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### **On the Logic of Personal Knowledge**

In 1951, the year Michael Polanyi eventually delivered the Gifford Lectures, a collection of his essays also appeared in print. This was apparently the realization of a plan much older than this, and it was very different from the volume he suggested in 1944 to Karl Mannheim. 1/

It is an important collection of published and unpublished works, not only for what it contains but because of its ambition, which is contained not only in its title: "The Logic of Liberty". I suggest that this volume, because it was put together at the same time the Gifford lectures were prepared, as well as the Lindsay Lectures, delivered just after the publication of *Personal Knowledge*, provides insights into the structure, logic and ambition of *Personal Knowledge* not obvious from its text.

Such a statement is likely to be met with doubt, especially as it is made by a sociologist who also claims that for an understanding of Michael Polanyi's magnum opus an understanding of his ties to sociology is very helpful. (I am aware that Michael Polanyi mostly ridicules sociology in the fifties and sixties, if he makes reference to it at all. But then *Personal Knowledge* contains some prescriptions for sociology as a science.)

I am suggesting that the roots of *Personal Knowledge* extend deeply into the past. This suggestion is not idle, as Michael Polanyi quotes Kant in his Preface to *Logic of Liberty* as follows:

"It is unfortunate that not until we have unsystematically collected observations for a long time to serve as building materials, following the guidance of an idea which lies concealed in our minds, and indeed only after we have spent much time in the technical disposition of these materials, do we first become capable of viewing the idea in a clearer light and of outlining it architectonically as one whole according to the intentions of reason."

It seems clear that Michael Polanyi then, in 1951, considered himself in a position to outline his idea architectonically. His "theory of freedom" remains tacit, however, to a large extent, save for this preface where he clarifies what it is not.

"Economic liberty I regard as a social technique suitable, and indeed indispensable, for the administration of a particular productive technique. While we are deeply committed to this technology to-day, other alternatives may one day present themselves with

1/ *The correspondence is available in the Regenstein collection.*

strong claims in their favour. Freedom of the individual to do as he pleases, so long as he respects the other fellow's right to do likewise, plays only a minor part in this theory of freedom. Private individualism is no important pillar of public liberty. A free society is not an Open Society, but one fully dedicated to a distinctive set of beliefs 2/. There is a link between my insistence on acknowledging the fiduciary foundations of science and thought in general, and my rejection of the individualistic formula of liberty. This formula could be upheld only in the innocence of eighteenth century rationalism, with its ingenuous self-evidences and unshakable scientific truths. Modern liberty, which has to stand up to a total critique of its fiduciary foundations, will have to be conceived in more positive terms."

While "there is a link" between the components of Michael Polanyi's philosophy, it seems easier to state it in negative terms. One 1929 diary entry is particularly telling 3/. I will return to it shortly, to mention first how this diary indicates some other links, to persons and sociology as an embryonic discipline. (I neglect Gestalt psychology intentionally.)

*2/ "Open" society, with a capital O, is clearly not a misprint, but a reference to Karl Popper's "The Open Society and its Enemies" - which is not mentioned explicitly by Polanyi, of course.*

*3/ There is only one diary in the Regenstein collection: 1929. To use it as evidence certainly goes against a commonly held view of the development of Polanyi's thought that we shared as we begun work on the project, as documented by our proposal to the Volkswagen-Stiftung (1984) . This view of Michael Polanyi as an essentially non-political scientist has been vividly illustrated by his friend Leo Szilard. Polanyi himself, by describing a conversation with Nicolai Bucharin shortly before his execution as influential for his own intellectual development, has given credibility to this view. It is wrong. Michael Polanyi's long 1944 letter to Karl Mannheim makes the point that he did not basically change his views since the time when they were both young people in Budapest. The 1929 diary entries concerning H.G. Wells and Julien Benda prove that Michael Polanyi still identified himself as the European pacifist intellectual he had been since his boyhood. His well-known rejection of the offer by Victoria University, Manchester, in 1933 does not contradict this at all. Professor Edward Shils has pointed out to me that he rejected the offer only after the November election in 1932, which the Nazis lost. Year-end reviews in German papers 1932/33 consider as a major event of the past year that the Nazis were finally beaten. (Adolf Hitler's appointment as Reichskanzler by Reichs-Prasident Hindenburg on January 30, 1933, came as a surprise to many. Even Leo Szilard, with his keen sense of political developments, leaves Germany only after the burning of the Reichstag.)*

## Some links to sociology

Hints linking Michael Polanyi to sociology are scarce, but telling. When he prepares for his journey to the United States in 1929, he notes in his diary (15.7.): "'Middletown' gekauft". This book by the Lynds about their classic community study is among his books in the University of Chicago library; inside the cover is a handwritten "Muncie" (MP's handwriting).

For a famous scientist, who has dedicated his whole existence to physical chemistry, this would appear as a rather strange activity: to buy a sociological community study as travel preparation, and even noting this in a diary.

We know all too little about Michael Polanyi's links to sociology then - but there must have been some. Few intellectuals in Berlin in 1929 knew about this study, and that "Middletown" was the "codename" for the city Muncie could have been known only to someone who was, however loosely, connected to the network of sociologists. In 1929 he also met the American political scientist Lasswell and US sociologist Loomis. Otherwise, the sources are scarce 4/.

This lack of knowledge on our part certainly is no firm basis to claim Michael Polanyi for sociology in any sense, especially as he moved his social science interests fully into economics since 1929<sup>5</sup>. But my claim would be that he did have a full understanding of the key problems of social science at that time, and that he returns to these problems later on. The idea of a "value free" sociology seems to keep bothering Michael Polanyi. He returns to this issue occasionally, and it is in this context that he takes issue with Max Weber. But this is by far not the only problem Michael Polanyi considers as left open.

*4/ Unfortunately, we neglected to pay attention to Michael Polanyi's activities in Budapest, Karlsruhe and Berlin. Consequently, there is not much that we know about this period, and the 1929 diary is an accidental find. However, it is well known that Michael Polanyi was an active participant in Budapest circles that were closely connected to Heidelberg circles (as the visit by the Heidelberg social historian Gothein to Budapest shows, beyond the membership of Georg Lukacs in both). Michael Polanyi was close to the Stolpers, and was in regular correspondence with Toni Stolper. (In one of her letters she mentions that "our friend Theodor Heuss has become minister of education". Heuss, who became Bundespräsident in 1949, incidentally wrote a Max Weber-Obituary in the *Osterreichischer Volkswirt*, edited by Gustav Stolper before he moved to Berlin.) The 1929 diary seems to indicate that Polanyi knows Dr. Melchior Palyi well (the diary gives no first name, though).*

*5/ The accounting framework of economics provides more than a superficial similarity for someone impressed by the fruitfulness of the laws of conservation. The economics-science circle organized by Polanyi in Berlin since 1929 includes Marschak, the Stolpers, John von Neumann, Szilard, Wigner, and a few others.*

Max Weber had reconciled the idea of free will with the possibility of a science of human action by introducing the notion of rationality, thereby making *Verstehen* non-arbitrary 6/.

This solution leads to several problem shifts and unresolved problems, among them

the unsolved problem of the understanding of error 7/

the choice between *Verstehen* und *Erklären* 8/

rationality leading the Way into a kind of slavery worse than ancient Egypt. 9/

He returns to these issues and solves all three, without disclosing in *Personal Knowledge* or elsewhere where these problems were posed. But Michael Polanyi gives more than just a hint later. He appends little more than two pages to the "Study of Man", pretending to offer just a few corrections concerning Collingwood. Here he does mention Max Weber, when he indicates that he did indeed compare the three editions of "*Grenzen der Naturwissenschaftlichen Begriffsbildung*". Polanyi gives a very condensed, precise

6/ See his "*Roscher und Knies und die logischen Probleme der historischen Nationalökonomie*" (dated 1903-1906) in *GAzW*,

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Weber suggested two approaches to the understanding of error: a confusion of two distinct concepts, namely rationality and understandability, in his misguided "*Richtigkeitsrationalität*" of 1913, and a capitulation in 1920, where he suggests that errors be counted rather than understood.

8/ English-language Weber readers using the Henderson-Parsons translation will never be able to figure this out, other than guessing that there must be a problem of utmost German incomprehensibility.

9/

The famous passage in "*Wirtschaft und Gesellschaft*", edited posthumously by Melchior Palyi (and, officially, Weber's widow Marianne) is (p. 835 in the fifth edition): "Eine leblose Maschine ist geronnener Geist. Nur, daß sie dies ist, gibt ihr die Macht, die Menschen in ihren Dienst zu zwingen und den Alltag ihres Arbeitslebens so beherrschend zu bestimmen, wie es tatsächlich in der Fabrik der Fall ist. Geronnener Geist ist doch jene lebende Maschine, welche die bürokratische Organisation mit ihrer Spezialisierung der geschulten Facharbeit, ihrer Abgrenzung der Kompetenzen, ihren Reglements und hierarchisch abgestuften Gehorsamsverhältnissen darstellt. Im Verein mit der toten Maschine ist sie an der Arbeit, das Gehäuse jener Horigkeit der Zukunft herzustellen, in welche vielleicht dereinst die Menschen sich, wie die Fellachen im altägyptischen Staat, ohnmächtig zu fügen gezwungen sein werden, wenn ihnen eine rein technisch gute und das heißt: eine rationale Beamten-Verwaltung und -Versorgung der letzte und einzige Wert ist, der über die Art der Leitung ihrer Angelegenheiten entscheiden soll. Denn das leistet die Bürokratie ganz unvergleichlich viel besser als jegliche andere Struktur der Herrschaft"

review of the south German school of philosophy, and shows the development of the methodology of the study of man since Dilthey in a most remarkable display of familiarity with the major figures participating in the dispute.

Raymond Aron has compared "Max Weber and Michael Polanyi" for the Polanyi Festschrift (*The Logic of Personal Knowledge*, RKP, 1961) 10/. (Aron, whose "Sociologie allemande contemporaine" is mostly an exposition of Weber's thought, is probably the international leading authority on Weber at that time.)<sup>11/</sup> Michael Polanyi writes to thank him: "One of my obstacles lay in the difficulty of relating my thoughts to Weber's position, the influence of which pervades so much of modern sociology" <sup>12/</sup>. Aron did not know Michael Polanyi's "Study of Man" when he wrote this essay, unfortunately. While MP certainly did write friendly letters, I am certain that there is more to this remark than just a friendly note of thanks.

Given the material accessible to me currently, it is highly speculative to link Michael Polanyi to Weber. There is sufficient material for speculation, however: after all, he belonged to the Sonntags-Kreis <sup>13/</sup> in Budapest. Some members of the circle, such as Georg Lukacs <sup>14/</sup>, had moved to Heidelberg.

According to Wigner's obituary, Polanyi visited Karlsruhe in 1912. After obtaining his doctorate in medicine in 1913, he went to the Technische Hochschule in Karlsruhe to study chemistry and work with Professor Bredig. For all practical purposes, "Karlsruhe" may also be read as "Heidelberg", given the short distance (less than 60 kms) and the easy train

<sup>10/</sup> Reprinted also in Thomas A. Longford and William H. Poteat (eds.), *Intellect and Hope. Essays in the Thought of Michael Polanyi*. Duke University Press, 1968.

<sup>11/</sup> Aron's **Deutsche Sociologie der der Gegenwart** gives the flavor of his view of Weber.

<sup>12/</sup> Carbon copy of this letter is in the Regenstein collection.

<sup>13/</sup> Bela Balazs' diary mentions MP, in: Karadi, Eva und Erzsebet Vezér (Hg.), *Georg Lukacs, Karl Mannheim und der Sonntagskreis, Frankfurt (Sendler), 1985.*

<sup>14/</sup> Lukacs was **not** unnoticed in Heidelberg: he is mentioned in Marianne Weber's biography *Max Weber - Ein Lebensbild*, as well as by Weber himself in *Wissenschaft als Beruf*.

connection. The Bibliographical Note indicates a considerable familiarity with the leading figures in Heidelberg intellectual circles 15/.

As of this writing, any participation of Michael Polanyi in Heidelberg's intellectual life is not documented. There is no doubt about the seriousness of his work in Karlsruhe. Even before he formally enters the TH Karlsruhe, he is encouraged by Bredig to work out and publish his ideas about the Third Law of Thermodynamics. Bredig, however, does not feel competent to judge the merits of Polanyi's paper and sends it to Albert Einstein, who liked it a lot. His letter to Bredig seems to have changed Polanyi's life: "Bang! I was created a scientist" 16/ is how he stated it himself later.

During the war, Polanyi was in his native Hungary to serve as medical officer (Lukacs returned to Budapest to serve in the office of the mail censor). Polanyi returned to Karlsruhe

15/

*The short Bibliographical Note appended contains this rather ambitious "criticism" of Collingwood's famous book "The Idea of History". In fact, Polanyi concisely presents the core methodological ideas of Windelband, Rickert and Weber, effectively correcting Dilthey's "secession" of "Geisteswissenschaft" from the sciences, in the following words: "Collingwood's sharp criticism of Windelband's rectorial address delivered at Strasburg in 1894 is based on a misrepresentation. Windelband does not say that the field of reality can be divided into the subjects of nomothetic and idiographic knowledge. He expressly denies this and asserts that these two forms of knowledge are two logically distinct parts of all knowledge. Nor is Windelband "strangely blind" to the objections raised by Schopenhauer against the scientific character of history on the grounds that history deals with unique events. Windelband refers to Schopenhauer on the very same lines as Collingwood does in criticizing him. This explains certain differences in my own references to Windelband compared with Collingwood's account of his views. I must also point out that Collingwood describes Rickert's views inaccurately. In his great work, *Die Grenzen der Naturwissenschaftlichen Begriffsbildung* (1902), Rickert does not say that the valuation of historical acts is a proper function of historiography. He says, on the contrary, and argues it in detail, that history as a science can merely identify acts deserving praise or blame, while strictly refraining from apportioning either praise or blame. In the later editions of his book (1921 and 1929) he upholds this view first against Troeltsch and then also against Meinecke, who had meanwhile taken their stand on the doctrine that historical interpretation includes moral valuation. By contrast, Rickert acknowledges Max Weber as a follower of his own doctrine of value-free science. My own text refers therefore to Troeltsch, Meinecke and Collingwood, rather than to Rickert and Max Weber."*

16/ According to Wigner, Bredig had not felt competent to judge Polanyi's paper and sent it to Einstein for review. The quotation "Bang! I was created..." is taken from Drusilla Scott, *Everyman Revived. The Common Sense of Michael Polanyi*. London, 1985: 2 (originally in MP's contribution to *Mid-Century Authors*).

he in 1919, and moved on to the Kaiser Wilhelm Institut für Faserstoffchemie in Berlin in 1920. While his brilliant career in Berlin within physical chemistry is abundantly documented (even in odd places like the Einstein-Born-Korrespondenz one finds an occasional sentence like "Polanyi hat ein Riesen-Ei gelegt!"), any suggestion linking him to "Heidelberg" or "sociology" at that time is conjectural and/or speculation, and I will leave it at that for the time being.

### **The structure of the argument: an impossibility theorem**

His diary (28.1.1929) notes a "Gespräch mit Wigner. Grundsatz: gleiche Begründung für Naturwissenschaft und Glauben." A thought of Dostojewski, which is later repeated and extended in a 1932 typescript, provides an impossibility to be compared to the "Unmöglichkeit des perpetuum mobile". "In beiden Fällen sowohl Gebundenheit als Willkür".

The 1929 diary seems to be the earliest place where Michael Polanyi notes that an impossibility theorem should be used as a foundation outside of the sciences, but just like in the sciences. This is not really a surprise, as thermodynamics must have made the earliest and strongest impressions on Michael Polanyi. A law like the conservation of energy has been extremely fruitful; stating that a perpetuum mobile is impossible has implications far beyond this perennial concern of tinkerers all over the world.

So it may be even more surprising that Michael Polanyi did not decide earlier that an impossibility theorem was needed, for the social sciences or ethics. But the way he mentions this after his conversation with Wigner suggests that this idea occurred to him the first time, January 28, 1929. It will take some time to work out, and it will change.

The idea that the foundation for "Naturwissenschaft und Glauben", "Gebundenheit und Willkür", must be the same is taken up in *Science, Faith and Society*, of course - even in the title. But he does not use an impossibility theorem there. Perhaps he has not decided on his "perpetuum mobile"-substitute yet. Soon thereafter, Michael Polanyi goes on to state two impossibility theorems. The perpetuum mobile-equivalent in the first is "central planning", in the second the "Laplacean demon".

The first is contained in an essay in *The Logic of Liberty*: "THE SPAN OF CENTRAL DIRECTION"

"This essay may be labouring the obvious. But obvious though my result may seem, I can find it stated nowhere while a great deal has been written which contradicts it by implication. I affirm that the central planning of production in the rigorous and historically not unwarranted sense of the term strictly impossible; the reason being that the number of relations requiring adjustment per unit of time for the functioning of an economic system of  $n$  productive units is  $n$ -times greater than can be adjusted by subordinating the units to central authority. Thus, if we insisted in placing the 100,000 business units of a major industrial country under a single technocratic control, replacing all market operations by central allocations of materials to each plant, the rate of economic

adjustments would be reduced to about 1 : 100,000 of its usual value and the rate of production would be reduced to the same extent."

Michael Polanyi occasionally returns to this topic, based on his proof that central planning is strictly impossible. This is not my topic today. What I would like to stress is that this proof is an indication of how Michael Polanyi sees the "architecture" of his argument. The foundation must be the recognition of an impossibility.

The second impossibility is contained in *Personal Knowledge*, but not stated simply in one place. Laplace is mentioned in the index of *Personal Knowledge* in 14 places. He states the Laplacean ideal of universal knowledge carefully (pp. 139-141). Many scientists assume that while the Laplacean idea is not practical, it is valid in principle. Michael Polanyi proves that this idea is not valid theoretically. The principle objection is, of course, the stratified nature of the universe. The Laplacean demon cannot come to grips with multiple levels. It cannot predict the behavior of machines (or tell a dead frog from one which is alive).

Now, this impossibility theorem is of great importance. This proof does away with determinism and reductionism.

The history of science is full of examples and he mentions a few. "In mechanics, centuries of misplaced ingenuity having been spent on solving the problem of perpetual motion, eventually the impossibility of constructing such a machine was established as a fundamental law of nature," he writes in a chapter headed by "Equivalence of Belief and Doubt" (p. 273).

There is no doubt that Michael Polanyi considers a theorem of impossibility crucial for the architecture of his argument, but he does not state his own argument this way. He does not begin with the statement of a negation.

A book - or the Gutenberg technology - forces a certain linearity of presentation. So he starts with Objectivity, Probability and Order, redefining quite a few concepts and not mentioning many of those whose problems he takes up here.

Rationality, developed at length by Max Weber, is turned objective by Polanyi, one example being Copernicus' theory. It "was to speak for itself in a fashion that went far beyond asserting its own inherent rationality. It was to speak to Kepler (66 years after the death of Copernicus)... and another 68 years later Newton..." (5). Rationality in this sense is not obvious at all. Neither the laws of nature nor those of man are fully explicit - a view of rationality very different from Weber's, to whom a judge in a system of rational law appears as "Paragraphenautomat". 17/

17/

*Oder wo der Richter, wie im bürokratischen Staat mit seinen rationalen Gesetzen, mehr oder minder ein Paragraphen-Automat ist, in welchen man oben die Akten nebst den Kosten und Gebühren hineinwirft, auf daß er unten das Urteil nebst des mehr oder minder stichhaltigen Gründen ausspöte, dessen Funktionieren also jedenfalls im groben und ganzen kalkulierbar ist. (S. 826)*

Dilthey is not mentioned once in *Personal Knowledge* (only the note appended to *Study of Man* points out his importance). Instead, Polanyi introduces one of his striking, deceptively simple examples.

"Welcome to Wales by British Railways" is the message of the thoughtful station master in Abergele, at the Welsh border. This message is really an arrangement of pebbles in an orderly garden. While we have no difficulty understanding this greeting that is physically implemented by pebbles, a rather clever Gedankenexperiment follows: after the death of the station master and a few years later, the pebbles are scattered, etc. The particular "arrangement" of scattered pebbles is, of course, also most unlikely - which only shows that we do not use the statistical approach to assess information content systematically at all.

"Why this sudden change in our methods of inference?" Michael Polanyi concludes the Gedankenexperiment. Now this clearly is an exercise in the use of statistics and probability for scientific explanation, but it also involves a sudden shift between "Verstehen" and "Erklaren", made much more precise by the introduction of statistical concepts.

Both "erklaren" and "verstehen", of course, come into play when machines are the subject. Functioning machines have to be understood, only the failure of machines is explained (Michael Polanyi's crucial contribution is the introduction of boundary conditions, of course. For Weber, machines were just "geronnener Geist", to be understood like any artifact.)

### **The fiduciary programme**

The introductory chapters on objectivity, probability and order serve many purposes **for** the argument of the book 18/. What appears as obvious is that Polanyi deals with the way scientists use statistical procedures to decide about theories using data. Polanyi made quite an effort to present a technically competent, accurate version of the objective and subjective schools of statistical inference, including Sir Ronald Fisher's "fiduciary programme" 19/.

*18/ Killing (at least) two birds with one stone is certainly one of Michael Polanyi's favorite ways of conducting a discussion. This makes it difficult to for the, reader to see which particular school of philosophy or science is the current subject of a devastating blow. Sometimes the reader is unaware that a foundation for a new philosophy of science was just being laid, while she is still puzzled how she could ride a bike or swim before Professor Polanyi explained the physics of swimming and biking.*

*19/M. S. Bartlett.*

His demonstration that neither the objective nor the subjective school make the judgement of the scientist unnecessary lay the groundwork for his bold claims in the "Stability of Beliefs" chapter, where he states that the logical status of science does not differ from psychoanalysis, marxism - or even the Azande! 20/

But one surely would fail to appreciate Polanyi's argument as well as the importance of his occasional striking examples if one assigned merely one function - one would not notice the architecture as a whole. In fact, quite frequently MP kills more than a single bird with one stone.

The first chapter titles have a ring to them that cannot fail to remind anyone familiar with Max Weber's methodology of his efforts to lay a foundation for sociology. While "Objektivität" has been the catchword of Weber's most programmatic essay (1904), the effort to tie individual actions to social order by means of probabilistic concepts ("... soil heiBen ... die Chance...") has been a characteristic feature of both the 1913 essay and the "Grundbegriffe" Weber completed shortly before his death in 1920 21/.

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*This critique of a falsificationist theory of science did not, of course, escape the attention of its chief proponent, Karl Popper (Polanyi had already presented this chapter at a professional meeting, circulated a mimeographed version and had it printed in a journal, as indicated in PK). Karl Popper's 1958 "Preface to the English Edition" of "The Logic of Scientific Discovery" (1959) ends with his wish to "save the sciences and philosophy from an obscurantist faith in the expert's special skill and in his personal knowledge and authority; a faith that so well fits our 'post-rationalist' and 'post-critical' age, proudly dedicated to the destruction of the tradition of rational philosophy, and of rational thought itself" (p. 23) Words like these leave no doubt who the opponent is, whereas the one reference (and some missing references) to Karl Popper in PK is sufficiently subtle to escape the attention of most readers. Anyone familiar with Popper's work will notice that the daring boldness of science, as exemplified by the Eddington expedition to "test" relativity theory, was considered by Popper as most different from psychoanalysis, such as Adler's, or marxism, since both could so easily be reconciled with any new fact. Thus, Popper developed the idea that the possibility of falsification could be used as a criterion to separate science from nonscience in Vienna in the twenties. Popper's LSdD had not been given a close look by Polanyi until 1949, as indicated by the one letter from Polanyi to Popper available in the Regenstein collection.*

21/

*Weber had studied the work of statisticians like von Bortkiewicz and Tschuprow quite carefully (see GAZW 269). The problems associated with his understanding of probability are the problems of statistics in his lifetime. Note that Polanyi has the modern subjective school of probability begin with Keynes in 1920 (incidentally the year Weber died). Given the rather fragmented evidence for the argument of this paper, it may be useful to quote a few words about the editorial division of labor from the "Vorbemerkung der Herausgeber" der "Wirtschaftsgeschichte. Abriss der universalen Sozial- und Wirtschaftsgeschichte" (Berlin: Duncker & Humblot 1923): "Dr. Palyi (stand) besonders für die 'Begriffliche Vorbemerkung' zur Seite, zu deren endgültiger Gestaltung er als Herausgeber von 'Wirtschaft und Gesellschaft' besonders berufen war." (3.1958:XX)*

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An unresolved problem in Weber's rational version of "Verstehen" is the understanding of error, Weber tried to solve this in two different attempts, and failed. Polanyi offers a solution, introducing the notion of logical levels.

The idea of levels of error is elaborated in "The Study of Man", but already contained in *Personal Knowledge*. It cannot be separated from the Verstehen/Erklaren distinction: We understand correct decisions and "higher level" errors (i.e., accepting false testimony as facts, wrong interpretation of the law), whereas failures of the lower level have to be explained (by, i.e., the liquor consumption of a judge). The choice between Verstehen and Erklaren is clearly an act of faith, however.

### **The rejection of machine intelligence**

A persistent concern with the problems of machine intelligence (today "Artificial Intelligence") runs through Polanyi's activities after the 2nd war. It is well known that he argues these issues extensively with Alan Turing in the late forties. He returns to these issues in *Personal Knowledge*, where he rejects "Artificial Intelligence" on new and different grounds. During the year he spends in Palo Alto at the Center for Advanced Study in the behavioral sciences, he uses the setting to familiarize himself with the work of John McCarthy<sup>22</sup>.

The distinction of levels is central to Polanyi's thought, as Drusilla Scott has pointed out. Without perceiving the hierarchical structure of his view of the universe, it is impossible to grasp the structure of his argument. Michael Polanyi always chooses the lowest level possible for his argument. If the argument holds for the lowest level, it must hold *a fortiori* on all higher levels.

While Polanyi is, of course, interested in man (even if the title of his book is not "The Study of Man"), he does not bother to argue issues such as free will vs. determinism (Weber treats issues of "Willensfreiheit" in his methodological essays - see GAZW). He chooses machines instead: since he can prove that a functioning machine ("geronnener Geist") and its behavior cannot be predicted by the laws of physics or chemistry, there is no need to go into the question whether the behavior of healthy human beings is "determined" by natural laws.

Likewise, the cognitive capabilities of fish and geese are quite sufficient to develop a typology of rationality and error in TSoM that is useful to appreciate the failures of historians.

Developing a hierarchical logic with deceptively simple examples (who could deny that the statement "the cat sees a rat" involves three logical levels) and stressing the hierarchy in nature, he is able to develop a distinction between man and machine that is not just a

matter of definition stated in such a way that machines will never be able to "think" according to it.

Polanyi's understanding of a human being goes well beyond following rules or rationalities. Men's capability to consider consequences of his actions or rules distinguishes him from any conceivable "machine intelligence". One can read this as a generalization of the notions embedded in a conception of "Verantwortungsethik".

**Why the example** of science?

Polanyi has a firm place among the founding fathers of the "sociology of science", well deserved by "Science, Faith and Society". But his essays make it clear that he wants to consider science as an "example".

While he is among the founding fathers of the "sociology of science", to be a sociologist of science in any narrow sense is clearly not his intention. For Polanyi, the "Society of Explorers", the scientific community, provides an example of a free society, based on fiduciary foundations.

This community allows for a new concept of tradition that embeds rationalities within traditions, instead of suggesting tradition and rationality as successive stages, as some disciples of Max Weber read their master.

Michael Polanyi did not return to the ambitions of *Logic of Liberty*, as far as I can tell. But he does not abandon them either. On the contrary: he goes back to the roots in "The Study of Man". If it is not obvious from the text, which has a deceptive simplicity, it is clearly shown by the masterful Bibliographical Note.