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Rethinking Michael Polanyi's Realism: From Personal Knowledge to Intersubjectively Viable Communication

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Abstract *Fifty years after the publication of Michael Polanyi's magnum opus,* Personal Knowledge*, the fashion for Knowledge Management (KM) has helped to institutionalise a redefinition of his distinction between tacit knowledge and explicit knowledge. But KM's redefinition of Polanyi's argument misrepresents his insights into the process of personal tacit 'knowing' and overlooks the implications of his faith in metaphysical 'being'. This paper explores the significance of Polanyi's original concept of tacit knowledge, together with the consequences of assuming a 'vertical' connection between personal knowledge and faith in an unknowable absolute truth. By using faith to protect personal knowledge from the charge of subjectivism, Polanyi precluded the possibility that different people, who interact in different contexts and believe in different things, could develop viable modes of knowing and learning. However, rethinking Polanyi's philosophy with regard to Ernst von Glasersfeld's radical constructivism, which is derived from intersubjectively viable 'horizontal' communication, allows the virtues of tacit knowledge to be separated from the complications of metaphysical realism.*

Keywords: communication; knowledge management; radical constructivism; tacit knowledge; truth

Introduction

During the closing years of the twentieth century, a surge of interest in Knowledge Management (KM) helped to give the distinction between 'tacit knowledge' and 'explicit knowledge', originally developed by Michael Polanyi (1891–1976), a new lease on life. Half a century after the term 'tacit knowledge' appeared in Polanyi's major philosophical work, *Personal Knowledge*,[1] the KM literature is replete with references to Polanyi and tacit knowledge. Many contributors to the KM debate cite *Personnel Knowledge*, together with Polanyi's subsequent monograph, *The Tacit Dimension*[2]—but frequently misrepresent Polanyi's original argument in ways that squander its strengths and ignore its complications.

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According to Japanese academics, Ikujiro Nonaka and Hirotaka Takeuchi, tacit knowledge, which is in the heads of persons, could be converted into impersonal explicit knowledge. In their highly influential book, *The Knowledge-Creating Company*, Nonaka and Takeuchi explained that: 'For tacit knowledge to be communicated and shared within the organization, it has to be converted into words or numbers that anyone can understand'.[3] This conversion process involves 'articulating tacit knowledge into explicit concepts' in a process of 'externalization', which is typically 'triggered by dialogue or collective reflection'.[4] Ostensibly, externalisation converts the 'cognitive dimension' of tacit knowledge[5] into universally comprehensible explicit knowledge. Somehow, what appears to be an ineffable 'private language' situated inside an individual's head is converted into a universally comprehensible language that everyone understands and no one misunderstands. Externalisation, it seems, is a matter of believing in impossible things, as Nonaka decreed: 'To convert tacit knowledge into explicit knowledge means finding a way to express the inexpressible'.[6] And the KM faithful have appeared happy to accept this logic-defying display of oracular mystique.

Whereas Polanyi insisted that is was *not* logically possible to be consciously aware of what is known tacitly, Nonaka and Takeuchi have helped to institutionalise a flat contradiction of Polanyi's argument and, in the process, contributed to what Haridimos Tsoukas has called 'the great misunderstanding'[7] in management studies. Certainly, KM enthusiasts have seized upon Nonaka and Takeuchi's interpretation of Polanyi's philosophy with an insouciant disregard for the consequences. Many KM proselytes treat tacit knowledge as if it were a 'problem' that could be 'solved' by objectifying the tacit capacity to know. And their solution—explicit knowledge—is regarded as an object among other objects that can be 'managed'. In a linguistic sleight of hand, the abstract noun 'knowledge' is used as if it were a concrete noun: explicit knowledge becomes a commodity that could be clicked across cyberspace.

While Tsoukas has done the KM community a considerable service by pointing out that Nonaka and Takeuchi's interpretation of Polanyi's work on tacit knowledge is erroneous and destroys much of merit in the original idea, there is a case for developing his criticism in at least two directions. Although Tsoukas criticised Nonaka and Takeuchi's reliance on a 'conduit metaphor of communication'[8] (in which explicit knowledge is 'piped' to where it is needed), he did not say much about how Polanyi's model of personal tacit knowing related to the complexities of communication, learning and the construction of intersubjectively viable knowing among scientists or other 'horizontal' communities of interaction. Also, he did not engage with implications arising from Polanyi's 'vertical' religious-style faith in a committed and responsible person's attempt to discover the truth about a reality that lies beyond experience.

For Polanyi, developing the personal capacity 'to know' was linked to discovering the truth about moral absolutes. In *The Logic of Liberty* (first published in 1951), Polanyi accused those with whom he disagreed of having their morals upside-down: they were 'morally inverted'.[9] Similarly, his short book, *The Study of Man* (published in 1959), declared that: 'In an ideal free society each person would have perfect access to the truth: to the truth in science, in art, religion and justice, both in public and private life'.[10] Meanwhile, Polanyi's principal philosophical work, *Personal Knowledge*, stressed his commitment to absolute truth: '*I believe that in spite of the hazards involved, I am called upon to search for the truth and state my findings*'.[11] But people have to seek the truth in a responsible manner: '*The freedom of the subjective*

person to do as he pleases is overruled by the freedom of the responsible person to do as he must'.[12] Different people might have different beliefs about what constitutes the truth, but there is only one truth.[13]

> We must now recognize *belief* once more as the source of all knowledge. Tacit assent and intellectual passions, the sharing of an idiom and of a cultural heritage, affiliation to a like-minded community: such are the impulses which shape our vision of the nature of things on which we rely for our mastery of things. No intelligence, however critical or original, can operate outside such a fiduciary framework.[14]

Notwithstanding the passion of Polanyi's dogmatism, it could be argued that intelligence *can* operate outside Polanyi's faith in his view of the truth *without* sacrificing fiduciary principles. In particular, Ernst von Glasersfeld's[15] radical constructivist model of learning and knowing provides a useful way of developing fiduciary principles, associated with the construction of *intersubjectively viable communication*, without recourse to metaphysical absolutes.

As Nonaka and Takeuchi[16] acknowledged, the point of departure for Polanyi's re-consideration of human knowledge was developed from his observation that '*we can know more than we can tell*'.[17] In Polanyi's model, tacit knowing is akin to 'being able'. We can point to acts or thoughts in our experience that are enabled or constrained by tacit knowing, but 'We must be forever unable to give it an explicit specification'.[18] Infants can learn to speak, but the tacit processes that render their speech meaningful defy articulation: words cannot stand in place of what is known tacitly. And Polanyi's analysis of the dialectical interaction between what is known *explicitly* and what is known *tacitly* avoids philosophical problems associated with both *introspectionist* and *behaviourist* approaches to what the individual 'self' knows.[19] It also offers an elegant conceptualisation of the way in which people learn in the course of 'doing things' without being aware of what they are learning. Paradoxically, Nonaka and Takeuchi's claim that externalisation enables people 'to tell what they know' (which is an outright contradiction of Polanyi's argument) destroys each of these advantages and provides a convenient way of explaining why a more careful reading of Polanyi's original work might be worthwhile.

After reflecting on the background to Polanyi's interest in philosophy and tacit knowing, subsequent discussion will address issues associated with Nonaka and Takeuchi's claim to have extended Polanyi's idea 'in a more practical direction'[20] and explain why their model of tacit–explicit knowledge-conversion is wholly *impractical*. But simply returning to Polanyi's original work raises a different type of difficulty in the guise of his 'vertical' commitment to metaphysical truth. Accordingly, the final part of the paper tries to rethink Polanyi's philosophy with regard to Glasersfeld's radical constructivist perspective on the 'horizontal' dimension of intersubjectively viable communication, which might guide the development of reliable modes of knowing and learning without recourse to metaphysical speculation about the nature of being.

Polanyi's Progression to Philosophy

Born in Budapest in 1891, Michael Polanyi was the fifth of six children;[21] and, in common with his older siblings, he had 'success and impact'.[22] A multilingual

childhood helped him to achieve a fluent command of Hungarian, German, French and English. He trained as a medical doctor, but subsequently pursued a career in physical chemistry—which, in 1919, led him to Germany where he thrived: interaction with Einstein and other highly distinguished intellectuals shaped his thoughts. Even so, Polanyi's freedom to prosper as a scientist was compromised by the rise of Anti-Semitism that swept Germany. Although Polanyi converted to Roman Catholicism in 1919, just before his departure for Germany,[23] he had been born Jewish. In 1932, Britain's University of Manchester offered to make him Chair of Physical Chemistry. At first, he refused. A year later, he was living in Manchester.

Polanyi's life in a new country marked a progressive shift from 'doing science' to developing a philosophy that challenged, what he believed to be, muddled thinking about impersonal scientific knowledge and its abuse by Marxists and Nazis. During the 1940s, Polanyi became increasingly concerned with safeguarding the freedom of individual scientists to pursue scientific ideals in the face of calls to yield to the authoritarian commands of central planning. In an era when J. D. Bernal[24] and others were advocating a utilitarian approach to planning science, Polanyi was eager to defend the authority and tradition of, what he later described in the inaugural issue of *Minerva*, as 'The Republic of Science'[25]—where individual scientists, who make their own choices, also cooperate as members of a close-knit organisation:[26] the authority of scientific opinion is *mutual*; it is established *between* scientists, *not* above them.[27]

In 1944, Polanyi was elected to the UK's Royal Society, which is the world's oldest scientific institution. It was a huge honour. Yet, Polanyi wondered whether recognition by such a venerable body fitted his life as a 'vagabond'.[28] While the history of science, since the mid-seventeenth-century, has been intertwined with the founding and flourishing of the Royal Society, its motto, *Nullius in Verba* ('on the word of no one') could be interpreted as a clarion call to 'sheer objectivity'. It repudiated personal claims to speak with authority, albeit by inventing the illusion that 'impersonal' observations could be made without an observer. For Polanyi, knowledge was always on the word of *someone*: positivism's ideal of knowledge embodied in 'strictly impersonal statements' appeared 'self-contradictory, meaningless, a fit subject for ridicule'.[29]

In *Science, Faith and Society*[30] (first published in 1946), Polanyi asserted that the search for truth involved moving closer to God: 'Knowledge of reality and the acceptance of obligations which guide our consciences once firmly realized, will reveal to us God in man and society'.[31] As Zdzislaw Najder pointed out, Polanyi's remarks on God and religion reveal metaphysical foundations that could underpin his claim to absolute values *but*: 'his mentions of God and religion are confoundingly vague: we do not know what concept of God and what kind of religion he has in mind'.[32] Nevertheless, theologians have been particularly prominent in nurturing Polanyi's legacy[33]—tacit knowing leaves the door open to the possibility of being influenced by things that cannot be understood in rational terms (such as messages from the gods or the illogical musings of management gurus).

Polanyi's paper on 'Sense-Giving and Sense-Reading', first published by the journal *Philosophy* in 1967, included a clear statement on the importance of tacit knowledge.

> *All knowledge falls into one of these two classes: it is either tacit or rooted in tacit knowledge.*

> The ideal of a strictly explicit knowledge is indeed self-contradictory; deprived of their tacit coefficients, all spoken words, all formulae, all maps and graphs, are strictly meaningless. An exact mathematical theory means nothing unless we recognize an inexact non-mathematical knowledge on which it bears and a person whose judgment upholds this bearing.
>
> The false ideal of a strictly explicit knowledge was pursued with the greatest zeal in the twentieth century by modern positivism.[34]

Positivism confines itself to what is positively given and avoids all speculation. It has nothing to say about the skilled process by which scientists decide what problems to tackle next, nor can it account for the sense that they make of their findings. In short, it is silent on where knowledge comes from and the skill of persons who verify science's supposedly impersonal findings. It ignores the twin pillars on which science stands: *discovery* and *verification*.

Polanyi's concept of personal knowledge hinged on ascending a hierarchy: there is a 'vertical' connection with higher levels of understanding. Discovery depends on dwelling in the details of a particular activity until you are rewarded with a *Gestalt* perception of a 'higher' and allegedly 'more real' picture. Each tier in the hierarchy relies on the level below for its workings, but it cannot be *reduced* to lower level entities. One way in which Polanyi illustrated the idea was to distinguish five hierarchical levels associated with a spoken literary composition.

> The lowest level is the production of a voice; the second, the utterance of words; the third, the joining of words to make sentences; the fourth, the working of sentences into a style; the fifth, and highest, the composition of the text.
>
> The principles of each level operate under the control of the next higher level. The voice you produce is shaped into words by a vocabulary; a given vocabulary is shaped into sentences in accordance with a grammar; and the sentences are fitted into a style, which in its turn is made to convey the ideas of the composition. Thus each level is subject to dual control: (i) control in accordance with the laws that apply to its elements in themselves, and (ii) control in accordance with the laws of the powers that control the comprehensive entity formed by these elements.[35]

While we might focus our attention on any level in the hierarchy, Polanyi explained that you cannot derive a higher level from a lower level: 'You cannot derive a vocabulary from phonetics; you cannot derive grammar from a vocabulary; a correct use of grammar does not account for good style; and a good style does not supply the content of a piece of prose'.[36] Indeed, Polanyi's model of tacit knowing distinguished the *Gestalt* perception of comprehensive entity (the higher level) as something that is qualitatively different from its constituent parts (the lower level). Clearly, a spoken literary composition relies on the use of words, but our appreciation of the integrated entity goes out of focus if we concern ourselves with its constituent parts: we attend to 'wholes' and 'parts' in different ways—as the next section will explain.

The connection between tacit knowing and Polanyi's belief in the ascension to more profound understanding rests on *significance*. Polanyi believed that profound things, such as knowing another person or understanding a problem, are

more significant, and therefore 'more real', than less profound things, such as cobblestones.

> The structural kinship between knowing a person and discovering a problem, and the alignment of both with our knowing of a cobblestone, call attention to the greater depth of a person and a problem, as compared with the lesser profundity of a cobblestone. Persons and problems are felt to be more profound, because we expect them yet to reveal themselves in unexpected ways in the future, while cobblestones evoke no such expectation. This capacity of a thing to reveal itself in unexpected ways in the future I attribute to the fact that the thing observed is an aspect of a reality, possessing a significance that is not exhausted by our conception of any single aspect of it. To trust that a thing we know is real is, in this sense, to feel that it has the independence and power for manifesting itself in yet unthought of ways in the future. I shall say, accordingly, that minds and problems possess a deeper reality than cobblestones, although cobblestones are admittedly more real in the sense of being tangible. And since I regard the significance of a thing as more important than its tangibility, I shall say that minds and problems are more real than cobblestones.[37]

Whereas it appears reasonable to suggest that getting to know a person or dwelling in the details of a problem could lead to *Gestalt* insights, believing that these insights take you into a 'deeper reality' or religious awareness[38] is a matter of faith.

Polanyi's success as a scientist seems to have owed much to 'guessing' what he wanted to conclude and then generating evidence to demonstrate the 'truth' of his intuition: but is it reasonable to confuse scientific success with claims to see the truth? In their contribution to *Biographical Memories of Fellows of the Royal Society*, E. P. Wigner and R. A. Hodgkin noted that Polanyi turned from success in science to mixing science with philosophy, aesthetics and occasional prophetic homilies: 'Some of the most powerful passages in *Personal Knowledge* have the ring of St Augustine or Cardinal Newman'.[39] Quite which passages they had in mind is not clear; but one candidate could be Polanyi's passionate pronouncement that reality, which exists independently of personal knowing, awaits discovery by the committed.

> [P]ersonal knowledge in science is not made but discovered, and as such it claims to establish contact with reality beyond the clues on which it relies. It commits us, passionately and far beyond our comprehension, to a vision of reality. Of this responsibility we cannot divest ourselves by setting up objective criteria of verifiability—or falsifiability, or testability, or what you will. For we live in it as in the garment of our own skin. Like love, to which it is akin, this commitment is a 'shirt of flame', blazing with passion and, also like love, consumed by a universal demand.[40]

While wearing a 'shirt of flame' sounds like an exhibition of extreme commitment (if not martyrdom), it is hard to see it as a necessary addition to the Republic of Science's use of the peer review process. And a case for caution could follow from Polanyi's admission that he might be wrong.

> The principal purpose of this book is to achieve a frame of mind in which I may hold firmly to what I believe to be true, even though I know that it might conceivably be false.[41]

You had to believe in order to understand. Furthermore, progress towards 'unthinkable consummation' was, Polanyi proclaimed in the closing phrase of *Personal Knowledge*, 'how a Christian is placed when worshipping God'.[42]

Wigner and Hodgkin noted that 'Successful scientists may have to wait ten or twenty years for their accolade; prophets generally have to wait a good deal longer'.[43] But *should* we, and *could* we, rethink Polanyi's philosophy in a way that avoids the need for prophecy? Conceivably, the significance of tacit knowing is too important to be ignored and radical constructivism could offer an alternative approach to making sense of personal knowledge and learning.

The Significance of Tacit Knowing

As the introduction indicated, Polanyi developed tacit knowing from the proposition that we can know more than we can tell. Whereas language is a linear affair in which ideas are arranged in a sequence, the human brain is capable of fantastic feats of parallel processing. We might break into spontaneous laughter without being able to explain why the joke is funny. A competent driver might hit the brake pedal as much a 0.5 seconds before he or she is conscious of seeing the child run in front of the car. And writers from a range of backgrounds regularly marvel at what we can know but cannot express in language. In his bestselling book, *Blink: The Power of Thinking Without Thinking*, Malcolm Gladwell[44] assessed astonishing acts of knowing that defied explicit explanation. In a similar vein, Gary Klein has written about the power of intuition—the 'hunches, impulses, insights, gut feelings, anticipations, and judgments'[45]—that draw on personal experience in ways that defy articulation.

Compared to the amount of information delivered to the human brain by sense perceptions, the linguistic dimension of conscious thought is limited. The Danish science writer, Tor Nørretranders, has suggested that the human senses are capable of providing the brain with more than 11 million bits of information per second (at least 10 million bits of which come from the eyes), but the here-and-now processing of consciousness is limited to about 40 bits of information per second—at best.[46] Consciousness could be seen as a series of 'edited highlights' in which the mind 'pauses' to reflect on what *has* happened or what *could* happen. But tacit knowing guides a reflexively automatic 'real time' interaction with what *is* happening. We might jump out of the way of a speeding truck (because our experience long ago taught that such things were dangerous) without waiting for consciousness to make sense of the danger.

Clearly, infants are born 'knowing more than they can tell' and it takes many thwarted linguistic interactions before the child feels confident in his or her use of words. For example, a child who grows up in a world where every apple is red might be surprised when a visitor brings a green fruit and calls it an apple. Should the stranger be trusted?[47] And other uses of apple could confuse. What about talk of 'apple pie order' or visiting New York—'the Big Apple'—or buying an Apple Computer? In the course of experience, the capacity to use the word 'apple' in different contexts becomes reflexively automatic. A passionate person who said 'you are the apple of my eye' would not normally imagine an apple nor be concerned with the difference between red and green apples. The competent use of language involves 'looking through' words to meanings generated in the course of personal experience.[48]

In *Personal Knowledge*, Polanyi opened a long chapter entitled 'Articulation'[49] with the story of a baby chimpanzee, Gua, who was raised with a baby human,

Donald Kellogg. Although Donald took the lead in intelligence tests, Gua was surprisingly competitive until the age of 15–18 months, when her mental development neared completion just as Donald's was about to start. By mastering the capacity to speak, Donald's learning leapt beyond reflexively automatic reactions to the 'here and now'. Gradually, the child learns to distinguish himself or herself as an observer and articulate what *he* or *she* thinks. But, contrary to Nonaka and Takeuchi's claims, we cannot have a *wholly objective, wholly explicit* knowledge of what we know. I am the *subject*—not the *object*—of my own experience. I can use language to reflect on how I experience myself, *subjectively*, but what I say is *not* a substitute for what I know.

Polanyi's model of tacit knowing distinguished between two mutually exclusive, but mutually dependent, dialectical categories: *focal awareness* that constitutes immediate consciousness and *subsidiary awareness*, associated with capacity to know that lies outside immediate consciousness. Most of the time, focal awareness is projected 'outwards': a driver might focus on the road ahead and only have a subsidiary awareness of the car's controls. Any form of 'doing' relies on the tacit integration of things that we have learned in the course of our experience and sense perceptions. The competent use of physical or mental artefacts—the 'tools' of knowing—has to be learned. And different people learn about different things in different ways. While Polanyi learned how to manipulate the theoretical tools of physical chemistry with consummate skill, his love of driving exceeded his capacity for competent performance. He achieved a formidable reputation as an appalling driver. His wife denounced him as 'the world's most rotten driver', while the famous economist, John Jewkes, once insisted on walking in the rain rather than board a car with Polanyi at the wheel.[50]

We cannot be focally aware of a *Gestalt* whole and its parts. If we try to focus on a potential part, the *Gestalt* whole goes out of focus. The themes of a spoken literary composition might captivate—until a word that we have not learned 'trips us up'. Suddenly, we find ourselves focussing on the rogue word and our appreciation of the composition's themes goes out of focus. As Polanyi put it, he could not use his spectacles, in a *subsidiary* sense (subconsciously, as a tool that enabled clearer vision), to become *focally* aware of his spectacles.[51] The mutually exclusive, but mutually dependent, dialectic between focal awareness and subsidiary awareness illustrates the way in which the meaning of words relies on tacit connections with a person's experience. Without its tacit coefficients, 'strictly explicit' knowledge is 'strictly meaningless'. The tacit dimension that 'we cannot tell' is fundamental to making 'what we can tell' *meaningful*.

Nonaka and Takeuchi's Casuistry

Nonaka and Takeuchi proposed that, while Polanyi developed the concept of people knowing more than they can tell in a philosophical context, 'it is also possible to expand his idea in a more practical direction'.[52] And their book struck a note that has proved popular among practical people who wanted to talk about 'knowledge' without risking a nettlesome brush with philosophy or epistemology.

The dustcover of Nonaka and Takeuchi's book carried endorsements from influential thinkers, including Michael Porter, Karl Weick and Kenichi Ohmae. For a brief period, KM masqueraded as a management fashion that might transcend the vicissitudes of fashion: if you could manage knowledge, you could manage

anything. In the introduction to a major handbook dedicated to organisational learning and KM, Mark Easterby-Smith and Marjorie Lyles noted that Nonaka 'set the standard' for the emergent field of organisational knowledge: he was 'the key *popularizing* influence'.[53] Similarly, the editors of *Organization*'s January 2007 special issue on 'The Philosophical Foundations of Knowledge Management', declared that Nonaka and Takeuchi's book is 'surely KM's most influential work'.[54] Evidently, Peter Drucker called Nonaka and Takeuchi's book a 'classic'.[55] But does Nonaka and Takeuchi's popularisation of Polanyi's philosophical legacy constitute a responsible contribution to scholarship?

Whereas Polanyi insisted that *all* tacit knowing involved the ineffable integration of unspecified particulars, Nonaka and Takeuchi's 'more practical' expansion of his idea divided the ineffable into two distinct categories: the 'technical' and the 'cognitive'. Technical tacit knowledge: 'encompasses the kind of informal and hard-to-pin-down skills or crafts captured in the term "know-how"',[56] which Nonaka and Takeuchi accepted *does* rely on an inexpressible capacity 'to know'. Despite their efforts to coax a Japanese baseball star, Shigeo Nagashima, into explaining his skill, he could do no better than say: 'you have to feel it'.[57] Nagashima knew more than he could tell—which fits with Polanyi's model.

But, in a dramatic departure from Polanyi's model, Nonaka and Takeuchi proposed that the ineffable realm of tacit knowledge 'contained' a cognitive tacit dimension that was capable of developing sophisticated linguistic concepts.

> [T]acit knowledge contains an important cognitive dimension. It consists of schemata, mental models, beliefs, and perceptions so ingrained that we take them for granted. The cognitive dimension of tacit knowledge reflects our image of reality (what is) and our vision for the future (what ought to be).[58]

But how is this capacity for cognition 'contained' within tacit knowledge? What prevents the language of cogitation—which Nonaka and Takeuchi credit with the generation of complex abstract concepts, such as 'what ought to be'—from informing the knowing subject of its conclusions? Are we to accept that a linguistically isolated 'private self', contained within the tacit dimension, *somehow* 'thinks' using a language that is unintelligible to the knower—until 'externalization' *somehow* converts the private self's private language into universally comprehensible 'explicit knowledge'?

In Western philosophy, the question of whether individuals have explicit knowledge of their innermost sensations, intentions, emotions and so on has generated two mutually exclusive alternatives: introspectionism and behaviourism. While each position has attracted its supporters, both involve heroic assumptions. And Ronald Hall has argued persuasively that Polanyi's concept of tacit knowing avoids the dilemma.[59] In contrast, Nonaka and Takeuchi's interpretation of Polanyi leaves them exposed to the problems of both introspectionism and behaviourism.

Introspectionism involves a Cartesian split between the private self's mind and an insensate body. The body supplies the mind with sense perceptions, which are processed in isolation from the world that is inhabited by the body. Thus, the private self is assumed capable of using a private language to objectify and manipulate meanings that are *somehow* associated with the use of ordinary language. Knowers might be mistaken in their sense perceptions, but the private self is credited with the capacity to be objective and logical. And such a position echoes what

Nonaka and Takeuchi claimed in the name of the cognitive tacit dimension. But, as Wittgenstein demonstrated in his *Philosophical Investigations*,[60] a private language that could not be used to communicate with another person runs counter to conventional uses of the word 'language'.

The behaviourist's answer to private language problem is to refuse the idea of a ghostly private self who somehow inhabits an insensate body. In stating such a position, Gilbert Ryle rejected Cartesian mind–body dualism with 'deliberate abusiveness': contrary to the prevailing dogma, the idea of a 'Ghost in the Machine' was entirely false, 'not in detail but in principle'.[61] For Ryle, the mind and body were fused in the oneness of a single being: instead of conceiving the 'second self' as a ghostly entity connected to the body, you had to imagine an entirely separate second self. This second self was *somehow* wholly independent of the body, but also able to interrogate the mind–body's oneness and generate wholly explicit knowledge of what the knowing subject knew. Objective observations of the mind–body entity are achieved, objectively, 'on the word of no one', by imagining a 'no one' who could do the observing.

> The sorts of things that I can find out about myself are the same as the sorts of things that I can find out about other people, and the methods of finding them out are much the same. […] John Doe's ways of finding out about John Doe are the same as John Doe's ways of finding out about Richard Roe.[62]

For the behaviourist, all knowledge is an objective matter of fact. There is no private self and, therefore, no private language. But nor is there any emotion or feeling. There is no way of knowing whether we are in pain or in love, because the imaginary 'no one' could not make empirical observations of such things. Ultimately, the empiricist reduces the acting and thinking self to an object that is assumed to exist among other objects.

Despite the Cartesian split associated with their use of cognition contained within an individual's cognitive tacit knowledge, Nonaka and Takeuchi's syncretism allowed them to talk approvingly of Zen Buddhism's 'oneness' of mind and body.[63] In this respect, what they claim in the name of externalisation signals a switch from the problems of *introspectionism* (based on cognition 'contained' within tacit knowledge) to the problems of *behaviourism*, where the oneness of a knower's mind and body is reduced to an object—explicit knowledge—among other objects. At a stroke, two untenable positions are fused in, what was claimed to be, a more practical expansion of Polanyi's work.

Notwithstanding its popularity, Nonaka and Takeuchi's idea that explicit knowledge constitutes words or numbers that anyone could understand raises a fundamental question: how could you ever say anything *new* without raising the possibility of being misunderstood? Plato addressed this issue in one of his Socratic dialogues, *The Meno*, which challenged Socrates to explain how the meaning of 'virtue' could be learned, if you do not already know what virtue means. In *The Tacit Dimension*, Polanyi confronted this problem head-on:

> To see a problem that will lead to a great discovery is not just to see something hidden, but to see something of which the rest of humanity cannot have even an inkling. All this is a commonplace; we take it for granted, without noticing the clash of self-contradiction entailed in it. Yet Plato has pointed out this

> contradiction in the *Meno*. He says that to search for the solution of a problem is an absurdity; for either you know what you are looking for, and then there is no problem; or you do not know what you are looking for, and then you cannot expect to find anything.[64]

Polanyi's concept of a dialectical relationship between focal awareness and subsidiary awareness provided a coherent account of how we '*know more than we can tell*'. In contrast, Nonaka and Takeuchi have used Polanyi's name to popularise the opposite idea that '*we can tell what we know*'—as strictly meaningless explicit knowledge.

A Radical Constructivist Alternative

Notwithstanding the significance of Polanyi's concept of tacit knowing, his ideal of a free society in which each person had perfect access to 'the truth' in science, art, religion and justice hardly seems appropriate to achieving intersubjectively viable understanding in a world where different people, in different places, interact with 'others' to make sense of their experience in different ways. Polanyi blends rational discussion—for example, in the form of 'horizontal' interaction across the Republic of Science—with a 'vertical' commitment to absolute truth that transcends human experience. Indeed, one of his biographers, the distinguished theoretical physicist, William Taussig Scott, found Polanyi to be 'a bridge between authentic science and authentic faith'[65]—which, from a radical constructivist perspective, is a bridge too far: the world that we experience is the only one that we can talk about in rational terms.

Ernst von Glasersfeld developed radical constructivism from the idea that knowledge (no matter how 'knowledge' is defined) is in the heads of persons and the knowing subject has no alternative other than to construct what he or she knows using his or her experience.[66] His argument owes much to Jean Piaget's work on constructivism, which became fashionable during the early 1970s—when researchers in mathematics education were particularly prominent in championing the idea that children constructed their cognitive structures *gradually*. Yet, the notion of gradual learning was hardly novel and many of those who flew the constructivist flag failed to appreciate the kernel of Piaget's point: he had changed the concept of knowledge.[67]

Glasersfeld's progression, from Piaget's radical re-conceptualisation of knowledge to a radical constructivist theory of knowing and learning, has embodied two radical principles:

- knowledge is not passively received but built up by the cognizing subject;
- the function of cognition is adaptive and serves the organization of the experiential world, not the discovery of ontological reality.[68]

The first of these principles *is* compatible with ideas developed by Polanyi in *Personal Knowledge*. For example, Polanyi's treatment of 'articulation', developed from a comparison of Donald Kellogg and Gua-the-chimp's infant learning also drew on the work of Piaget—and there are striking similarities between tacit knowing and Glasersfeld's 'first principle' of radical constructivism. However, that similarity is eclipsed by a damning difference. The adaptive cognition in Glasersfeld's 'second principle' of radical constructivism is adaptive in the biological sense of the term:

it involves 'fit' or 'viability' and does *not* reveal the 'truth' about an independent, ontological reality that may or may not *exist*.

To begin with the first of Glasersfeld's radical principles, a newborn infant starts life without any idea of the difference between the interior and exterior world: the distinction between biting itself and biting its pillow has to be learned. Observations suggest that, in their early stages of development, infants are inclined to treat everything that moves as if were alive—until they learn to distinguish between the movement of a jumping frog and clouds that move across the sky. Gradually, children learn to differentiate between movement in general and the movement of birds, animals, fish and so on. Crucially, they learn to identify other human beings as something similar to themselves.[69]

Most human beings develop the capacity to use language and most, if not all, of their conceptual thinking is associated with words. Language evolves from human interaction and the ability to use language transforms the knowing subject's capacity to learn in concert with 'others'. But, contrary to Nonaka and Takeuchi's claims, language cannot be used to 'share' knowledge. Short of brain transplant, it is not possible to share knowledge. Knowledge is *not* a transferable commodity and communication is *not* a form of conveyance. If you tell me something, I might learn and your use of language might shape what I learn. But your knowledge will not be diminished and you cannot know what I have learned. Moreover, as the *subject* (not the *object*) of my experience, I cannot be *objective* about what I have learned.

While language is fundamental to conceptual thinking, the mental processes that make the use of words meaningful represent a personal achievement on the part of each individual language user. They are learned in the course of his or her experience. Quoting Louise Rosenblatt, Glasersfeld emphasised that the 'object' on which the language user focuses is not 'verbal' but 'experiential'.[70] In Polanyi's parlance, the object of focal awareness is shaped through the *Gestalt* integration of unspecified subsidiary particulars that are subject to what has been learned *tacitly*, in the course of an individual's experience. Although Glasersfeld does not refer to Polanyi, his approach resembles Polanyi's distinction between focal awareness and subsidiary awareness.

> It is important to realize that the neural network is constantly teeming with signals that originate in the peripheral neurones that are usually called 'receptors' or 'sensory organs'. While you are reading this, there are innumerable signals available to you to which you are not attending; e.g. some that you would call 'tactual' that originate in your rump and which you could interpret as telling you that you are sitting; others that originate in your ears and which you could interpret as telling you that a car is passing in the street; but your attention was focused on this text and therefore you were not doing any of this other interpreting before I mentioned the possibility. Similarly, literally millions of signals are constantly generated in the retinas of your eyes, but you disregard almost all of them because you are focusing your attention on 'some specific thing', a coordination of signals that is of interest and 'makes sense' to you at the moment.[71]

The ability to shift our focus of attention is fundamental to the process of conscious conceptualisation, as we reflect on aspects of our experience in the course of exploring new ideas. Moreover, interaction with other people can shape the sense

that we make of our experience and the significance that we attach to our conjectures. Such interactions orientate and impede—but *do not* determine—the sense that we make of our experience. We might feel justified in talking about 'confirmed facts'; but we *cannot* claim access to ontological reality.

Whereas the portrait painter, who aims at a 'true likeness', can compare his or her painting with the person being painted, the scientist who seeks the truth cannot obtain a God's-eye view of the 'real' thing.[72] Scientists can compare results from different experiments in the pursuit of reliable theories, but it is not possible to transcend experience to 'see' what truly exists. As the Irish philosopher, George Berkeley, suggested: we can only compare ideas with ideas.[73] From a radical constructivist perspective, comparisons form the conceptual scaffolding for making sense of the world that we experience, which is the only world that we can *know*. But the mind cannot arrange experience in any way that it pleases—there are constraints; as we find whenever the world that we experience differs from the world that we would like or expect.

Corroboration by others shapes our 'common sense' appreciation of what to expect. And the refinement of common sense according to scientific principles can allow competent scientists to make precise and reliable predictions about what to expect, in specified circumstances, *without resorting to realism*. Quoting Humberto Maturana, Glasersfeld offers a four-stage account of what is usually called the scientific method, which explains what scientists *do*, without invoking the discovery of ontological reality. In practice, scientists: (1) specify the constraints under which a phenomenon is observed; (2) propose an explanation of interesting or surprising aspects of the phenomenon; (3) produce predictions; and (4) generate conditions that should lead to the observation of the predicted phenomenon.[74] What matters is the sense that scientists make of their experience. As Einstein put it, 'The whole of science is nothing more than a refinement of everyday thinking […] even the concept of the "real external world" of everyday thinking rests exclusively on sense impressions'.[75] In a similar vein, Heisenberg commented that: 'The deeper the scientist looks, the more he sees himself'[76]—which could be seen as a counterpoint to Polanyi's proposition that scientific discovery reveals what is 'more real' and points towards God.

In spite of the hazards involved, many people feel that realism is a worthwhile bulwark against relativism and point to positivism's success in the hard sciences: sheer objectivity, 'on the word of no one', might sound nonsensical—but success in the hard sciences 'proves' that they 'work'. Invoking sheer objectivity tells you what 'exists' without holding any individual to account—hence its popularity. People are often keen to claim that their opinion is backed by objectivity and seek to be 'as objective as possible'.

Arguably, success in the hard sciences is *not* a matter of faith in what lies outside experience, but a reflection of the sense that can be made of problems that are amenable to *reductionism*. The assumption of linear relationships between complex wholes and their constituent parts can make it possible to reduce a problem to the point where its components can be understood. And the fiction of objectivity can be sustained because it is relatively easy for scientists to agree on the 'objective' reduction of a problem to its constituent parts. But the living world involves non-linear relationships between wholes and parts, which make it difficult for different observers to agree on how to specify and test cause-and-effect relationships. Heinz von Foerster highlighted the differences between problems in the hard and soft sciences with a pithy aphorism.

> The hard sciences are successful because they deal with the soft problems; the soft sciences are struggling because they deal with the hard problems.[77]

Polanyi's point that strictly explicit knowledge—'on the word of no one'—was an illusion in the hard sciences applies *a fortiori* when it comes to dealing with 'hard problems' in the soft sciences. But his claim that all knowing is personal knowing is compromised by his faith in what no person can know: metaphysical truth. In contrast, radical constructivism insists that people have to take responsibility for making intersubjectively viable sense of the challenges and opportunities that emerge from human interaction across our increasingly interconnected and endangered planet.

Conclusion

It would be churlish to deny that Nonaka and Takeuchi's reinterpretation of Polanyi's philosophy is anything other than popular: but is it useful? Concerns about Polanyi's commitment to metaphysical truth, which this paper has identified as a worthy focus for critical commentary, are ignored. Nonaka and Takeuchi denounce truth, but they do not offer an alternative—leaving them open to the charge that they are advocating a form of unconstrained relativism bordering on solipsism or nihilism. Meanwhile, their reinterpretation of Polanyi's distinction between tacit knowledge and explicit knowledge blends subjectivism with objectivism. Everything that is perceived is *subjective*, whereas (through the magic of 'externalization') everything that is said is *objective*. If you are able to 'express the inexpressible', tacit knowledge can be converted into explicit knowledge that anyone could understand. And the promise of delivering 'strictly explicit knowledge'—which Polanyi saw as 'strictly meaningless'—is presented in Polanyi's name.

In contrast to Nonaka and Takeuchi's casuistry, Polanyi's original model of tacit knowing embodies a number of useful insights. His carefully considered dialectical interaction between focal awareness and subsidiary awareness offers a convincing explanation of why we cannot achieve a wholly objective, wholly explicit knowledge of what we know. It constitutes an elegant way of avoiding absurdities associated with the introspectionist–behaviourist dilemma and provides a robust response to *Meno*'s paradox.

Polanyi's concept of personal knowing is a bold alternative to objectivity's delusion that observations could be made without an observer; it bears a striking similarity with radical constructivism's idea that knowledge is built up by the cognising subject. And Polanyi's view of the 'Republic of Science', as a close-knit organisation in which individual scientists exercise mutual authority over each other, is commensurate with the radical constructivist notion of achieving intersubjectively viable knowing and learning in any self-organising field of interaction. But this 'horizontal' theme of trust and mutuality is eclipsed by Polanyi's concern with a 'vertical' relationship between each individual knower and metaphysical truth: in the manner of Christian placed before God.

From a radical constructivist perspective, all rational knowing and learning is 'horizontal'—in the sense that it cannot transcend human experience. It is uninhibitedly subjectivist. Scientific knowledge is not qualitatively different from any other form of knowing and learning: it relies on intersubjectively viable interaction among people who trust each other to act and think in a reasonable and

responsible manner. Accordingly, this paper has argued that radical constructivism provides a viable way of developing Polanyi's concept of tacit knowing without invoking metaphysical absolutes. Although, for those who feel that fashion is more important than viability, Nonaka and Takeuchi's model might have the edge.

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