that 'into every act of knowing there enters a passionate contribution of the person knowing what is being known, and that this coefficient is no mere imperfection but a vital component of his knowledge'[4].

The axis of argument is the account of tacit integration which first appears in chapter 4 of *Personal Knowledge*, from which the rest of the book flows and also Polanyi's further applications and developments of it in most of his subsequent publications. It is necessary for a proper understanding of the rest of his work to set out Polanyi's account of tacit integration in some detail and then to sketch its most general implications for all knowing and action.

2. Polanyi's account of tacit integration

Phenomenology, following Brentano, has rightly stressed the intentionality of mind: that mental acts and functions have objects (no knowing without something known, no willing without something willed, no desiring without something desired, no loving or hating without something loved or hated). Polanyi goes one step further and formulates an account of mental functions and acts as having a double intentionality, though he does not refer to it as such. Instead of 'A attends *to* B', Polanyi says, 'A attends *from* B *to* C'. This 'from-to' relation is a functional one: C is the *focal* object of attention, and B is the set of *subsidiary details* which we use as clues to the apprehension or performance of C. For example, a blind man using his stick does not pay attention to the impressions which the stick makes upon the palm of his hand but uses them as clues to what the

[4] M. Polanyi, *Personal Knowledge,* cit., p. VIII. Some years ago I suggested, as a parody of Popper, that his ideal of science would be one computer program generating random hypotheses, a second one testing them with falsifying data, and a third one writing the non-falsified to CDs, which would then be placed in boxes and dropped in the ocean. Dr John Preston, at the University of Reading, who is an expert on contemporary philosophy of science, then said that one of Popper's pupils had in fact seriously suggested this really impersonal knowledge!

other end of the stick is touching and thus to what, if anything, is in front of him[5]. Again in learning to understand what is spoken or written in a foreign language, we have to shift our attention *from* the sounds of the words or shapes of the letters and *to* what they mean. This is especially noticeable in the cases where the same sound or letters or ideogram has several meanings.

It is important to understand in all this that nothing is subsidiary or focal in and by itself, but only as, respectively, we attend *from* it and *rely* on it in order to attend *to*, or to perform, something else. Polanyi cites many examples of this: the invisible signs by which a psychiatrist could distinguish genuine from hysterical epileptic seizures, and the mere humps and hollows, when seen on the ground, but which aerial photographs showed to be traces of prehistoric settlements[6]; the features by which we can pick out a familiar face from many others but which we usually can recognise when shown them one by one, as a photograph is cut up[7]; learning to anticipate electric shocks which come after only certain nonsense syllables among groups of others, but having no idea as to which syllables they were[8]; and maintaining one's balance on a bicycle by steering to the side to which one is falling in order to produce a centrifugal force to counter the force of gravity pulling one over, again with knowing that this is what on does, which Polanyi himself worked out for the first time, it seems[9].

The general definition of tacit knowing and integration is therefore a *functional* relation between the subsidiary details or 'proximal term', and the focal whole or 'distal term': 'we know the first term only by relying on our awareness of it for attending to the second'. It is not the *tacit* nature of this integration that is primary but the *from-to* relation of subsidiary to focal awareness[10].

Implicit and explicit awareness is not identical with subsidiary and focal awareness. All focal awareness is not explicit: animals and human infants have no or little explicit knowing, which proceeds by way of spoken or written words, diagrams, notations, codes of gestures and movements, or other symbolic systems, which make our thoughts pre-

[5] M. Polanyi, *Personal Knowledge,* cit., pp. 55-6.
[6] M. Polanyi, *Knowing and Being,* London, Routledge; Chicago, University of Chicago Press, 1969, p. 123.
[7] M. Polanyi, *The Tacit Dimension,* London, Routledge; New York, Doubleday, 1966; reprinted, pp. 4-5.
[8] *Ibid.,* pp. 7-8.
[9] M. Polanyi, *Personal Knowledge,* cit., pp. 49-50.
[10] M. Polanyi, *The Tacit Dimension,* cit., p. 10.

sent before us, and vastly enhance and extend our self-consciousness and with it our self-responsibility, and some subsidiary awareness can be explicit. Polanyi gives, from his own medical training, an example of both together, that of anatomical topography, for which medical students explicitly learn all the detailed components of the human body —bones, arteries, nerves and viscera—, *from* which they must attend, but the intricate three-dimensional relationships of all of these, *to* which they must attend, cannot be seen nor explicitly represented[11].

But we can never make everything explicit. For, when attending *to* any one item, we always rely upon others *from* which we attend. For example, I rely upon my spectacles to see clearly things close to me or at distance and we have learned as infants not automatically to treat blurred perceptions of things as perceptions of blurred things. But to test my spectacles to see if they need stronger lenses, I have to rely upon my eyes alone as I move the lenses closer and then further away. Alternatively, I, or the optician, can rely upon a set of lenses to test my eyes, to discover at what distances close to or further away I fail to see things clearly. What neither of us can do is not to rely upon the one when testing the other. In general we rely upon, and attend from, our bodily and mental powers. When we do attend to any of them, as in cleaning and dressing a wound, we rely upon others from we which continue to attend.

Attending *to* something is usually incompatible with attending *from* it, later if not immediately. In all the examples cited in the first paragraph there are details seen or heard or performed which we integrate into perceptions of whole objects or performances of whole actions. This is *tacit* integration because attention has to be focused upon the latter and not upon the former, that is, in those cases where we can be focally aware of what was previously a subsidiary detail. When we do focus upon the former, the latter dissolves, sooner or later: a word constantly repeated becomes a mere noise without meaning, for it is not being used to mean anything; the isolated features of a face are difficult to recognise as those of any person we know; looking at how we are holding the steering-wheel and moving the gear-stick, soon prevents us from driving the car safely. The improvement of skills requires a double effort: of analysis of the whole action into its phases and practice of them separately, which yields an explicit knowledge of them; and then of reintegration of them, and any explicit knowledge about them, in the performance of the whole, in

[11] M. Polanyi, *Personal Knowledge,* cit., pp. 88-9. In Chap. V, 'Articulation', pp. 69-131, Polanyi examines in detail the relations between the tacit and the explicit across the sciences, arts and language itself.

which we cease to attend *to* them, and to our explicit knowledge about them, and instead attend *from* them, and from explicit knowledge about them, and *to* the whole object or action. The details or rules to which we have attended, then lapse into unconsciousness as we attend from them, so that we come to forget altogether the explicit advice and rules that we were given and know them only tacitly in using them to play the game or speak the new language[12].

Even if all the subsidiary particulars could be specified, the way in which we integrate them into the focal whole or complex action could not itself be specified. For, if it were analysed into a set of rules, the question would then arise as to the manner in which we would apply *those* rules. But no rule can tell us how, when and when not, to apply itself. So if a second rule were formulated to tell us how and when to apply the first, it would itself require a third rule to tell us how and when to apply it. Some rule, method or procedure must be simply applied and not as an application of a higher and more general one. The same applies to the application of concepts, as noted even by Kant[13].

What this means is that the extent of tacit knowing can never be reduced. As soon as any part of it is explicitly known and formulated, that explicit knowledge is itself tacitly understood and used for the reasons just given. No manual or casuistry can tell us all we need to know in order to play a game, conduct scientific research, speak a foreign language, operate a machine, manage a business, or generally how to live our lives. At the most, formulated rules are 'maxims' which give general guidance and not detailed instructions, and the practitioner has to exercise his own intelligence and judgement in interpreting and applying them. Polanyi gives many examples of this from his own experience and from the history of natural science. For example, Popper required that scientific hypotheses must be capable of yielding predictions that could be shown to be false (but the theory of evolution does not entail any specific predictions) and that a hypothesis should be abandoned as soon as one example fails to fit a prediction drawn from it. But Polanyi knew that that happens everyday in laboratories and only the scientist's personal judgement can decide if an aberrant result is an inexplicable occurrence, the result of

[12] M. Polanyi, *The Tacit Dimension,* cit., pp. 18-20.

[13] The ability to subsume a particular instance under a general rule or concept cannot be exercised according to any rule but is 'our so-called mother wit' (A. 133); and this ability, necessary for making any judgements, 'is a skill so deeply hidden in the human soul that we shall hardly guess the secret trick that Nature here employs' (A. 141). *The Critique of Pure Reason*, trans. N. Kemp Smith, London, Macmillan, 1929. Kant never followed this through. His philosophy would have been very different if he had.

a fault in observation or in the experimental apparatus, explicable by a further modification of the hypothesis, or a really significant discovery requiring a radical review of the hypothesis and perhaps the theories and assumptions on which it depends[14]. The explicit has meaning and usefulness only because of the tacit.

There is much more that can be said about tacit integration, but now we must turn to its specifically personalist implications and applications, for, after all, Polanyi's aim was to restore the 'personal coefficient' —our activities of judgement, skill, commitment and emotion— to all our knowing and action[15].

3. The personal coefficient of knowing and action

3.1. Indwelling our knowing and action

Modern philosophy, since Descartes and Locke, created insoluble problems for itself by starting with a picture of a knowing subject set over and against an 'external world'. Polanyi's philosophy of tacit integration, drawing upon empirical studies of perception and mental development from infancy onwards, subtly changes that picture to one of engagement in and with the world. Going beyond what such as Dilthey and Lipps said about reliving the workings and products of the minds of others, Polanyi shows that our knowledge of everything is an indwelling of them everything we know, deeper and more intense as we rise from mere things to living ones, and thence to animals and, above all, to our fellow persons[16].

Firstly, what I propose to call the 'primary indwelling' of our own minds and bodies, or, better, our bodily and mental powers. As we have seen, in all knowing and action, we attend *from*, rely upon and integrate,

[14] M. Polanyi, *Personal Knowledge,* cit., pp. 276-8; see also pp. 292-3, and 'Genius in Science' reprinted in *Society, Economics and Philosophy: Selected articles by Michael Polanyi*, ed. R.T. Allen, New Brunswick, NJ, Transaction Publishers, 1997.

[15] M. Polanyi, *Knowing and Being*, London, Routledge; Chicago, University of Chicago Press, 1969, p. 120, at the end of 'The Unaccountable Element in Science', the editor, Dr Marjorie Grene, lists five types of what cannot be specified in natural science, and thus can be only tacitly known or performed, in natural science: '(1) the indeterminacy of empirical knowledge in its bearing on reality; (2) the unspecifiability of rules for establishing true, as distinct from illusory, coherence; (3) the indeterminacy of the grounds on which knowledge is held to be true; (4) the unspecifiability of the process of tacit integration by which knowledge is achieved; (5) the unspecifiability of the existential changes involved in modifying the grounds of scientific judgement', as set out in 'Logic and Psychiatry', *American Psychologist*, 23, 1968, pp. 27-43.

[16] M. Polanyi, *The Tacit Dimension,* cit., pp. 16-7.

subsidiary details in ourselves in using them as clues to that *to* which we attend. This also applies to the tools we use. In using and relying upon them, we attend *from* the proximal term, the sensations in our hands and arms, and *to* the distal term, the other end of the stick, the point of the probe, the head of the hammer. In this way, they cease to be external objects, while we are using them, and become parts of our bodies. We temporarily *incorporate* them into our bodies[17].

Much more intimate and permanent are the mental and personal frameworks which we acquire and 'interiorise'. In so doing, we not only think and act upon them but identify ourselves with them and thus they can transform us. In acquiring a language, the human child frees himself from life in the immediate present, and can imagine the future and what is out of sight, touch and hearing, and can recall the past, and share all this and much more with his fellows. In addition, to acquire a vocabulary and patterns of speech is also to acquire an inventory of what is in the world, a set of fundamental distinctions and categories, and thus a distinct way of viewing the world[18]. The student of any science and the apprentice to any craft, as we saw in the example of Polanyi and his medical studies, enlarges both his vocabulary and his horizons. He does not learn *about* it in a detached manner but absorbs its conceptions, theories, methods and procedures, and proceeds to use them, and thus to rely upon them, to interpret experience and to practice the science or craft. Only by indwelling them in this manner does he understand them: to list the rules of a foreign language is not to be able to speak it, nor is the ability to specify those for conducting experiments the ability to engage in scientific research. Likewise, the articulate contents of a science are not properly known if one merely knows about them. At the least, they need to be 'interiorised', to become an active part of the mental frameworks with which we understands the world. When that happens we attend *from* them, perhaps without realising it, and *to* what they reveal. They thereby irreversibly change our understanding and attitudes, just as one cannot be puzzled by a problem that one has solved or return to the confused state of mind prior to having things clarified and sorted out. Often the most important results of our education are not the many details which we soon forget unless we frequently have need to use them, but the general patterns and structures which we tacitly acquire with them.

[17] M. Polanyi, *Personal Knowledge,* cit., p. 59.
[18] M. Polanyi, *Personal Knowledge,* cit., pp. 112-3.

Moreover, as well as tacitly dwelling in them we have the power tacitly to modify them or even to break out of them altogether, save that which is presupposed by all our thinking and action[19].

Polanyi also uses 'indwelling' for the understanding of that which does not become a part of ourselves, for which I suggest the terms 'secondary', 'reconstitutive' or 're-enactive' indwelling. At this point we need to elaborate the ontological structure of tacit integration and apply it to the object known. A comprehensive entity is some sort of whole which is the integration of its subsidiary details, such that we have to attend from them, as well as from other details in ourselves and perhaps in the context in which we apprehend it, in order to apprehend it. When, for example, we attend from the parts of an unknown device in order to grasp what it is meant to do and thus what it *is*, we imaginatively reconstruct the functions of the parts and of the whole. Indeed, because it is an artefact, we reconstruct the human purposes that indwell it, brought it into being, and shaped the parts jointly to meet those purposes. The same applies to any comprehension of an organism, 'living machinery', as Polanyi calls it[20], in which each part serves the whole and some or all other parts, directly or indirectly. To discover what a part of an organism is, one must attend from it to what it does in the functioning of the whole. Similar functions, such as breathing and digestion, can be performed by different mechanisms, and the same mechanism can play a part in different functions, such as those of excretion and reproduction. In all this we do not simply look *at* the parts, separately or together, but *from* them to their specific and joint functions, thereby we imaginatively indwell their operations.

The same applies, but less intimately, to the comprehension of merely physical things. They, too, as modern chemistry and physics have disclosed, are systems of interacting components which themselves may be sub-systems. The original unitary and simple atom has itself proved to be a complex system. Simply to look at the components, each in turn, is not to understand how they interact, how the system continues to exist, and when and how it breaks up, changes into another sort of system, or combines with others to form a more complex one. Each can be understood only in terms of its interactions with others: it properties *are* its patterns

[19] *Ibid.*, pp. 105-6, 196-9, 267, 284-94; *Knowing and Being,* cit., pp. 31-32. Only with tacit powers which reach beyond our existing conceptions, language, and presuppositions can we grasp radically new realities and change our frameworks.

[20] M. Polanyi, *Personal Knowledge,* cit., p. 359.

of interaction. Properly to know any physical entity is imaginatively to reconstitute its place in a pattern or system of mutual interactions.

Yet, while Behaviourism holds true on this level, it radically distorts our knowledge on the animal level and even more on the human level. It is yet another example of attending *to* the details when what is required is to attend *from* them to that which they mean. Against Behaviourists, who assert that all that we can know is 'observable behaviour' (but *who* is there to observe them?) or identify overt actions with the workings of people's minds, Polanyi objected that we can understand 'behaviour' as a clue to the workings of a person's mind only as a subsidiary detail *from* which we attend *to* his mind and intentions. No 'behaviours' can be identified apart from understanding the person's intentions: for example, the passing of money to another person can be payment for goods or services rendered, repayment of a loan, a gift, payment of blackmail, a bribe, and all of these can be performed in other ways, as by cheque, bank transfer or getting another to pay by some means or other. Only by attending from the action, and other clues, such as the facial expressions, tones of voice, openness or furtiveness of the parties, can we ascertain just what the action is or is likely to be. We have to *read* the intention from all these clues: that is, to attend from them to that to which they point, manifest or express, and is their joint *meaning*[21]. In this way, we reperformingly indwell the actions, gestures, expressions and utterances of each other, just they indwell their mental and bodily powers and act and express themselves in and through them. Simply to look *at* the details will tell us nothing.

Furthermore, the functioning of organs and their organisms, the operations of machines and devices, and the actions of animals and our fellow men, are all *achievements* for they succeed or fail in one way or another and totally or to some degree. Hence, to apprehend them is thereby to evaluate them in terms of the self-set 'rules of rightness' of their 'principles of operation', all of which requires the use, the correct use of the personal judgement, not of the external and detached observer, but of the indwelling interpreter. All living things are healthy or unhealthy, whole or impaired, strong or weak, mature or immature or senescent, and fertile or sterile. Likewise, all machines and devices operate correctly or not in some way or not at all, are efficient or inefficient, and are economically viable or not. To know them is personally to evaluate them

[21] *Ibid.*, cit., pp. 372-3; *Knowing and Being,* cit., pp. 152, 156, 169 and 187; *Society, Economics and Philosophy: Selected articles by Michael Polanyi*, ed. R.T. Allen, cit., pp. 319-20.

in terms of their correct, incorrect or completely failing functioning and operations[22].

3.2. Judgement and decision

In general, what we know but cannot tell cannot be measured and calculated, and so it can be only estimated by the knower. Again, it cannot be clear and precise and so must be controlled by unspecifiable personal judgements, even feelings, and never by a comprehensive set of unambiguous rules. Many of the examples mentioned above in the second paragraph are ones of judgement, or include it: for example, the application of rules and concepts. Knowing is a matter of skill, and even in mathematics much practice is needed fully to learn how to apply its theorems and formulae, especially in sorting out in a problem just which ones are needed for solving it, which itself is not a matter of calculation and is the hardest part for pupils to learn[23]. Indeed, no proof of a theorem is itself deduced, but is the product of a personal effort to find and try what is a likely way of proving it from our repertoire of methods, or, in major discoveries, to invent a new method altogether. The same applies to the writing of computer programs.

All these in turn require personal valuations and evaluations of our own activities of cognition: whether their results are true or false, correct or incorrect, valid or invalid, more or less precise, appropriate or inappropriate, timely or premature, likely or unlikely, and worth pursing or not. In every sphere or level of existence above the merely physical, the facts are more than facts: they are *achievements* and thus value-facts. Polanyi thus restores the person, not only to his own thinking and action, but also to a living and personal world.

3.3. Commitment

In contrast, impersonalist philosophies seek to remove the person from his knowing, and so look for methods that they believe not to require any personal involvement, such as formal logic, algorithms and mathematics. Today technical devices are available that reduce somewhat the scope for personal judgement, such as calculators, high-speed ca-

[22] M. Polanyi, *Personal Knowledge,* cit., Chaps. 11 and 12.

[23] *Ibid.,* p. 124. Polanyi deals with the unspecifiable, and hence tacitly known and performed, aspects of mathematics, especially discoveries which cannot be deduced from existing conceptions and theorems, in *Personal Knowledge,* pp. 184-93.

meras[24] and timing devices that measure in hundredths of seconds for athletics and other sports, and, above all, computers. Yet all such devices are designed, built and operated by fallible human beings, so that, in respect of computers and even apart from any faults in entering data ('Junk in, junk out'), a computer's programs themselves may have errors, or the particular machine could cause faults in them, and thus either way it would corrupt its output. We would not use any device we knew to be seriously faulty.

Even more so do we tacitly commit ourselves to the general reliability of our mental, perceptual and bodily powers from which we attend in all we think and do, and so we learn by our mistakes and failures when and where to be cautious about using them or not to trust them at all, but instead to find aids to correct or supplement them, to and on which we thereby commit ourselves and rely, such as spectacles and hearing aids, lists of appointments and tasks to be done, and the knowledge and advice of others.

But the rationalism that resulted in objectivism sought certain and impeccable knowledge and so, starting with Descartes, practised the method of doubt in order in order thoroughly to purge all the errors from what we have assumed to be true. Yet Descartes, for one, never questioned, nor could he, what he relied upon, and thus committed himself to, in his tasks of doubt and reconstruction, namely, his own mental powers and the meaningfulness of the Latin and French in and by which he thought and wrote them. To be sure, we can doubt the rightness of some, as in finding *le mot juste* for what we want to express or in checking a calculation, but only by then and there relying *a*crtically upon others. For such fundamental beliefs can be 'justified' only by this back-handed 'justification' that, ultimately, we cannot but rely upon them while we live, think and act[25].

[24] Polanyi cites an example given to him by Alan Turing: a photo-finish camera at a race meeting showed one horse fractionally ahead of another but the nose of the second horse was extend beyond that of the first by a stream of saliva, an unanticipated result which had to be referred to the stewards for their personal decision. M. Polanyi, *Personal Knowledge,* cit., p. 20 n. 1.

[25] For a full treatment of this theme, see *Personal Knowledge* Chap. 9, 'The Critique of Doubt', and for the alternative, Chap. 8, 'The Logic of Affirmation', and its conclusion: 'Innocently, we had trusted that we could be relieved of all personal responsibility for our beliefs by objective criteria of validity—and our own critical powers have shattered this hope. Struck by our sudden nakedness we may try to brazen it out by flaunting it in a profession of nihilism. But modern man's immorality is unstable. Presently his moral passions reassert themselves in objectivist disguise and the scientist Minotaur is born.

'The alternative to this, which I am seeking to establish here, is to restore to us once more is the power for the deliberate holding of unproven beliefs'. M. Polanyi, *Personal*

Thus Polanyi begins chapter 10, 'Commitment', with this announcement: 'I believe that in spite of the hazards involved, I am called upon to search for the truth and state my findings'. This sentence, summarising my fiduciary programme, conveys an ultimate belief which I find myself holding. Its assertion must therefore prove consistent with its content by practising what it authorizes. This is indeed true. For in uttering this sentence I both say that I must commit myself by thought and speech, and do so at the same time. Any enquiry into our ultimate beliefs can be consistent only if it presupposes its own conclusions. It must be intentionally circular'[26]. The rest of the chapter and the whole book is an exposition of that thesis.

This is a personalist philosophy in a very strong sense, for only one who fully acknowledges his existence as a person and his personal responsibility for what he thinks and does, and so acts accordingly, can genuinely endorse it. Conversely all those who profess to hold subpersonal and impersonal beliefs about us tacitly exempt themselves from their accounts, and by their actions outside their lectures and publications, clearly show that they do not believe them and thereby severely compromise their intellectual integrity by refusing to recognise this self-contradiction and to undertake a radical rethinking of their primary beliefs. Hume did recognise the irrationality of his scepticism but merely put it aside and turned to backgammon and history, while Popper, having admitted that his own 'critical rationalism' condemns itself, nevertheless continued with it[27].

Earlier in PK Polanyi had cited St Augustine's *nisi crederitis non intelligitis*[28], 'Unless you believe, you will not understand', the Old Latin mistranslation of Isaiah 7:9: 'Unless ye believe, ye will not be established', which inspired St Anselm's *credo ut intellegam*, 'I believe in order to understand'. A general faith comes before and underlies reason, and, as R.G. Collingwood said, following Anselm, 'Reason is faith cultivating itself'[29]. To which we may add that rationalism rests on a faith in human reason, a tacit commitment which it will not acknowledge, and so is really irrational; and that fideism and fundamentalism of all kinds are fai-

Knowledge, cit., p. 268.

[26] M. Polanyi, *Personal Knowledge,* cit., p. 299.

[27] K. Popper, *The Open Society and its Enemies*, 2 vols., London, Routledge, 5th ed. 1962, vol. 1, pp. 230-1.

[28] M. Polanyi, *Personal Knowledge,* cit., p. 266, citing *De libero arbitrio*, Bk I, para. 4.

[29] In *Faith and Reason: Essays in the Philosophy of Religion by R.G. Collingwood*, ed. L. Rubinoff, Chicago, Quadrangle Books, 1967. See also the title essay.

th that refuses to develop itself, and so remains unreasoned and largely irrational.

Objectivists and positivists also attempt to eliminate personal commitment to reality and truth and the task of finding it, in favour of 'pseudo-substitutions' such as 'economy', 'symmetry', 'simplicity' and 'fruitfulness' for deciding among theories, and Kant's 'regulative principles' *as if* they really applied to how organisms and their organs actually operate and adjust their operations to maintain themselves, each other and the whole system, in short, exhibit a non-conscious teleology. But, as Polanyi says, what is 'economic' or 'simple' or 'symmetrical' in science may seem very complicated and a theory that is less complicated may be false: it has to be 'the true inner simplicity' as Weyl admits, and likewise with 'simplicity' and 'symmetry' which are used to smuggle in truth, rationality and reasonableness without frank admitting them; while theories can be fruitful of errors as well as truth, and fruitfulness can be judged in advance; and no one would use a 'regulative principle' that he thought inappropriate or false[30].

3.4. Intellectual Passions

This is the title of PK chapter 6, in which Polanyi aims to show that 'scientific passions are no mere psychological by-product, but have a logical function which contributes an indispensable element to science'[31]. Thereby he shows that it involves the whole person and is valuable in itself just like the other great components of civilisation, and is not just a source of technology. His treatment of this theme also discloses further applications of our tacit powers which cannot be explicitly formulated and formalised into sets of rules.

Intellectual passions have three functions in scientific discovery: selective, heuristic and persuasive, plus, as Polanyi adds, that of satisfaction at its success.

The selective function has two aspects: because 'positive passions affirm that something is precious', it follows that 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*'[32]. Thus science along with the other great articulate systems

[30] M. Polanyi, *Personal Knowledge,* cit., pp. 16, 42, 95n., 117, 145-8, 166, 169, 308, 315, 354.
[31] *Ibid.*, p. 134.
[32] *Ibid.*

of civilisation, such as religion and law, evokes and imposes and claims to be right those emotions which sustain and appraise it and appraise its theories for their intellectual beauty as a token of contact with reality[33]. Presented, we may say, as a mere body of objective fact, all that science can evoke is a 'so what?' or a 'justification' in terms of its technological utility, which would crimp and stunt it. The second aspect of the selective function corresponds to the notion of a motivating emotion, for it gives the underlying desire to discover the truth about nature a specific direction. Out of all the facts which are known or knowable, only a few are of scientific interest. The appreciation of this interest, which relies on a sense of intellectual beauty, cannot be dispassionately defined, as neither can the beauty of works of art nor the excellence of noble actions. Without selection and guidance by emotional appraisal of the scientific value of what is known or appears likely to be discovered, enquiry would 'inevitably spread out into a desert of trivialities'. What is needed is a general vision of reality which yields a scale of interest and plausibility, so that important conceptions can be upheld as intrinsically plausible even when there is evidence against them at the moment, and others can be rejected as specious even though there may be some evidence for them[34]. A scientist, in selecting a problem to be pursued, requires a sense, a feeling, for problems which are likely to be soluble, soluble by him with the resources and time available, and to be of some wider value and significance for science[35]. There is no set of formulae or rules for this. Only what is routine and thus easily anticipatable and of low interest, we may add, can be attained by the scientist with only minimal emotional involvement in what he is doing. As for what constitutes scientific value, Polanyi suggests three joint factors, unevenly distributed over the natural sciences: certainty or accuracy which by itself may be of little significance; systematic relevance or profundity, of what has wider applications and implications; and intrinsic interest for us human beings in the world, which is especially found in biology[36].

The heuristic function is that of sustaining the effort to discover by intimating specific discoveries, yet to be made, and sustaining the pursuit of them over a long period. Major discoveries which change the interpretative framework of science cannot be made by the routine use of the existing methods and framework. Those who make them have to cross a logical gap between present conceptions and new ones, the problem and

[33] *Ibid*.
[34] M. Polanyi, *Personal Knowledge,* cit., p. 135.
[35] *Ibid.,* pp. 123-124.
[36] *Ibid.,* pp. 135-136.

its solution, which involves a change in their whole way of seeing things, and they can do this only 'by relying on the unspecifiable impulse of our heuristic passion…. Like all ventures in which we comprehensively dispose of ourselves, such intentional change of our personality requires a passionate motive to accomplish it. Originality must be passionate'[37]. Citing the example of Kepler, who expressed such passion in respect of both genuine discoveries and mistaken ideas, Polanyi points out that it is not infallible. All the same, it is necessary.

This heuristic function, I suggest, corresponds also to the notion of the motivating emotion. It, too, intimates something specific to be done and sustains through difficulties the effort to do it. It therefore also acts, not as a terminating emotion in the specific sense of closing the line of enquiry, but as a provoking one which evokes further efforts after disappointing results have been encountered at particular stages on the way.

Polanyi's third function is the persuasive one[38]. Having satisfied himself that he has made a genuine and significant discovery, the scientist must communicate it to his colleagues, and so have it confirmed. It is not made true by consensus, but all serious utterances about the world are put forth with what Polanyi calls 'universal intent', as true sayings and worthy of all men to be believed. Though it is possible to be *Athanasius contra mundum* and later to be confirmed to have been right all along, the agreement of one's colleagues gives added assurance that one is correct[39]. Thus the scientific community, or those specialising in one's own corner, have to be convinced. Again it is the major discovery, creating a wide logical gap, which demands persuasive passion, on the one side, and, on the other, sympathy with what one initially cannot comprehend[40]. The other scientists have, as it were, to learn a new language, for the great discovery cannot be expressed in terms of existing conceptions and terminology. One cannot argue for a new framework of thought in terms of an old one. A process of conversion is required to bring the others to follow the pioneer in crossing the logical gap that he has bridged. Thus arises the phenomenon of unseemly scientific controversies, some of them long lasting such as those concerning the status of psycho-analysis, in which persuasive emotions get out of hand. At the limit these concern what it is

[37] *Ibid.,* p. 143.

[38] M. Polanyi, *Personal Knowledge,* cit., pp. 150ss.

[39] See Polanyi's own experience with his theory of 'The potential theory of adsorption', in *Knowing and Being*.

[40] M. Polanyi, *Personal Knowledge,* cit., p. 101, where Polanyi, drawing on his own experience as a medical student, shows that such sympathy is needed in the learning of anything radically unfamiliar, otherwise one will take it to be nonsense at the start.

for something to be science or scientific in the first place, the one party claiming that its theory, practice or branch of study is scientific, the other denying it. This persuasive passion is the motivating emotion of a second course of action —gaining the agreement of one's colleagues— which follows upon the successful outcome of a previous one, the original line of research.

'A scientist seeks to discover a satisfying theory, and when he has found it, he can enjoy its excellence permanently'[41]. Without experiences of satisfaction and dissatisfaction, we would not know when to stop, for we would have no idea of whether we had succeeded or not. The intellectual life is distinguished by an attitude of detachment, a bracketing of other concerns and interests. It is the *dis*interested pursuit of knowledge, or it is that primarily although it can be joined with some types of other concern provided they remain subordinate and do not lead to the distortion of the truth. But it is not the *un*interested pursuit of knowledge. It is detachment from those other interests out of commitment to intellectual and academic ones and attachment to their distinctive values.

Polanyi has an interesting comment to make at the end of his discussion of the constitutive emotions of science: 'Some people may listen to these illustrations of continuing and sometimes violently conducting controversies with impatience, for they believe that science provides a procedure for deciding any such issues by systematic and dispassionate empirical investigations. However, if that were clearly the case, there would be no reason to be annoyed with me. My argument would have no persuasive force, and could be ignored without anger'[42].

4. From a personalist epistemology to a multilevel ontology

That last subsection especially will inevitably prove beyond doubt to objectivists that Polanyi is a subjectivist, for each camp needs the other to distinguish itself in opposition to it. Polanyi explicitly chose the term 'personal knowledge' to overcome this dichotomy of 'objectivism' and 'subjectivism': 'The freedom of the subjective person to do as he

[41] M. Polanyi, *Personal Knowledge,* cit., p. 173.

[42] M. Polanyi, *Personal Knowledge,* cit., p. 159. For more on Polanyi's account of emotions, see R.T. Allen 'Governance by emotion', *Journal of the British Society for Phenomenology*, Vol. 22 No. 2, May 1991, pp. 15-30; 'The cognitive functions of emotion', *Appraisal,* Vol. 3 No. 1, March 2000, pp. 38-47; 'Polanyi and the Rehabilitation of Emotion', in ed. with Struan Jacobs: *Emotion, Reason and Tradition: Essays on the Social, Political and Economic Thought of Michael Polanyi*, Guildford, Ashgate, 2005, pp. 41-53; 'Emotion, Autonomy and Commitment', in *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi*, ed. Tihamér Margitay, Newcastle-on-Tyne, Cambridge Scholars Publishing, 2010.

pleases is overruled by the freedom of the responsible person to do as he must'[43]. This is what a colleague of mine used to call Polanyi's 'Lutheran freedom', generalised elsewhere as 'public' versus 'private' freedom: in the former, individualism and free association perform social functions by dedicating themselves to transcendent ideals; but in the latter they contribute little, though both deserve protection[44]. Objectivism, as in Laplace's paradigmatic system[45], has no place for the scientist in his science nor for anyone else, while Subjectivism has no place for responsibility.

The question then arises as to what sort of ontology can properly accommodate the person, and so I shall conclude with a short sketch of Polanyi's.

Reference has already been made to comprehensive entities and complex actions in which subsidiary details are integrated, and which we apprehend by attending from those details, and others, and to the comprehensive entities or complex actions themselves. Polanyi proposed a generalisation of this correspondence between the structure of comprehension and that of the comprehensive entity which is its object[46]. Such a comprehensive entity exists on at least two levels, each with its own organising principles which account for events on that level. Hence knowledge of a lower level, and how it works, does not illuminate the workings of a higher level. For example, the laws of physics and chemistry explain the effects of stresses and strains upon the internal structures of the parts of a machine, but throw no light on what they do, nor why they are shaped and arranged as they are. That comes only from the principles of technology and knowledge of the function of the machine, what it is meant to do. We have to look *from* the composition of the parts *to* their functions and that of the machine, of which physics and chemistry know nothing. But, given this knowledge of human purposes and technology, the recognition of a mass of metalwork as a machine, and of its having broken down, the laws of physics and chemistry can then be used to explain how it has broken down, such as how an irregularity in the chemical structure of a part caused it to fracture under a normal stress or to overheat. This is the principle of 'dual' or 'marginal control', whereby the boundary conditions of one level, the extent to which its or-

[43] M. Polanyi, *Personal Knowledge,* cit., p. 309.

[44] M. Polanyi, *The Logic of Liberty,* London, Routledge; Chicago, University of Chicago Press, 1951, pp. 157-8, 198-200; see also *Science, Faith and Society,* London, OUP, 1946; 2nd ed. U. of Chicago Press, 1964, III; *Personal Knowledge,* cit., pp. 213-4, pp. 226-7, pp. 244-5, and other references.

[45] M. Polanyi, *Personal Knowledge,* cit., pp. 139-42 and other references.

[46] M. Polanyi, *The Tacit Dimension,* cit., pp. 33-4.

ganising principle is applicable which are left open by the principle itself, are determined by the organising principles of the next higher one. Thus the physical and chemical properties of metals leave open how they are to be shaped and fitted together in a machine, and those matters are determined by the operational principles of technology, a practical science of using and adapting materials and energy for the execution of types of task in order to serve human purposes. In turn it is the last which determine which technological principles are to be used, for example: clockwork or electronics for timepieces, CRT or LED for computer monitors. They include considerations of economic as well as technical efficiency: coal-fired steam locomotives were once cheaper though much less thermally efficient than ones powered by diesel engines. Polanyi applies this hierarchical structure of dual control to organs and organisms, persons and their minds and bodies, artefacts and their material composition, human actions and their components[47]. Instead of the uni-level, merely physical, dead and de-personalised world of Reductionism, the philosophy of tacit integration restores the multi-level, living and personal world in which we actually live[48].

[47] M. Polanyi, *Personal Knowledge,* cit., Chs 11 and 12; *The Study of Man,* London, Routledge; Chicago, University of Chicago Press; 1959, Lect II; *The Tacit Dimension* Lect. II; *Knowing and Being,* Chs 13 and 14, *Society, Economics and Philosophy: Selected articles by Michael Polanyi*, ed. R.T. Allen Articles 19, 20, 21, 22, 23.

[48] Nevertheless, despite this, his numerous statements that the sciences aim at truth, what was said above about his rejection of 'pseudo-substitions' for reality, and such explicit articles as 'Science and reality' (*The British Journal for the Philosophy of Science*, XVIII, 1967, and in *Society, Economics and Philosophy: Selected articles by Michael Polanyi*, ed. R.T. Allen), Popper and his fellow Objectivists still called Polanyi a 'subjectivist'.