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**Tacit and Explicit Knowledge: Harry Collins's  
Framework**

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# Tacit Knowledge and Its Antonyms

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**Résumé :** L'ouvrage de Harry Collins *Tacit and Explicit Knowledge* caractérise la connaissance tacite à partir d'un certain nombre d'antonymes : explicite, explicitable qui est ensuite spécifié en explicitable par élaboration, par transformation, par mécanisation et par explication, et enfin, au niveau le plus fondamental, ce qui peut être communiqué via des « strings ». Mais son exposé brouille la distinction entre connaissance et ce sur quoi peut porter la connaissance, et il aboutit à un certain nombre de conséquences contre-intuitives. Ceci est la conséquence de son adoption des « strings », à la place de *l'usage* des mots ou des signes, en tant que marqueur de ce qui est explicite, et je suggère que ceci peut provenir de sa réponse antérieure à la régression des règles de Wittgenstein.

**Abstract:** Harry Collins's *Tacit and Explicit Knowledge* characterises tacit knowledge through a number of antonyms: explicit, explicable, and then explicable via elaboration, transformation, mechanization and explanation and, most fundamentally, what can be communicated via "strings". But his account blurs the distinction between knowledge and what knowledge can be of and has a number of counter-intuitive consequences. This is the result of his adoption of strings themselves rather than the *use* of words or signs as the mark of what is explicit and, I suggest, it may stem from his earlier response to Wittgenstein's rules regress.

## 1 Introduction

In *Tacit and Explicit Knowledge* [Collins 2010a], hereafter [TEK], Harry Collins explores what is tacit by setting out what stands opposed to it, the various antonyms of "tacit" in the book. The antonyms include different ways in which things can be "explicated" and the way they can be encoded in or carried by "strings". But, as I will argue in the second section of this paper,

the subject matter of the contrast between what is tacit and what can be explicated turns out not to be knowledge but rather what is known: the nature of a worldly task or process rather than how one knows how to do that task (for example, tacitly or explicitly). One clue to this is the way that the tacit status of one subject's knowledge of how to carry out a task or process can be affected by facts about the mechanization of that task or process elsewhere. I will argue that the presence in the account of such "action at a distance" is explained by the fact that *Tacit and Explicit Knowledge* is really a book about ontology rather than epistemology.

In the third section of the paper, I suggest a diagnosis of the blurring of epistemology and ontology. It results from the selection of strings—"bits of stuff inscribed with patterns"—rather than what can be expressed in linguistic signs as the key antonym for tacit. And that in turn, I suggest, stems from a failure correctly to follow the lessons of Wittgenstein's discussion of rule following.

To put these, perhaps contentious, claims in context, it is helpful to compare Collins's work with Michael Polanyi's seminal text. Polanyi starts his book *The Tacit Dimension* with the following slogan:

I shall reconsider human knowledge by starting from the fact that  
*we can know more than we can tell.* [Polanyi 1967, 4]

The broad suggestion is that knowledge can be tacit when it is, on some understanding, untellable. Tellable knowledge is a subset of all knowledge and excludes tacit knowledge. But as Polanyi—like Harry Collins more recently—immediately concedes, the slogan is gnomic, e.g. [TEK, 4, 85, 88–91]. Does it carry, for example, a *sotto voce* qualification "at any one particular time"? Or does it mean: ever? Polanyi continues:

This fact seems obvious enough; but it is not easy to say exactly what it means. Take an example. We know a person's face, and can recognize it among a thousand, indeed among a million. Yet we usually cannot tell how we recognize a face we know. So most of this knowledge cannot be put into words. [Polanyi 1967, 4]

But this still leaves the question of the nature of the impossibility unclear. Can aspects of it be put into words but just not all of it at the same time? Or are the elements themselves ineffable? Polanyi's slogan suggests an approach to understanding tacit knowledge which resembles the *via negativa* in theology: approaching the nature of God by describing what God is not, the (finite and limiting) properties God does not have. In the case at hand, it is characterising what is tacit by selecting and investigating a suitable antonym. Tacit knowledge is not *explicit*, for example, on a suitable understanding of "explicit".

Harry Collins takes the same general approach in *Tacit and Explicit Knowledge*. He describes this strategy in a pithy summary at the very start of

his book: “explain ‘explicit’, then classify tacit” [TEK, 1]. Thus the first three chapters address the nature of what is explicit and the next three examine three kinds of tacit knowledge which vary in accord with their impediments to explicitness. They are relational, somatic and collective tacit knowledge. Each of these later chapters ends by asking whether the form of knowledge concerned could be made explicit. The different kinds of tacit knowledge correspond to different possibilities for explicitness and hence different underlying antonyms. There are, he says, “three main kinds of reason for not being able to write things down” [TEK, 80].

As I will argue, however, his approach to the nature of what is explicit faces a dilemma common to any attempt to characterise tacit knowledge which stems from the fact that *it has to be tacit* and *it has to be knowledge*. But it is not easy to meet both conditions. Playing up the tacit status threatens the idea that there is something known. Whilst articulating a knowable content, that which is known by the possessor of tacit knowledge, risks making it explicit.

I can give an example of the danger by quoting Collins’s recent summary of some of his own earlier work on tacit knowledge (before his more recent distinction) set out originally in *Changing Order*. In the 1970s, he visited six of the seven UK laboratories that were attempting to build a working laser of a new design (a Transversely Excited Atmospheric pressure CO<sub>2</sub>, or TEA, laser), although it had already been successfully built in other laboratories in the US. In one case, a scientist who had already built one working model aimed to replicate it so as to have two working models. Despite this limited problem—a clear case of Kuhnian “normal science”—and despite the availability of explicit instructions, Collins discovered a surprising difficulty.

[N]o scientist succeeded in building a laser by using only information found in published or other written sources. Thus every scientist who managed to copy the laser obtained a crucial component of the requisite knowledge from personal contact and discussion. [Collins 1985, 55]

Returning to summarise his investigation in a recent popular article, Collins writes:

[Y]ou may not know what you need to know and I may not know what I know. Thus, in the early days of TEA lasers scientists did not necessarily know that the inductance of the top lead was important but by copying existing designs they built in successful short top leads without knowing why. [Collins 2010b]

The first sentence echoes Polanyi’s slogan and thus suggests that what follows is supposed to be a case of tacit knowledge (and the article is called “Tacit knowledge: you don’t know how much you know”). But whilst it seems plausible to deny that the scientists had explicit knowledge of the requirements on the length of the top lead, and hence it might count as tacit in some sense of that term, it is not clear how it counts as tacit *knowledge* since no one

seems to have had knowledge of the top lead. Successful short leads seem not to have been the result of sensitivity to the length but rather a feature of a copying process.

Outlining the general challenge and illustrating it with some of Collins's earlier work is not to say that it is not met in his later work. But, as I will argue in the next section, *Tacit and Explicit Knowledge* does fall prey to this problem. In concentrating on the nature of tacitness by setting out various antonyms, Collins lets slip the knowledge status of tacit knowledge. He blurs epistemology and ontology.

Ascribing a precise view of the nature of tacit knowledge to the book is, however, more difficult than it might first seem because, as well as making some direct claims about tacit knowledge, the book also describes some conventional uses of that phrase against which it cautions. Thus the book says:

We are now in a position to explain the tacit and the explicit. That which is not explicit knowledge is mostly just the way the world unfolds. Sometimes it is referred to as tacit knowledge. Much of it consists of the working out of mechanical sequences of greater (cats, dogs, humans-as-animals, paint sprayers, neural nets) or lesser (trees, sieves) complexity. For most of this *the term "tacit knowledge" should not be used*, the notion of mechanism being more appropriate [...]. [TEK, 80, italics added]

The first part seems to make a direct claim about the nature of tacit and explicit knowledge but later on there is a description of use and a warning about it. There is thus a standing possibility of misinterpreting a description aimed at making explicit an everyday sense of "tacit" with an endorsement of the view. To attempt to minimise this risk I quote the work more than is customary in such a paper.

## 2 The knowledge status of tacit knowledge in *Tacit and Explicit Knowledge*

The first sentence of the first chapter of *Tacit and Explicit Knowledge* says "Tacit knowledge is knowledge that is not *explicated*" [TEK, 1, italics added]. This might be terminologically anodyne if "explicate" were taken to mean *make clear*. If so tacit knowledge would be knowledge that is not, or perhaps could not be (a distinction to which Collins returns), made clear, which is close to Polanyi's slogan, *we can know more than we can tell*. In fact, however, Collins expands his initial opposition of tacit and explicit to *explicable* and then to four distinct meanings of "explicable". There are thus four distinct antonyms to "tacit" because there are four ways in which he characterises explication. These are explication by elaboration, transformation, mechanization and explanation [TEK, 81] (with elaboration perhaps the closest to "make clear").

These four senses of “explicable” give four senses to “explicit” and since the tacit is “that which has not or cannot be made explicit” they provide four ways for things not to be tacit or four antonyms of “tacit” [TEK, 85]. One possibility would be to say that tacit knowledge is knowledge that is not explicit in *any* of these four ways. It seems closer to the spirit of the book to say that we can understand different reasons to call things “tacit” by looking to these different antonyms and hence that there are different kinds of tacit status.

In fact, Collins seems to suggest that as well as there being different kinds of tacit knowledge there are also different degrees of tacitness. The first evidence of this is that he says that Relational, Somatic and Collective Tacit Knowledge are, respectively, “weak”, “medium” and “strong”: “these adjectives referring to the *degree* of resistance [...] to being made explicit” [TEK, 85, italics added]. But, second, he connects knowledge which has been made explicit in one sense with knowledge that is less (or “not quite so”) tacit as illustrated in the *New Scientist* article.

In *The Logic of Tacit Inference*, Polanyi argues persuasively that humans do not know how they ride, but he also provides a formula: “In order to compensate for a given angle of imbalance  $\alpha$  we must take a curve on the side of the imbalance, of which the radius ( $r$ ) should be proportionate to the square of the velocity ( $v$ ) over the imbalance  $r \sim v^2/\alpha$ ”. While no human can actually ride a bike using that formula, a robot, with much faster reactions, might. So that aspect of bike-riding is *not quite so tacit* after all. [Collins 2010b, italics added]

The formula is part of an *explanation* of cycling and the idea of making a robot ride a bicycle looks to be an instance of *mechanization*. So such knowledge is made explicable and hence explicit in two of the four senses outlined and, by that fact, is, according to Collins, rendered *less* tacit.

Though the idea that tacitness admits of degrees is interesting in itself, the passage also suggests something more fundamental about the target of Collins’s analysis. The fact that humans cannot ride a bike by using the formula mentioned suggests that it is tacit. But the further fact that a robot with faster reactions might be programmed in accordance with the formula implies that it is not as tacit as it might otherwise have been thought to be (“not quite so tacit after all”). So the tacit status of human knowledge of how to ride a bike is affected—reduced—by facts about robot bike riding.

That is to say that, the fact that the task or process can be explained by others—whether or not they themselves have practical knowledge how to do it—counts against it being fully tacit for a different subject, however he or she thinks about or grasps riding a bike. There is a kind of “action at a distance” for the status of a human subject’s knowledge by facts about explication, for example by mechanization, elsewhere. This is surprising. Why should the question of whether a subject has tacit rather than explicit knowledge of how

to carry out some task be affected by facts about whether some other agent or system could carry out the same task explicitly?

That it does, according to Collins's analysis, follows from two features of the analysis. First, there are several antonyms of "tacit" in play giving rise to distinct kinds and gradations of tacitness. But, second and more fundamentally, it is an initial indication of the fact that the focus of Collins's attention is not really knowledge, of a task or process, at all but the nature of the task or process itself. I will argue that this same view (from the *New Scientist* article) is present in *Tacit and Explicit Knowledge* and that it undermines the knowledge status of tacit knowledge. In the two-fold challenge of explaining how tacit knowledge can be both tacit and knowledge, Collins fails to account for it being knowledge.

To clarify my objection, it will help to contrast two claims Collins makes. He says, on the one hand, that:

[T]he idea of tacit knowledge only makes sense when it is in tension with explicit knowledge, and since cats and dogs and sieves and trees cannot be said to "know" any explicit knowledge, they shouldn't be said to know any tacit knowledge either. In fact, they don't "know" anything [...]. [TEK, 78]

The worry expressed in this quotation concerns limits on who or what can be a possessor of knowledge. Only those who can have explicit knowledge can properly be said to have tacit knowledge. But at the same time, Collins suggests, that one of the things that makes the very idea of tacit knowledge seem unduly mysterious is just the separation of such rational subjects from the rest of the animal, vegetable and mineral world. At the start of the book, he offers a kind of philosophical therapeutic diagnosis. Modernism in general, and the computer revolution in particular, has made explicit knowledge seem conceptually straightforward and tacit knowledge puzzling.

But nearly the entire history of the universe [...] consists of things going on quite nicely without anyone telling anything to anything or anyone. [TEK, 7]

So whilst explicit knowledge presupposes tacit knowledge, the *concept* of tacit knowledge is parasitic on that of explicit knowledge. Thus it is helpful to his project of demystifying the concept of tacit knowledge to suggest the similarities between human and non-human cases.

In all the ways that do not involve the way we intentionally choose to do certain acts and not others, and the way we choose to carry out those acts, the human, per individual body and brain [...] is continuous with the animal and physical world. We are just like complicated cats, dogs, trees, and sieves. [...] Sometimes we can do things better than cats, dogs, trees and sieves can do them, and sometimes worse. A sieve is generally better at sorting stones

than a human (as a fridge is better at chilling water), a tree is certainly better at growing leaves, dogs are better at being affected by strings of smells, and cats are better at hunting small animals. [...] That teaching humans to accomplish even mimeomorphic actions is a complicated business, involving personal contact, says nothing about the nature of the knowledge, per se. [TEK, 104–105]

Aside from the fact that we can *choose* to do some things rather than others, and can choose to do them in particular ways, whilst cats, dogs, trees and sieves cannot, the performance of the tasks, which for us is expressive of tacit knowledge, is just the same. In that respect, we are *just like* those animals, plants and artefacts, according to Collins.

But whilst the therapeutic aim of this comparison is clear—inverting the recent assumption that tacit knowledge is more conceptually puzzling than explicit knowledge by emphasising that tacit knowledge is natural and longstanding—the details are less so. One problem is the point Collins himself makes: that cats and dogs, sieves and trees cannot be said to know *anything*, whether explicit or tacit. Intuitions may vary about whether cats and dogs can have knowledge but it is surely uncontentious that sieves and trees cannot. Given that fact, how can there be continuity between the tacit knowledge of human subjects and the dispositions of plants and artefacts?

A clue to how Collins addresses the apparent incompatibility—between the claims that cats, dogs, trees and sieves *know nothing* whilst the way they “do” things is *just like* the way we do things when we use and express our tacit knowledge—is his focus on what he calls (in the last quote) the “nature of the knowledge, per se”. This “nature of the knowledge, per se” does not, however, seem to mean the way humans *know* how to do the task, their *knowledge*, after all. Rather, it seems to mean the nature, not of the knowledge, but of the task, or better the process, itself. The process or task can be a common element between humans and non-humans since the same process can be enacted, or brought about, or underpinned by human agency or non-human happening.

Let me illustrate. Consider one of Collins’s examples: the task or process of typing. This task can be carried out by skilled typists (who may intuitively be thought to have tacit knowledge of the location of the keys), beginners (who may have to scan the keyboard visually to find a key) or robots (which, intuitively have no knowledge at all, in virtue of lacking minds or rational faculties). One might expect that an analysis of the tacit *knowledge* of typing would have to distinguish between these cases and examine the way in which subjects think about, or knowingly grasp, the task at hand. (One possible analysis would say that the first group has tacit knowledge, the second explicit knowledge and the third no knowledge at all, merely instantiating a mechanism or process.) But because Collins wants to draw parallels between cats, dogs, trees and sieves and ourselves, his focus is on the mechanical process of typing not on the different ways that can be grasped.



Collins discusses this example in a chapter on one of the sub-species of tacit knowledge: Somatic Tacit Knowledge. In a discussion of Dreyfus, Collins notes that, for skilled typists, consciously following the rules they originally learned by slows them down. If his focus were on knowledge rather than process this would be important. But in fact he plays it down saying:

this seems to bear on nothing but the way humans work; it does not bear on the way knowledge works. [TEK, 104]

“Knowledge” simpliciter does not denote the knowledge or know-how of human typists, then, but is rather a generalised account of the task or process of typing that could be given.

This assimilation (of the knowledge of a rational subject and a mere worldly process) is also suggested in a later comment on the limits of human typing:

[W]e humans cannot generally type as fast or efficiently when we are paying attention to the keys but that’s just us. An automated typing machine that scanned print that was set out in a clear and undamaged font, transformed it into editable text, and then typed it out again could work as fast as any human typist, and faster if desired. [...] The constraints on the methods available for efficient typing by humans (by contrast e.g., with machines) are somatic limits; they have everything to do with us and nothing to do with the task as a task—nothing to do with knowledge as knowledge. [TEK, 104]

The last line highlights the assimilation of process or task and knowledge. Further, it shows why it is relevant when discussing the tacit knowledge of human typists to discuss the possible mechanization of that task. Without the assimilation of task and knowledge (including knowledge of how to do the task), such a comparison would be a *non-sequitur* because even if the process can be made explicit (for example, in the sense of put into words that Polanyi’s slogan suggests) that is not the *source* of skilled human typists’ abilities. They can type because they have tacit knowledge or know-how whether or not the same task or process could be mechanised by others. Since for Collins, mechanization makes things explicit, this is again a case where explanation and mechanization elsewhere seem to have a surprising “action at a distance” on the nature of the typists’ knowledge: it is less tacit whether or not they know that.

Collins warns that there is a danger in “mixing up the analysis of the way humans do things with the nature of knowledge itself” [TEK, 110]. But the problem is that by not paying attention to the way humans think of tasks, and for example the contrast between explicitly following rules about key location and having tacit knowledge of where the keys are, Collins focuses on a process which itself is not knowledge at all (though it could be the object of knowledge). Of course, a human typist can have knowledge of the process, of how to do it, and different typists may have different kinds of knowledge of this, but

process and knowledge are different categories. It seems that in this discussion of somatic tacit knowledge, but also in his more general account of the long history of the working out of mechanical sequences, Collins has attempted to hold onto what is tacit but only at a cost of losing his grip on what is knowledge. He says, for example:

That which is not explicit knowledge is mostly just the way the world unfolds. [TEK, 80]

Although he goes on to suggest that “mechanism” is a “more appropriate” label than “tacit knowledge” for the working out of mechanical sequences of greater or lesser complexity, he does not object that to call such worldly processes “knowledge” at all is an unusual anthropomorphism.

### 3 Signs and strings

Why does Collins assimilate the knowledge that subjects can possess of processes with the processes themselves? The reason seems to be one key choice of antonym for “tacit”. As I remarked earlier, *Tacit and Explicit Knowledge* aims to shed light on tacit knowledge by contrasting it with a suitable account of what is explicit. Collins’s initial characterisation of the explicit (which culminates in the four senses of elaboration, transformation, mechanization and explanation) is not, however, with what can be expressed linguistically—as Polanyi assumes—but rather with what he calls “strings”.

“Explicit” is something to do with something being conveyed as a result of strings impacting with things. [TEK, 57]

Strings are:

bits of stuff inscribed with patterns: they might be bits of air with patterns of sound waves, or bits of paper with writing, or bits of the seashore with marks made by waves, or patterns of mould, or almost anything [...]. [TEK, 9]

The motivation for this seems to be to avoid the “freight of inherent meaning that makes the notions of signs, symbols and icons so complicated” [TEK, 9]. One worry repeated in the book is that strings (and hence signs as kinds of strings) do not have an essential meaning:

strings are without meaning [...] a book is a physical thing, not a meaningful thing. [TEK, 34]

So rather than starting with the meaning that can be expressed in words or signs he stresses instead the physical nature of strings:

a string is just a physical object and it is immediately clear that whether it has any effect and what kind of effect this might be is entirely a matter of what happens to it. [TEK, 9]

The claim that neither strings nor signs have meanings essentially is surely correct. What kind of physical object or sign could *compel* a particular interpretation of it, independently, that is, of a contingent background practice of sign use? What is less clear is why this might be thought to be such problem that it is better to invent a new ontological entity rather than contrast tacit knowledge with what can be put into words given a linguistic community. But before speculating on the reason for that, I will note four immediate consequences of discussing strings rather than linguistic signs not for Collins's account of tacit knowledge but for his discussion of meaning and linguistic communication in *Tacit and Explicit Knowledge*.

First, without being able to rely on the idea that meaning can be expressed in the use of signs (for example, expressed in words in natural language), Collins talks of meanings as though they are independent of their means of expression: he reifies them.

A language is a set of meanings located in a society, whereas, to repeat, strings are just physical objects. [TEK, 10]

The reification in turn leads to very frankly bizarre platonic sounding comments such as:

Though strings are sometimes used to represent meanings, their relationship to meanings cannot be stabilised [...] because meaning is continually changing *as it lives its life in society*. [TEK, 44, italics added]

Second, as in that quote, it gives rise to the need to talk of using strings to *represent* meanings. This is a substantial philosophical commitment but one which receives little attention. How can physical items, bits of stuff inscribed with patterns, represent meanings unless they are used as signs in a linguistic community? What other account of representation of meaning is there?

Third, missing the possibility that, as part of a custom, a sign-post, for example, can simply mean turn left, he is forced to empty signs or strings of meaning: "There is no meaning in the book or the photograph" [TEK, 36]. But now with all (or as it turns out *nearly* all) the work done by human interpreters and none (or little) done by dead or empty signs there is the problem of explaining the fact that a sign-post does indicate a direction for a community. The stop-sign on roads leaves no room for doubt amongst regular drivers, for example. Collins admits to some embarrassment as he invokes the notion of affordance here:

[I]nstead of saying "capable of being interpreted", I will adopt the term "affords the interpretation", which carries the implication that there is something in the string that makes it easier to interpret one way rather than another. [...] What "afford" does not mean is "determine". [...] The terms "afford" and "affordance" are lazy terms [...] [which] merely paper over deep cracks in our

understanding—or, or at least, my understanding—of why, given the extraordinary interpretative capabilities of humans, anything affords any one interpretation better than any other. How are meanings ever fixed, or even favoured? [TEK, 35–36]

Fourth, it gives rise to a distorted picture of linguistic communication (which I have abbreviated significantly to emphasise the key elements):

Language translation or just plain conversation within one natural language consists of three stages. [...] Stage 1: inscription. In “telling” the attempt is made to represent lived meaning with the inscribed string. For example, in the case of conversation an attempt is made to represent the meaning as a string comprising vibrations in the air. [...] Stage 2: transmission and transformation. [...] Stage 3: interpretation. This is the attempt to recreate meaning from the string—to interpret it. [TEK, 27–28]

In this picture, Collins seems to subscribe to a seventeenth century view of communication in which meanings are encoded in mental items such as Lockean or Humean ideas and inter-personal understanding involves an attempt to synchronise the same ideas in different minds through signs or sounds which are themselves lacking in meaning. Wittgenstein critically summarises this picture thus:

It seems that there are *certain definite* mental processes bound up with the working of language, processes through which alone language can function. I mean the processes of understanding and meaning. The signs of our language seem dead without these mental processes; and it might seem that the only function of the signs is to induce such processes, and that these are the things we ought really to be interested in [...]. We are tempted to think that the action of language consists of two parts; an inorganic part, the handling of signs, and an organic part, which we may call understanding these signs, meaning them, interpreting them, thinking. [Wittgenstein 1958, 3]

Wittgenstein’s challenge (both here and in the *Philosophical Investigations*) is to ask the nature of the inner processes which are able to animate otherwise dead signs or to “recreate meaning from the [dead] string” and he finds no plausible solution. Collins does not address this worry.

Why does Collins reject the use of words or signs to express meaning in favour of the transformation of strings and their affordances? I can only speculate, but I suggest that the reason is his interpretation of what he calls Wittgenstein’s “rules regress” [TEK, 2, 46, 76].

Rules can never contain all the rules for their own application.  
[TEK, 46]

His interest in this goes back at least as far as *Changing Order* where he connects tacit knowledge with Wittgenstein's discussion in §185 of the *Philosophical Investigations* of what understanding a mathematical series comprises. Collins considers the example of being asked to continue the "2, 4, 6, 8" sequence in the *same* way. "The immediate answer that springs to mind is '10, 12, 14, 16' and, to all intents and purposes, this is indeed the 'correct answer'" but he presses the question of how we know this [Collins 1985, 13]. It cannot, he argues, be a matter of following the rule "go on in the same way" because "this rule allows for a number of possibilities" [Collins 1985, 13]. Nor, assuming that that rule is merely insufficiently *specific*, does further codification that one sequentially adds 2 help because that might result in the continuation "82, 822, 8222 [...]" or other typographic variants each of which amounts to adding 2 in some sense.

He concludes both that the notion of "sameness" is ambiguous and that it is not possible fully to specify a rule (unless a limited range of responses is defined in advance). But "since in spite of this we all know the correct way to go on, there must be something more to a rule than its specifiability" [Collins 1985, 14]. The extra element is described in the introduction as "social entrenchment" or a "shared form of life". Later, as in the quotation above, it is called "tacit knowledge". Thus it is tacit knowledge that underpins the "*mysterious abilities* that enable us to know when to continue '2, 4, 6, 8' with '10, 12, 14, 16' and when with 'who do we appreciate?'" [Collins 1985, 22, italics added].

This view of Collins suggests that whatever is put into words in explanations of meaning cannot go far enough. The gap between what is meant and what is actually explained has to be filled by something. It ignores what Wittgenstein himself goes on to stress in comments such as:

"But do you really explain to the other person what you yourself understand? Don't you get him to *guess* the essential thing? You give him examples,—but he has to guess their drift, to guess your intention." — Every explanation which I can give myself I give to him too. [Wittgenstein 1953, §210]

"But this initial segment of a series obviously admitted of various interpretations (e.g. by means of algebraic expressions) and so you must first have chosen *one* such interpretation." — Not at all. A doubt was possible in certain circumstances. But that is not to say that I did doubt, or even could doubt [...]. [Wittgenstein 1953, §213]

But putting aside the issue of the correct interpretation of Wittgenstein, Collins's reading implies that signs can never simply express meaning (and hence the idea that books are not meaningful). I suspect that that is why, in setting out possible antonyms of "tacit", he rejects signs since, on his view,

they themselves cannot make *anything* explicit. Hence, I speculate, his turn to something more basic to make explicit knowledge explicit: strings.

Explicit knowledge has substance—it is knowledge that can, to some extent, be transferred by the use of strings in the right circumstances. [TEK, 80]

There is a cost, however. Because strings are simply “bits of stuff inscribed with patterns” they are ubiquitous. The result is that there is no distinction between string transformations and mechanical causes and effects (“string transformation merges seamlessly into good old cause and effect” [TEK, 49]), whereas, by contrast, only some mechanical causes and effects have the right context to count as sign usage. But, since strings are used to underpin explicit knowledge, which is used as the antonym of tacit, this puts stress on the realm of tacit knowledge. For one thing, if mechanical cause and effect counts as string transformation and if string transformation is a form of explication and hence the explicit [TEK, 81], it is hard to see how anything is left for tacit knowledge.

There is a partial acknowledgement of this point in the form that if transformations of one pattern into another can be *explained*, for example, then that can no longer be a matter of, or for, fully *tacit* knowledge.

[S]tring transformations and mechanical causes and effects are, to speak metaphysically, just two aspects of the same thing. This is why we have a strong sense that when we explain some process scientifically we have made it explicit; this is the “explicable” part of the antonym of tacit with its “scientifically explained” connotation. [TEK, 50]

This claim is the source of the “action at a distance” of explanation on the tacit status of a subject’s knowledge. But the deeper problem is that approaching what is explicit through the very broad notion of matter in patterns confuses what might be the object of knowledge—what a subject knows *about*—with the subject’s epistemic attitude to that.

## Conclusion

This is how knowledge goes missing from Collins’s account of tacit knowledge. First, following Polanyi, tacit knowledge is contrasted with its standard antonym: explicit knowledge. But then the standard contrast is approached through the broader idea of strings rather than what can be expressed linguistically in words or signs. But since strings are just “bits of stuff inscribed with patterns” their elaboration, transformation, mechanization and explanation all count as instances of explication and hence what is explicit. Because he uses strings to explain the antonyms of “tacit” and strings are merely “bits of stuff”,

the focus of the discussion is not the nature of the knowledge that subjects possess but the processes or tasks or worldly patterns themselves.

Such a focus does not address the different ways in which such processes might be *known* by skilful or less skilful human agents (and possibly by animals) or replicated by non human artefacts or organisms. Collins's broader account is of the nature of patterns or processes that might be known, not of the different ways in which they are known. It is pitched at the level of worldly patterns or ontology rather than the way they are known by epistemic subjects. Now that might be a perfectly fine area of inquiry. But it is not a discussion of tacit *knowledge*.

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