TACIT KNOWLEDGE

Making It Explicit

Background

Tacit knowledge is contrasted with explicit or propositional knowledge. Very loosely, tacit knowledge collects all those things that we know how to do but perhaps do not know how to explain (at least symbolically). The term "tacit knowledge" comes to us courtesy of Michael Polyani, a chemical engineer turned philosopher of science. This biographical detail is not incidental, for Polanyi emerged from his laboratory with the news that the philosophers had scientific practice all wrong: their account of how science proceeds was massively weighted toward the propositional, encoded, formulaic knowledge that is exchanged between laboratories, and almost totally ignorant of the set of skills that are required to actually work in one of those laboratories.

Polanyi's motivation is that we recognise the importance of this second, embodied (and hence "personal") sort of knowledge, and that we collapse the hierarchy that sees hands-on skills and unwritten rules neglected and devalued, whilst the propositional report is privileged. Tacit knowledge is messy, difficult to study, regarded as being of negligible epistemic worth. Proper knowledge exists in propositional form (which is, conveniently, much easier to study).

Is a fact the type of thing that could travel without being written down, or otherwise symbolically encoded? For those working with a narrow conception of "fact" that excludes all but propositional formulations, tacit knowledge is (necessarily) not the type of thing that could act as a conduit or vehicle for travelling "facts." But those who want to argue in this way will need a new word to describe what it is that travels when the technologies of early modernity spread across Europe. The growth of material culture effectively demonstrates that facts about how to make cement, mould and fire porcelain, cut stone, hew oak, and so on, travelled extensively among illiterate, innumerate populations. Some mechanism or other enabled this, and tacit knowledge seems like a good way to talk about it.

Nonetheless, resistance to the concept remains. Not everyone feels that talking about tacit knowledge is either useful or accurate, and some – like Jerry Fodor – doubt whether the term can support its claim to name a particular and distinct type of knowledge. Before we help ourselves to this new terminology, we ought to clarify (in propositional terms) what it is we intend to mean by it.

Polanyi's account of personal and tacit knowledge

What does Polanyi mean by "tacit knowledge"? He means that there is a type of knowledge that is not captured by language or mathematics. Because of this elusive character, we can see it only by its action. Tacit knowledge is knowledge that the actor knows he has (how to catch a ball, tie a knot, mark a line) but which he cannot, nonetheless, describe in terms other than its own (skilful) performance: "*the aim of a skilful performance is achieved by the observance of a set of rules which are not known as such to the person following them*" (from Polanyi, *Personal Knowledge* 2002 [1958]: 49). The mention of "a set of rules" here may alert us. Polanyi explains:

> Rules of art can be useful, but they do not determine the practice of an art; they are maxims which can serve as a guide to the art only if they can be integrated into the practical knowledge of the art. They cannot replace this knowledge. (2002 [1958]: 50)

So tacit knowledge is knowledge we have, and know we have, but nonetheless cannot put into words. With such comments, Polanyi seems to be inserting the tacit as a category outside language. How does the tacit evade linguistics?

Embodied and symbolic forms

Language is a means of getting information from one mind to another. Whilst different forms have particular possibilities for modifying the meanings they carry (tone in song, typeface or style in writing, accent in speech, etc) the bulk of the meaning is carried in strings of discrete meanings which (in a coherent string) sum to a unifying meaning. Sign language, which replaces the spoken and written words with performed gestures, retains this syntactic form. Consequently, signing, writing, and speaking are all of a part. Mathematics, although concerned with the expression of a different class of meanings, uses a similar structure. Tacit knowledge is defined in opposition to these forms by not being encoded symbolically. With no means of encoding the information for remote storage and transmission, one constraint on tacit knowledge is that it must be passed from person to person. This has ramifications, as Polanyi explains:

> An art which cannot be specified in detail cannot be transmitted by prescription, since no prescription for it exists. […] It follows that an art which has fallen into disuse for the period of a generation is altogether lost. (2002 [1958]: 53)

The requirement of person-to-person transmission generates immediate problems, for without some sort translation into symbolic form, it's not immediately clear how the information can travel at all: if this knowledge is embedded in the minds and bodies of its practitioners, and

cannot be converted into "prescription" (written, spoken, signed, and so on), how, exactly, does Polanyi think it is going to get from mind to mind?

Polanyi explains this with reference to apprenticeship: "By watching the master and emulating his efforts in the presence of his example, the apprentice unconsciously picks up the rules of the art" (2002 [1958]: 53). So the transfer of tacit knowledge consists in the imitation of physical gestures. But gestures, surely, could be described? Drawn, written about, mimed (like sign language). Polanyi will go further: for a suitably observant student will copy not only the types of conscious actions which could be described equally well in words ("hold the hammer by the handle, lower the metal head in an arc…"), but also "those which are not explicitly known to the master himself" (2002 [1958]: 53). Because these gestures are subliminal, it is important that the process of acquisition be unconscious: "These hidden rules can be assimilated only by a person who surrenders himself to that extent uncritically to the imitation of another" (2002 [1958]: 53). Finally, consequent upon this is a sociological rider about generational relations: "A society which wants to preserve a fund of personal knowledge must submit to tradition" (2002 [1958]: 53).

The body which copies knows more than the mind which "controls" it. Not insignificantly, Polanyi is inverting the hierarchy that privileged the propositional, analytic intelligence over the physical, subconsciously acquired and unconsciously employed skills of the craftsperson.

Tacit knowledge and rigorous knowledge

In case this sounds like it might be an argument against the use and validity of rationality, it is worth stressing that Polanyi has no intention of undermining or doubting the efficacy of scientific knowledge. He stresses instead that the notion that things can be better understood when broken down (what he calls "the destructive method") is unimpaired by the recognition of tacit knowledge. Polanyi illustrates the residual power of the "destructive method" by the example of homeopathy as a chemical impossibility – the dilutions of efficacious chemicals being too low to retain any of that efficacy: "Destructive analysis remains also an indispensable weapon against superstition and religious practices" (2002 [1958]: 51).

Scientific knowledge is just a fraction of a much wider field. Knowledge extends beyond propositional knowledge, and the area into which it extends is the tacit. A further instance of this is *connoisseurship*, for example: the "touch" of a pianist being (apparently) underdetermined by the mechanical striking of chords with hammers, the "special" sound from a Stradivarius violin, the diagnostician's "instinct," the "art" of the wine taster. This last example (in particular) treads a little close to Polanyi's previous dismissal of homeopathy – is the human olfactory system really so good? In other words: connoisseurship crosses over

quite quickly into delusion and charlatanry. As if aware of this latent capacity for the connoisseur to be a swindler, Polanyi reminds us of his position: “Wherever connoisseurship is found operating within science or technology we may assume that it persists only because it has not been possible to replace it with a measurable grading” (2002 [1958]: 55).

This might suggest that Polanyi feels that connoisseurship is an illusion arising as a consequence of our having clumsy tools – and that this, in turn, is a problem that can (and will) be remedied by the development of more accurate measuring equipment. He is disdainful of the efforts of scientists using their laboratory methods to try to divine the special quality of Stradivarius violins, but he would presumably concede (taking the homeopathy example into account) that at base it is *some or other* physical difference between Stradivarius and non-Stradivarius violins that makes the difference between their respective qualities, and that in turn, *some or other* physico-chemical test would eventually reveal the character of this difference in a non-ambiguous formula. Importantly, it would also be a formula by which new violins of equal quality could be constructed. Polanyi’s position seems to be:

1. as a matter of fact we rely more on personal knowledge than the empirical scientists would like to admit; however:
2. all discernible differences [in quality] must have a physical explanation, regardless of whether we have yet developed an instrument or test capable of making these differences perspicacious
3. In the absence of better instruments, personal knowledge is the best tool we have for many tasks (inc. scientific tasks).

As his original formulation should show (“*the aim of a skilful performance is achieved by the observance of a set of rules which are not known as such to the person following them*”) Polanyi doesn’t think the rules don’t exist, just that we don’t need to know them explicitly in order to work according to them. Rules not known “*as such*” are still rules.

Polanyi will call these rules “unspecifiable” (2002 [1958]: 55) – but it is difficult to decide in what sense they are unspecifiable. There is the weak reading, apparently endorsed in the original formulation, which claims that these rules-for-action do not need to be specified in order to be useful; and there is a strong reading which claims that they are not the types of things that could be specified, that is, they are *categorically unspecifiable* – which is what seems to be implicit in the master/apprentice relation. For consistency, you would hope that Polanyi means “unspecifiable” is the weak reading.

Polanyi on tool use

It's worth noting that the weak reading is consistent with the strong-sounding claim that the efficacy of these rules may in fact partially or wholly rely on their remaining unspecified to the agent who is involved in their performance. This seems to be the case with many physical skills – e.g., catching a ball is easier (which means: more effective) if you don't think about how the arm and hand physically execute their complex synchronous ball-catching motions. Physical aptitudes frequently possess this character. So it is that Polanyi mentions the "blind man's probe" to show how we extend our attention through tools (a knife and fork or even a pair of gloves would have been equally demonstrative – both enable a similar sort of prosthetic extension). The tool, when in the hands of someone who is competent, becomes invisible to them – or rather, becomes like an extension of their body (2002 [1958]: 60). (This is the same distinction Heidegger had made between "present at hand" and "ready to hand" – the latter being a functioning tool, the former the physical object made apparent by [e.g.] it's malfunction. In other words, the issue of tool use was something that philosophers had recently been thinking about quite a lot).

Another reason for Polanyi's use of the blind man's probe is a rhetorical advantage: it allows for a smooth transition into talk of our "feeling our way through" a problem (2002 [1958]: 62). Like the blind man who eventually finds what he is looking form by bumping and touching, so too is much (and maybe all) human discovery a product of the integration of conscious knowing and unconscious knowing. At all times, the point is that our knowledge is not composed only of declarative sentences and logical propositions, but rather that it is also (and substantially) composed of "personal knowledge" which evades explicit formulation but contributes to the production the final product of our endeavours, be they knowledge claims or technologies.

Fodor's argument against tacit knowledge

Polanyi's distinction seems so obvious, trivial even, that it would be surprising if no one else had made it. In *The Concept of Mind* (1949) Gilbert Ryle had spoken of the distinction between knowing that something was the case, and knowing how to do something. With an admirable directness, he called this distinction "knowing that" and "knowing how." Once this distinction has been made, it looks very obvious. If we ever confused the two before, it was only because the English language uses the same verb for task performance and sentence memorising (or some such formulation). It might have been the case that we used difference verbs – after which the distinction between knowing that and knowing how would already be present in the language and thus of little surprise to us. We might, under these conditions,

have found ourselves instead having a discussion about how the "two" types of knowledge we thought we had were in fact one and the same.

As it is, the distinction has become so embedded, that it actually requires some concentration to return to the previous state whereby we (apparently) had no awareness that such a distinction could be made. Interestingly, this is exactly what Jerry Fodor does in "The Appeal to Tacit Knowledge" (1981, originally 1968). Fodor puts is well when he says of Ryle's distinction between "knowing that" and "knowing how" that "there is not one, but a family of distinctions that goes by that name" (Fodor 1981: 70). Of these, Fodor mentions skills (which may be "best taught by example" [1981: 70]), and "cases where we know how to do X and can give an account of what we do when we do X, but where it seems clear that the ability to give the account is logically and psychologically independent of the abilities involved in X-ing" (1981: 70).

Fodor dismisses these categories as "too crude" and goes on to argue that to call it all "know how" (or "tacit knowledge" – Fodor makes no distinction) blurs the distinction between "doing" and "doing well," claiming that: "Traits give rise to adverbs, competences to verbs: we exhibit our competences in our activities and our traits in our style" (1981: 72). So there are (at least) two classes of know how: knowing how to do something and knowing how to do something well.

The second of these is the more slippery, and seems to correspond with "proficiency," or what Polanyi called "connoisseurship." This opens the "serious question" underneath the paper: "what, if anything, would make it reasonable to decide to talk this way, what kinds of evidence should we take to be relevant to assessing claims that some organism tacitly knows some propostion?" (1981: 74). Fodor's case is, in effect, that the appeal to tacit knowledge is a way of avoiding addressing how it is that mental operations (actually) work. He thinks it is a case of sweeping under the carpet a whole class of mental events – conveniently, and not incidentally, this is a class of mental events which his own theory of mind is especially good at explaining. (Fodor is a philosopher of mind and language who once authored and now advocates a modern version of the so-called "language of thought" hypothesis. This is the claim that thoughts in the brain work a little like lines of program in a computer, where there is a match-up between syntactic operations and semantic operations.)

An objection from artificial intelligence

Aware of the strategically advantageous fuzziness, Fodor thinks that it is important to confront the issue of how "unspecified" the rules in tacit knowing really are. He does so by analogy with machine (computer) simulations of organism (human) behaviour. He begins with a very reasonable allegation:

> Although an organism can know how to *X* without knowing the answer to the question "How does one *X*?," it cannot know how to *X* unless there *is* an answer to the question "How does one *X*?" Now, one kind of requirement it would be rational to place on a psychological theory is this: for every behaviour an organism knows how to perform, a psychological theory of that organism must supply an answer to the question "How does one produce behaviours of that kind? (1981: 74)

(The "psychological theory" in question, we can be sure, is Fodor's, or one very much like it.) He goes on to argue:

> In describing the propositions, maxims, or instructions that a machine employs in the computation of its output, we are *ipso facto* describing the etiology of its output. (1981: 76)

Fodor's is quite a contorted argument, but breaks down into quite clear steps. In effect, he says that *if* a machine can simulate the behaviour of an organism, and *if* a machine code can always be translated into English sentences, *then* an organism's behaviour (or an exact simulation of it) is expressible in English sentences.[1]

Not everyone, of course, will be happy to join Fodor in supposing "there is a machine that optimally simulates the behaviour of some organism" (1981: 77). There are problems with the computer-program/AI analogy. For example, Fodor claims that the isomorphism between machine behaviour and organism behaviour is "intended to be a formulation of the principle that permits us to infer like causes from like effects" (Fodor 1981: 77) – although it remains entirely unclear whether such an inference is valid for *simulations* of intelligence. Turing himself recognised that it might be the case that thinking-machines would, internally, be doing something very different from thinking-people. Similar outputs might conceal very different internal states. (For example, although they play the same functional role, the operations of a mechanical and quartz digital wristwatch watch are so different that there is little you could learn about one from dissembling the other.) Even with functionally equivalent responses, a thinking-machine might be doing something radically different from a thinking-human. "This objection is a very strong one," Turing concedes, "but at least we can say that if, nevertheless, a machine can be constructed to play the imitation game satisfactorily, we need not be troubled by this objection" (Turing 1950: 42). Turing is happy with functional equivalence, because he is not interested in understanding how the mind works, but simply that its outputs can be simulated. Fodor, on the other hand, wants license to infer that the possibility of replicating on a machine what would (in human terms) be the

[1] "If machines and organisms can produce behaviours of the same type and if descriptions of machine computations in terms of rules, instructions, etc., that they employ are true descriptions of the etiology of their output, then the principle that licenses inferences from like causes to like effects must license us to infer that the tacit knowledge of organisms is represented by the programs of the machines that simulate their behaviour." (Fodor 1981: 78)

performance of tacit knowledge is evidence that humans must be doing something similar. (He feels confident doing this because he is already convinced that the mind works in this way. If you don't think that the "language of thought" is persuasive, you may not be convinced by the argument.) The problem is that Fodor's premises ask rather a lot of us. Effectively: we are asked first to believe that a machine can optimally simulate an organism, and secondly, we are asked to agree that similar outputs must have similar causes. Even if the first is imaginable, the second just doesn't seem a fair inference.

The weak and the strong readings – some consequences

As Fodor's objection to tacit as a usefully distinct category points up, tacit knowledge (in the strong sense) prohibits the project of artificial intelligence (AI). AI cannot even get off the ground, cannot even begin to simulate organism behaviour, if organism behaviour categorically cannot be reduced to program statements. On the other hand, if AI is possible, and if the simulated organism is able to do something that in human terms would constitute a performance of tacit knowing, then there are at least grounds for saying that knowing how to do something only tacitly is not a *necessary* feature of certain task performances. In other words: successful AI would be a argument against the *necessity* of tacit knowledge, but it would not (as Fodor claims) be an argument against the necessity of tacit knowledge for successful task performance in humans.

As mentioned, the weak reading is the claim that tacit knowledge is precisely that type of competence which does not rely on explicit formulation in order to be effective (and may in fact be less effective or impossible when made explicit). The weak reading, then, is still quite strong. But it seems that Polanyi won't settle for this. See how Polanyi uses "completely specified" in the following sentence:

> Hence the practical discovery of a wide range of not consciously known rules of skill and connoisseurship which comprise important technical processes that can rarely be completely specified, and even then only as a result of extensive scientific research. (2002 [1958]: 62)

The "rarely" and "even then" deliberately allow for a category of knowledge that is immune to explanation even after "extensive scientific research." Here again, Polanyi retains that ambiguity over the meaning of "unspecified." It suggests that he wants to retain the weak and the strong sense together – using the latter to impress us with the boldness and originality of his thinking, and the former as a position for safe retreat if threatened. Of course, in one sense (the sense relevant to us), it doesn't really matter whether we endorse the strong or the weak reading of tacit knowledge. Insofar as the mechanism for acquiring these physical skills remains concealed – that is, insofar as skills must be passed from person-to-person in

elaborate and long lasting apprenticeships – then facts travel slowly, embodied, person to person. But do they travel poorly because of this?

Another consequence of the rules being unavailable to conscious examination (when even scrupulous introspection will not disclose them, as with the master and the apprentice) is that the extent to which performances of tacit knowledge are willed or chosen becomes problematic. It seems that an action over which you have limited awareness is voluntary in a weaker sense than an action you decide to do knowing more precisely how it is accomplished because less controlled (we would certainly say this regarding reflexes and tropisms: a sneeze, a yawn, the regulation of the circulation – sometimes these acts can be initiated, but it's a fire-and-forget species of voluntary behaviour, quite different from, say, writing a paper, where every word is chosen). Of course, this condition only applies to the strong reading. But in what sense one "works according to the rules" and in what sense the rules make you work in a particular way is an interesting adjunct to this problem: in other words, if you don't have conscious control over the action, it's unclear if you are "doing the action" of if the action is "doing" you.

Works cited

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