13

POLANYI AND TACIT KNOWLEDGE

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Michael Polanyi is responsible for the popularity of the term "tacit knowledge," and for developing the concept in its multiple aspects by generalizing from the case he makes for its role in science to all forms of intelligent engagement with the world. By identifying it with science, and arguing that tacit knowledge was indispensable for science, he assured its respectability, but at the same time assured that it would be controversial, and it has been. This entry will provide a brief account of the concept, the interpretive controversies surrounding it, and the criticisms of it.

The core of the idea of tacit knowledge is contained in the slogan, "we know more than we can tell" (Polanyi 1966: 4). Tacit knowledge is knowledge that we *cannot* articulate. But beyond this slogan, and even in the interpretation of it (including the meaning of the "can" in the slogan), there is a great deal of controversy, some of which Polanyi himself is responsible for. He changed his usages over time, and reinterpreted his own prior statements about the term and the terms he associated with it, and used a variety of terms normally associated with the tacit, such as "premises," in ways that seemingly refer to tacit *epistemes* and presuppositions, despite being opposed to and rejecting the philosophical theories that the use of these terms was associated with. To understand the Polanyian conception of tacit knowledge requires us to cut through these confusions, many of which are generated by his own (often shifting) usages.

At the center of his own distinctive conception there are two ways of speaking about articulating the tacit. The positive conception is concerned with the process of knowing, and the dependence of this process on elements of the knowing process that cannot be articulated, the paradigm of which is the process of scientific discovery. The tacit in these cases he assimilates to skills and comments that it is "continuous in its inarticulateness with the knowledge possessed by animals and infants, who . . . also possess the capacity for reorganizing their inarticulate knowledge and using it as an interpretative framework" ([1958] 1962: 90). The other conception is concerned with unaccountable elements, particularly in verbalization, which pose limits to such things as the formalization of scientific knowledge, but also to any attempt to make tacit knowledge fully explicit. In discussing "easily intelligible speech," where "*the tacit is coextensive with the text of which it carries the meaning*," he comments that "the tacit component is the information conveyed," ([1958] 1962: 87). The "information conveyed," the meaning, is different from the text, despite being co-extensive with it; similarly, "hearing a message and knowing what it conveys to us" are two different things.

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In neither the verbal nor the nonverbal case can the knowledge be *adequately* articulated. In an important passage in the Introduction to *Science, Faith and Society*, he makes a point similar to the famous rule-following argument in Wittgenstein's *Philosophical Investigations*, when he observes that "There are an infinite number of mathematical formulae that will cover any series of numerical observations. Any additional future observations can still be accounted for by an infinite number of formulae" ([1946] 1964: 9).

What is common to both ways of talking about the tacit is that there are "limitations to articulation" ([1958] 1962: 90). The two ways of thinking about the tacit come together in the thought that "To assert that I have knowledge which is ineffable is not to deny that I can speak of it, but only that I can speak of it adequately" ([1958] 1962: 91): that there is always an unaccountable residue beyond the possibility of articulation. Moreover, this residue is "personal" in that the process of integration of elements of thought that lead to discovery or understanding, and then, sometimes, to articulation, is individual and based on the skills and elements of thought of a specific person. in *Science, Faith and Society* he analogizes this to the personal coefficient of the observational astronomer recording positions of stars from a telescope that is on a moving earth. But this is a problematic analogy: the point of this personal coefficient is that it *can* be made explicit; the process of coming to understanding contains elements that cannot be.

What is the relation between this thesis and traditional ways of talking about the tacit intellectual content of activities such as scientific discovery, for instance, "assumptions," "presuppositions," and "premises"? Premises are, normally, semantic objects: things that *can* be articulated, or made explicit, without residue. The principles of causation indeed would seem to be a paradigm case of the kind of thing that can be articulated, and indeed would not be "principles" or "premises" if they could not be. This is exactly what Polanyi denies: "The premises underlying a major intellectual process are never formulated and transmitted in the form of definite precepts. When children learn to think naturalistically they do not acquire any explicit knowledge of the principles of causation" (Polanyi [1946] 1964: 42). But there is still ambiguity here. If Polanyi is saying that they *are* never formulated or transmitted in the form of definite precepts, we must ask whether this is simply an observation about how this knowledge is acquired, or a claim that such "premises" cannot be understood – at least fully – as explicit "premises," principles, or any other semantic object.

In his major work, *Personal Knowledge*, where he works the concept out in greatest detail, he is attentive to what he describes as the "participation of the tacit in the process of articulation" ([1958] 1962: 87), which suggests that articulation is not only possible, but a goal of science. Indeed, the process of scientific discovery itself may be understood as a process in which our tacit knowledge, for example the unarticulated intuitions that lead to a discovery, is made explicit. This is not an inconsistency. The core thought here is that there are *some* tacit things that could be, and are, articulated, but these are never *adequately* articulated, and the personal element is never eliminated.

But the role and nature of "premises" and similar concepts for Polanyi is still obscure. When he discusses the changes in the premises of science that led to Einstein and to Heisenberg's revision of Bohr, for example, he attributes them to Mach's philosophy of science and the idea that "essentially unverifiable" implications of theories should be eliminated from scientific propositions ([1958] 1962: 87). But he denies that "analytical operations" of this kind produced any great discoveries: "What happened was that scientific intuition made use of the positivist critique for reshaping its creative assumptions concerning the nature of things," and comments that what the discoveries illustrated refuted the positivist conception of science by showing that it depended on a "faculty of speculative discovery" ([1958] 1962: 88). In the same passages, when he speaks of the premises of science, he says that "no exhaustive statement of the

premises of science can possibly exist" ([1958] 1962: 90). But he then adds that "The common ground of science is, however, accessible to all scientists and is accepted by them as they become apprenticed to the traditional practice of science" ([1958] 1962: 90). Sorting such claims out, and understanding how the "personal" relates to them is the central puzzle in accounting for Polanyi's view of the tacit.

The Background

The term "tacit" as applied in the conceptual domain of reasoning and cognition appears as early as Herbert Spencer (Spencer 1887: Ch. VIII, §302: 87; §305: 99). But the dominance of neo-Kantian philosophy in the later nineteenth century led to the incorporation of the general thought behind "tacitness" into the notion of presupposition, understood in the sense of Kantian categories of thought. The original Kantian concept involved the general categories of thought required to apprehend and organize experience, and were understood to be not psychological but "logical," or conceptual preconditions of experience that were built into experience but not in the empirical world itself; in the hands of the neo-Kantians these preconditions were understood differently. The key idea was the "*faktum der Wissenschaft*": the fact that there was a conceptually organized domain of thought and experience that presupposed certain concepts that validated these conceptual presuppositions. Thus the validity of the presuppositions of physics was warranted by the existence of physics as a science.

These presuppositions were tacit in the sense that they were normally not articulated. It was the task of philosophy to identify and reveal them. It became a commonplace to speak of the presuppositions of science, especially in contrast to those of theology, and to regard each domain as in some sense dependent on an act of faith in the presuppositions and therefore equal. Writers like Pierre Duhem applied this reasoning to the history of science itself, and especially to the change from Aristotelian to Newtonian science, which could then be understood as a succession of coherent bodies of thought, each with its own distinctive conceptual presuppositions.

An alternative to this way of thinking both preceded and paralleled Kantianism and neo-Kantianism. Kant was responding to Hume's argument that our grasp of causality was based on habit or custom: Kant thought this was insufficient, as it could not justify our beliefs. The pragmatists broadened the idea of habit to deal more generally with the tacit, with such notions as habits of mind, and suggested that conscious reasoning arose from failures of habitual responses to the situations faced by people in the course of their interaction with the world. This implied that notions of belief and truth applied to the results of this kind of situation, and that their basis was itself pragmatic – that truth was equivalent to the best beliefs, and the best were those that were best for us to believe, and that the quest for certainty was based on an illusion. A variant of this idea was that truth in the full sense meant the opinion on which investigators ultimately converged. This image of knowledge suggested that knowledge rested on a set of habits which had not yet and might never become problematic through failure.

One might identify yet a third tradition, less well-defined, which Polanyi explicitly identifies with: the tradition of phenomenology and existentialism (for him represented by Dilthey), and its product, Gestalt psychology. He does give some credit to the neo-Kantians, notably Windelband, whom he praises for the idea that ideographic and nomothetic knowledge are "logically distinct parts of all knowledge" (1959: 100), meaning that despite being distinct, *all* knowledge contained both inseparably. This was analogous to Polanyi's own view that explicit knowledge could nor exhaust knowledge, and that the personal and tacit were an ineliminable part of all knowledge.

The neo-Kantians thought the objectively experienced world was constituted by categories and concepts, but that these were not psychological facts, but rather "logical" ones built into the

experience of the world which it was the task of philosophy to elucidate, and make explicit. So although they were, in Polanyian terms, tacit, they were the sorts of things we could come to tell. From the neo-Kantian point of view, "tacit knowledge," is an oxymoron: if knowledge is, classically, "justified true belief," it appears that tacitness, by definition, precludes justification, and cannot be understood as "belief" and therefore not as knowledge. This is the problem the neo-Kantians "solved" by appealing to the notion of presuppositions, which were understood as something that *could be* made explicit rather than tacit. Polanyi's relation to these ideas is somewhat ambiguous. On the one hand he uses the notion of interpretive frames, a concept very similar to Kuhn's "paradigms" and the neo-Kantian notion of an intellectual domain – physics was for them, as for Kant, a favorite example, constituted by concepts. But Polanyi denied that one was trapped into a single interpretive frame. They were for him, like theories, a kind of resource which could be brought to bear on problems. Moreover, the rejected the basic Kantian critique of Hume, when he distinguished "demonstration" and knowledge and said "I deny that truth is demonstrable, [but] I assert that it is knowable" ([1958] 1962: 82). To understand these claims, one must understand his basic model of tacit knowing.

Polanyi's Model

Polanyi's own model of tacit knowing involved a triangular relation between two elements of knowledge, focal and subsidiary, and the knower, who is an active agent. The key to this relation was the indeterminacy of the links between them. He built the model from the paradigm case of perception, in which he rejected contemporary positivist notions of sense-data, and identified tacit knowing with what he called "from-to knowing." He explains this in terms of a simpler example: the integration of images that occurs when we view a stereoscopic image and experience it phenomenally as an image of one thing.

> The grounds of all tacit knowing are items – or particulars – like the stereo pictures of which we are aware in the act of focusing our attention on something else, away from them. This I call the *functional relation* of subsidiaries to the focal target, and we may also call it a *from-to relation*. Moreover, I can say that this relation establishes a *from-to knowledge* of the subsidiaries, as linked to their focus. Tacit knowing is a from-to knowing. Sometimes it will also be called a from-at knowing, but this variation will be only a matter of convenience.
>
> (1968: 29)

The point of the analogy with the stereoscopic image is that what we see depends on what we focus on. To focus *on* is to focus *away*, or "from," something we are not focused on which our focus is nevertheless dependent on. The thing we focus away from is what he calls subsidiaries; the focus "to" is on particulars. The relation between the "from" or subsidiary part and the focal part is indeterminate, and personal, because the content of the subsidiary part is personal: it is what we personally bring to the process of understanding or discovery. These features carry over to all forms of knowing.

What does Polanyi have in mind here? The key idea is that from-to knowing is a skilled performance, even in the act of perception, though in the most elementary forms of perception the element of skill is attenuated and less notable. He distinguishes three "aspects" of tacit knowing in which this relation operates. The functional relation is contained in the act of focusing which establishes the relation between the object of focal attention and the subsidiaries. The phenomenal aspect is the creation of a novel sensory experience – the stereoscopically integrated image – which

has "a new sensory quality not possessed by the sense perceptions from which it was tacitly created" (1974: 35). What we see depends on the subsidiaries we possess and which are employed in the course of our meaning-making activities. The semantic relation is the meaning of the image, and it is also the joint product of the subsidiaries and the focal object. The "familiar use of a word, which is our subsidiary awareness of it, renders it in a way bodiless" (1974: 35).

This relation of dependence, the relation between subsidiary and focal, is neither a logical nor a causal, mechanical one. It is the product of our attention and activity. But Polanyi goes beyond this language to describe the incorporation of the objects of thought into our world in a different way, reflecting the nature of our engagement with the world, in terms of what he calls indwelling. The example he uses to explain this concept is the use of a stick to feel one's way in the dark.

> Such exploration is a from-to knowing for we attend subsidiarily to the feeling of holding the probe in our hand, while the focus of our attention is fixed on the far end of the probe, where it touches an obstacle in its path.
>
> (1974: 35)

This generalizes to all perception. As with the probe, "all sensation is assisted by some (however slight) *skillful* performance, the motions of which are performed with our attention focused on the intended action so that our awareness of the motion is subsidiary to the performance" (1974: 36). So "the structure of tacit knowing . . . includes a joint pair of constituents. Subsidiaries exist as such by bearing on the focus to which we are attending from them" (1974: 37–38). A skilled act requires an agent, who possesses particular properties. Integration is neither logically determinate nor mechanically causal, *because* it depends on personal effort using personal skills. The result can be valid or invalid, true or mistaken, and our sense of coherence, the coherence we produce through integration, may be correct or illusory (1974: 39). But once achieved, an integration "can be damaged by contrary facts *only if these items are absorbed in an alternative integration* which disrupts the one previously established" (1974: 42). Only an "alternative that appears to us to be more meaningful and so true will produce a new perception that will correct our errors" (1974: 42). But this alternative will be produced in the same way: through personal effort assisted by personal skills.

Over time Polanyi changed some of his terminology, and some of his emphases, but the core from-to idea remained, along with the idea that the integration achieved was a personal result. The focal-subsidiary distinction was replaced by proximal and distal, based on the idea of indwelling, which will be discussed later. The core of the later thought was still the use of a stick as a probe: the cavity at the end of the stick was "distal" and object-like, while the stick and the body itself were proximal and instrument-like, and dropped out of attention. But he extended this reasoning to "meaning," as when he says that "all meaning tends to be displaced away from ourselves, and that is in fact my justification for using the terms 'proximal' and 'distal' to describe the first and second terms of tacit knowing" (1966: 13).

The way he elucidated this process, and also the way he understood his relation to Kant, was through a psychological account. Kant had had said that "The schematicism by which our understanding deals with the phenomenal world . . . is a skill so deeply hidden in the human soul that we shall hardly guess the secret trick that Nature here employs" (Kant [1781/1787] 1998: A.141; quoted in Polanyi 1962: 1, 1969: 105). Polanyi provided a solution to the mystery: the psychological operations that produce not only perception but advanced scientific thinking are hidden and dependent on peripheral impressions that are integrated according to Gestalt like operations to form our perceptions, rather than anything resembling rules or logical

derivations. It is here, he thought that "We are at last facing here fully that secret power of our nature that Kant despaired of knowing." The power is embodied: "The main clues on which perception relies are deeply hidden *inside the body* and cannot be experienced in themselves by the perceiver" ([1958] 1962: 9, 1969: 115). "[T]hey are seen only incidentally and their effect on the appearance of the object perceived can be revealed only by elaborate experimental investigations" (1969: 115).

> Yet all these hidden evaluations of not identifiable clues are conducted, . . . by our full powers of our intelligence, relying on operations which . . . must be acquired by efforts which in certain cases may prove so strenuous that their persistent pursuit leads to mental breakdown.
>
> ([1958] 1962: 10, 1969: 115)

The power is that of integrating clues in our thought, what he calls "peripheral impressions" ([1958] 1962: 9, 1969: 114) in the course of "skillful integration." This is a vivid picture of the hidden character of skillful integration in science, and of the difficulties in acquiring the skills, their hidden character, and of the hidden character of the processes of integration themselves. And it is, in its purely psychological character, a picture radically opposed to the neo-Kantian one. But it has implications for any version of the Kantian approach to the tacit, and to the idea of presuppositions in general. But he makes an important concession to the idea that we can make these processes explicit: although "integration cannot be replaced by any explicit mechanical procedure . . . one can paraphrase the cognitive content of an integration," though "the sensory quality which conveys this content cannot be made explicit" (1968: 32).

The Relation to Empathy

Polanyi also said a few other things that located him in relation to previous philosophy, though he was careful to explain how he had radicalized these earlier thoughts. He said little about empiricism, which reasoned something like this: we acquire knowledge empirically, in accordance with habits that we also acquire empirically. His emphasis on agency separated him from this tradition, which he thought was too passive in its account of the acquisition of knowledge as a matter of inputs. He appealed to Brentano ([1874] 1942) [who] "taught that consciousness necessarily attends to an object, and that only a conscious mental act can attend to an object." Polanyi added that

> My analysis of tacit knowing has amplified this view of consciousness. It tells us not only that consciousness is intentional, but also that it always has roots from which it attends to its object. It includes a tacit awareness of its subsidiaries.
>
> (1968: 32)

Brentano was a thinker outside of, and opposed to, the neo-Kantian tradition, as was Dilthey, in a somewhat more ambiguous way. But one of Polanyi's clearest statements of his views dealt with the issue of "indwelling" by reference to the idea of empathy, *Einfühlung* ("in-feeling"), developed by Theodor Lipps. Polanyi accepts the lessons taught by Lipps and Dilthey. He says that "German thinkers postulated that indwelling, or empathy, is the proper way of knowing man and the humanities" (1966: 16). But Polanyi radicalizes these lessons, by saying that empathy is just a special case of "indwelling," a term that he regards as not only more comprehensive in that it applies to all knowing, and more precise as a concept.

He applies this term to the tacit inferences that allow us to make discoveries and form an awareness of objects, the core of his basic account of the role of the tacit in knowing, but also to the process by which we assimilate theories. This is a crucial step: understanding, interpretation, and discovery now appear to be products of the same process of knowing, with the same basic structure. Polanyi describes "another indication of the wide functions of indwelling when we find acceptance of moral teachings described as their interiorization" (1966: 17). He explains that interiorization makes the teachings "function as the proximal term of a tacit moral knowledge, as applied to practice" (1966: 17). In other words, they are the things we focus on, but can only focus on by virtue of knowledge we are not focused on. When he says that "mathematical theory can be learned only by practicing its application: its true knowledge lies in our ability to use it" (1966: 17), he is making a related point. In both cases, using our knowledge, as well as acquiring it, depends on much that operates out of the range of direct attention.

The Reception

The reception and use of Polanyi's ideas about tacit knowledge have been divided. Although philosophers of science have typically acknowledged the role of tacit knowledge, they have regarded it as a psychological fact, and taken Polanyi's insistence on the tacit element and its personal character to be an embrace of subjectivism. This would appear to be the implication of such statements as these:

> We have yet to recognize an important element of all personal judgements affecting scientific statements. Viewed from outside as we described him the scientist may appear as a mere truth-finding machine steered by intuitive sensitivity. But this view takes no account of the curious fact that he is himself the ultimate judge of what he accepts as true. His brain labors to satisfy its own demands according to criteria applied by its own judgement. It is like a game of patience in which the player has discretion to apply the rules to each run as he thinks fit. Or, to vary the simile, the scientist appears acting here as detective, policeman, judge, and jury all rolled into one. He apprehends certain clues as suspect; formulates the charge and examines the evidence both for and against it, admitting or rejecting such parts of it as he thinks fit, and finally pronounces judgement. While all the time, far from being neutral at heart, he is, himself passionately interested in the outcome of the procedure.
>
> (Polanyi [1946] 1964: 38)

An important dissertation by Alan Musgrave (1968), a follower of Karl Popper, outlines the charge of subjectivism in detail.

The large set of issues raised by this criticism, and Polanyi's general approach to objectivity, lay largely outside of his approach to tacitness, but his solution to the problem of objective knowledge, and his response to the charge of subjectivism, reflects his account of skillful performance. Relating to a comprehensive entity, i.e., something real, is a skilled performance. As commentators have noted, this is personal, but far from subjective: it is about engagement with the world, which produces a common, but not a "constructed" response. As Polanyi puts it,

> the characteristic features of the situation are seen more clearly when we consider the way one man comes to understand the skillful performance of another man. He must try to combine mentally the movements which the performer combines practically and he must combine them in a pattern similar to the performer's pattern of

> movements. . . . He dwells in these moves by interiorizing them. By such exploratory indwelling the pupil gets the feel of the master's skill and may learn to rival him.
>
> (1966: 29–30)

This placed Polanyi outside of the common view that arose in science studies, which nevertheless took over the term tacit knowledge, and outside the debates that dominated philosophy of science, each of which took over the idea of science creating its objects by shared conceptual schemes.

Outside of this domain, however, the idea of tacit knowledge, in its negative form of the denial of the reducibility of thought to rules, found considerable support. The significance and attractiveness of the idea of tacit knowledge is largely unconnected to the model Polanyi himself constructs. The key attraction, the claim of the existence and indispensability of tacit knowledge, is taken as evidence of the limits of attempts to reduce science, or any complex intellectual activity, or even simple manual labor, to a rule-driven computer program. It is in this form that the concept has been applied to multiple topics.[1]

Related Topics

Chapters 3, 4, 14, 15, 31

Notes

1 There is a large secondary literature on Polanyi, only some of which deals with the concept of tacit knowledge. Notable explications of Polanyi's views include Jha (1997, 2002), Blum (2010), Jacobs (2001), Scott and Moleski (2005), Zmyślony (2010), Drew Leder (1990), Jerry H. Gill (2000), and Harry Prosch (1986). Special mention should be made of the relationship between Polanyi and Marjorie Grene, who contributed greatly to his philosophical efforts, and provided an important explication of his thought (1977), in addition to editing a collection of his essays, *Knowing and Being* (1969). A larger collection is Walter Gulick, *Recovering Truths: A Comprehensive Anthology of Michael Polanyi's Writings* (www.polanyisociety.org/). For a critical approach which attempts to reconcile tacit knowledge with recent analytic epistemology, see Gascoigne and Thornton (2013). For a response to the Popperian critique, see Andy Sanders (1988). For a more general account of his thought and science, see Mary Jo Nye (2011). The journal *Tradition and Discovery*, devoted to Polanyi's thought, and available on the web, includes many articles on tacit knowing.

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