Starting with Tacit Knowledge, Ending with Durkheim?


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Stephen P. Turner  
Department of Philosophy  
University of South Florida  
Tampa, Florida

Harry Collins is a science studies scholar—no other description fits without qualification—who has contributed enormously to the discussion of tacit knowledge, particularly by thinking through such things as computer assisted surrogates for experts and the role of tacit knowledge in the building of scientific instrumentation. This work embodies the special, and somewhat strange, combination of traits for which his work generally is known: its intelligence and originality, its use of telling and interesting examples and his shrewd analyses of others examples, its polemical character (not to say fierceness), its use of clever inversions (a practice shared with his rival Bruno Latour) along with its lack of detailed reference to the arguments of other writers, its invention of alternative language for describing familiar topics, its honesty about what is not known, and its somewhat off-key employment and reworking of philosophical topics. In this book he takes on specific rivals, particularly Hubert Dreyfus, and, unusually for him, attaches himself to an intellectual tradition familiar to sociologists—a tribe of which he is at best only a nominal member. In addition, the book is a kind of synthesis of his work, or at least of a bunch of strands of his thinking whose connections have not always been apparent: between his critique of John Searle’s Chinese Room example and his views of tacitness, for instance, and the relation
between his account of types of expertise and the rest of his views. The outcome of this melange is surprising and interesting. It advances the discussion, but perhaps not, as we will see, in the way it was intended to, and for reasons closely connected to the special qualities of Collins’ work.

1. Defining ‘explicit’

The big idea with which the book begins is this: we can’t understand ‘tacit’ knowledge unless we understand the binary opposite which it is defined against, namely explicit knowledge. There is a puzzle with this binary. On the one hand, explicit knowledge is parasitical on tacit knowledge. On the other, the idea of tacit knowledge is parasitical on the idea of explicit knowledge. What is it to be explicit? A traditional philosophical answer would be that it is that which is contained in sentences, or utterances. Another answer might be in terms of the distinction between conceptual and non-conceptual knowledge. Collins characteristically makes no reference to any of these distinctions, though he uses the Gibsonian-Brandomian term ‘affordances’. He supplies his own vocabulary. There are the following players: digital strings, analogue strings, affordances, causes, and interpreters.

‘A string is just a physical object and it is immediately clear that whether it has any effect or what kind of effect this might be is entirely a matter of what happens to it’ (p. 9). Strings are not languages, but they ‘are the means by which languages are shared, and there can be no language without sharing’ (p. 10). Strings, then, are in the causal world, and impact entities. But they also have inscribed properties, or patterns, though not meanings, so that they can be
transformed such that these patterned or inscribed properties are preserved. But strings do more than inscriptions, in that they have causal powers: they can cause something to do something or give it new powers. Communication happens in two ways through responses to strings: with and without interpretation. He gives the case of ‘the Sergeant Major’s shout of “shun” to soldiers on the parade ground’ (p.17). This should become a reflex response, a mechanical effect, needing no interpretation; but at some point in the soldier’s training it is not yet a reflex, and requires interpretation. Only humans, he says, interpret. Computers do not: only mechanical effects on computers are possible. Communication occurs when an entity can do something it could not do before as a result of the ‘transfer’ of a string to it. There is a trivial sense in which one can answer a question in a game if one has memorized an answer without understanding it, but this is a kind of limit: the important sense is where you can do something with the transfer.

This becomes relevant to tacit knowledge. It is central to communication that although communication can fail, it can also often be repaired by more communication. Collins describes this in terms of longer and shorter strings. People who know the same things can often convey what they want to convey with short strings. But people who do not know the same things can often be given a longer string which enables the same effect, meaning that it enables the recipient to do something they could not do before. This turns out to be a critical part of the story for Collins, because it is in this difference that the secret of tacit knowledge lies: whatever it means to have tacit knowledge or make tacit knowledge explicit has to do with this substitution of long strings for short strings. The fact that one can sometimes substitute communicating with long strings for failed communications with short strings suggests that all knowledge can be made explicit in this fashion. There is no guarantee, however, that substituting a longer string will
result in communication. The problem can always be solved, in principle, by changing the receptor. But in practice, not every receptor can be changed.

Strings don’t have inherent meanings. They get meaning by the properties and interpretive activity of the receptor. In humans, the relevant properties and capacity for interpretation are given by socialization (p. 31). There is, he acknowledges, a bit of a mystery here: how do you transfer all this stuff unless you are fluent, meaning endowed with a capacity for interpretation and flexibility, already?

Somehow, the ability that needs to be transferred to engender fluent language use has to be flexible- it has to be an ability to respond to social cues and contexts. To date, the only way we know how to engender such a change is through socialization. (p.31)

‘Strings’ come in two kinds: analogue (or continuous) and digital. The digital ones can be transformed easily; the analogue ones less so. Digital ones can be chopped into discrete entities, such as electronic states in a calculator, and transformed using look-up tables to produce numbers, for example. Analogue strings, such as a picture, can also be transformed, but it is harder to avoid losses.

A ‘language’ cannot be transformed, but only translated, and translation always involves potential loss of meaning (p. 25). Language, in contrast to strings, is something in which knowledge can be ‘located’ (p. 135). There is no look-up table for ‘meanings’ (p. 43). Translation is done by interpreters, who unconsciously add themselves. But while strings are inert and without meaning on their own, they are prone to being interpreted in certain ways— this
is what Collins means by affordances. ‘A photograph is just in marks on paper—a string—and in itself not “of” anything or anybody’ (p. 34). But it is nevertheless easier to interpret a picture of Wittgenstein as that, rather than as a picture of a banana. Collin’s engagingly admits that terms like ‘afford’ are ‘lazy terms’ that ‘paper over deep cracks in our understanding’. But he tries to do something to help: he notes that it becomes easier to interpret in certain ways with experience, that one needs to learn how to interpret a picture, and so forth.

So how does this help in defining tacit knowledge? By contrast: ‘Explicit knowledge’ now can be understood to mean ‘a string that, when appropriately transformed, affords, say, the Mona Lisa for those who know how to interpret it (that is those who know how to see the smile)’ (p. 46). And this definition shows why Michael Polanyi was right to claim that ‘all knowledge is either tacit or rooted in tacit knowledge’ (p. 46). No set of rules, no look-up table, ‘can substitute for the ability to see the smile—one cannot explain to anyone who cannot see the smile how it is to be seen’ (p. 46). String transformation is reducible to physical processes. But where digital processes are explicable in terms of look-up tables, analogue processes are usually not.

What about the fact that computers can be constructed to do the tasks that people do using their tacit knowledge? Does that mean that we have explicated their tacit knowledge, or made it explicit? Collins says no—everything that is going on in the computer is transformation, not translation. The relevance of this to tacit knowledge becomes clear when we consider a distinction between mimeomorphic and polymorphic actions—that is, between actions that copy another action by mimicry and actions that copy the intended ends and ‘copy’ by also achieving the end, perhaps in a way that is not physically the same (pp. 55-6). According to Collins, people can copy the motions, and can also mimic intentionality, but computers and animals can only
copy motions, and can’t copy intentions.

2. Explicitness, explication, and explanation

Explicit, explicable, and so on now can be seen to have a variety of meanings. Explication can mean describing physical processes involving strings. But this is not making something that is ‘usable when tacit’ (namely, the neural nets or whatever supposedly contains the tacit knowledge) into something that is ‘usable when explicit’. We don’t get anything usable at all out of these explications. So it makes no sense to say that tacit knowledge is in these physical processes. The interesting issues involve the cases where we do get something usable: when people can ‘tell’ what is ‘tacit’ so that what is usable when tacit is also usable when explicit. What is going on when this happens?

To answer this, we need one more clarification, which is also a demystification. Polanyi says that ‘a wholly explicit knowledge is unthinkable’. Collins wants to translate this into ‘strings must be interpreted before they are meaningful’ (p. 70) and for us to ‘forget about the word “unthinkable”’. The point is really this: when a programmer makes a calculator do arithmetic it is doing no such thing—it is transforming strings. To do arithmetic requires a user who ‘has to decide what to calculate and how to use the answer’, which in turn requires tacit knowledge (p. 70). Unthinkable is misleading because it would be better to say this: lengthening the string is not always a solution to problems of communication. ‘However long the sequence of transformations that takes place in the calculator, no arithmetic will have been afforded unless the cultural gap between the programmer and the user is not too big—the calculator is of no use to a tribesman
from the Amazon jungle’ (p. 71).

There is, however, an important twist that also needs to be added, and it is one which Collins has appealed to before, in the context of asking what expert systems do. The calculator itself is not doing what people did before there were calculators. The calculator is a prosthesis. In medicine, prostheses rarely work in the same way as the part they replace. Neural nets are like calculators: the strings that make up the nets are, in principle, accessible, meaning describable, but they don’t tell us anything, meaning they don’t give us usable knowledge. They are just string transformers that work by cause and effect (p. 76). Animals work in this way, but they are just machines—they don’t interpret strings, as humans do (p. 76). Of course, some human learning and action works this way as well, but not the kind that we are interested in when we are concerned with knowledge (p. 77). The bright line is language: the way we learn language ‘is nothing like’ this process (p. 75).

The cases of embodied tacit knowledge that Dreyfus and Polanyi focus on and treat as the model for all tacit knowledge are cases of embodied, or, as Collins calls it, somatic tacit knowledge. The standard model is knowledge of how to ride a bicycle, or specifically knowledge of how to keep a bicycle balanced. It is tacit because we cannot tell it. Nevertheless ‘it is passed on in ways which involve close contact with those who already have it’ (p. 99). So it is not the same as unrecognized knowledge, which is also passed on in this way. But the fact that we can’t tell, meaning convert our knowledge of how to balance a bike into explicit knowledge in the form of interpreted strings, is itself contingent. If ‘we rode our bikes on the surface of a small asteroid with almost zero gravity so everything happened much slower, we could probably use [explicit] rules to balance’ (p. 100). If our brains were faster we could do the same thing. So the
tacit character of this knowledge is a consequence of what Collins calls somatic limits—the limits of our bodies and brains. Somatic limits are the source of the mystery element of tacit knowledge. In fact, machines can be programmed to do the things it involves, though they will do it in a different way (p. 106) human brains are complicated—but they are still just mechanisms (p. 110). The only thing machines would lack is human somatic affordances, because they lack our bodies (p. 109).

3. The point

The argument so far is this: ‘tacit’ means not transmitted by strings; ‘explicit’ means transmitted by strings and subject to mechanical transformation. Digital strings are easy to transform; analogue ones are harder. But in the end this difference does not mean that analogue is tacit and digital is not: both are strings that are transformed. Interpretation is distinct from transformation and not reducible to it. There is a kind of substitutability of explicit for tacit that works some of the time, so that longer strings substitute (prosthetically?) for small cultural gaps but in the end communication depends on shortening the cultural gap. When someone ‘tells’ what is tacit, they substitute a long string for a short one. Tacit knowledge does transfer, but not by mere imitation. Nevertheless it requires some sort of close association between persons in order to transfer. Much of what is normally called tacit knowledge is merely contingently tacit. Some is tacit because the physical conditions for making it explicit are not present: gravity is too strong to allow writing a good bike balancing program. Some is tacit because of the way society is organized and could be explicit if it were organized differently.
In part, Collins is writing a de-mystification of tacit knowledge: much of what has been supposed to be tacit, tacit in the sense that it is irreducibly tacit, tacit in a deep or non-contingent sense, is not. Why? Apparently because we can tell that performances like bike-riding that are supposedly based on it are really based on a mechanical string-transformation type process, and we know by virtue of the fact that we can substitute a mechanical process of this sort (even if the substitution requires thought experiments involving asteroids) for the supposed tacit knowledge. Once the pretenders to the title ‘tacit knowledge’ have been sent packing, the real thing we are looking for will be revealed. The real thing is that which is irreducibly tacit. Strong tacit knowledge, ‘the irreducible heartland of the concept’ of tacit knowledge (p. 119), or collective tacit knowledge, ‘is a kind of knowledge that we do not know how to make explicit and we cannot foresee how to make explicit ... [it] is the domain of knowledge that is located in society—it has to do with the way society is constituted’ (p. 85; italics in the original).

This last argument step of the argument is not fully spelled out. It looks like a definition, a definition of irreducibility, but it is a definition which includes the supposed cause or explanation of this kind of knowledge. Instead it is presented as a position, which Collins calls ‘Social Cartesianism’ and explicated. The core of the explication is an attack on what he calls the ‘bias’ toward individualism.

In Social Cartesianism, the individual is not the unit of analysis: the individual merely shares the collectivity’s knowledge. The special thing about humans is their ability to feast on the cultural blood of the collectivity in the way that fleas feast on the blood of large animals. We are, in short, parasites, and the one thing about human brains that we
can be sure is special is the way they afford parasitism in the matter of socially located knowledge. Neither animals nor things have the ability to live as parasites on social knowledge. (p. 131)

The explication of this position passes in a few short pages (pp. 119-38). Much of the discussion is devoted to claims about the differences between humans and animals. The point of the discussion is this: human beings traffic in meanings, language, and culture, and thus are radically different from animals or machines, which do not.

It is only humans who have the ability to acquire cultural fluency. It is only humans who possess what we call ‘socialness’—the ability to absorb ways of going on from the surrounding society without being able to articulate the rules in detail. (p. 125)

The differences are such that we can ignore facts about how animals actually learn behavior, copy it from one another, associate in groups, and so forth (p. 126).

A few more pages are devoted to the Chinese Room example (pp. 127-30). He notes that the occupant of the room, who gives answers according to formula, cannot respond to changes in the language: she is stuck with a look-up table that doesn’t change. We are given a major example of collective tacit knowledge, which relates to fluency, namely in the task of driving in traffic, which differs in different countries (pp.121-4). We get

a picture of the individual as a parasite on the social group, sucking up social knowledge
from the super organism; stop sucking and the knowledge gradually degrades—that is, its match with the collective’s knowledge gradually weakens. But how does social knowledge pass into the individual? So far we have simply said that it happens as a result of ‘being immersed’ in society. (p. 133).

The dependence of the individual on the group is vast, pervasive, and primary: a huge amount falls in the category of shared or collective. He freely concedes that there is a mystery about how it gets there, a mystery that we have no solution to but call by such names as ‘socialization’. But we are so dependent on the social, meaning the collective, that even such research traditions as studies of child development, or the project of cognitive modeling of a five year old cannot tell us how it works.

We also get a few lines on how the body serves as one of the conditions of communication (pp. 133-6) and a discussion of immersion, meaning ‘participating in the talk and practices of society’ (p. 133). And we get an image of the location of knowledge:

There is nothing even remotely strange about saying that the seat of knowledge is the collectivity of brains because the collectivity of brains is just as much a ‘thing’ as my individual brain is a ‘thing’; my brain is a collection of neurons separated by (if we were to examine them on an atomic scale) huge distances so the distance between brains in the collectivity is no obstacle to their comprising one ‘thing’ between them. The collectivity of brains is just a large-scale version of my brain—it is just a bigger collection of interconnected neurons—and, as with synapses, the weights of the connections change
whenever social and technological life is rearranged. So, if we don’t like the metaphysics of the collectivity we can still accept the idea that knowledge is located in the collection of brains while remaining philosophically conservative. We can even say that the tacit knowledge that is associated with speaking language is located, not primarily in the individual brain but in the collection of brains. Interestingly, the very concept of the neural net shows us how to think about it this way without invoking anything mysterious like ‘collective consciousness’. The metaphysically bashful can just think of all brains linked by speech as making up one big neural net. (p. 132).

This, then is the solution to the problem of irreducible tacit knowledge: it is irreducible because it is contained in collective processes, the collective brain, on which we are parasitically dependent, so dependent that the content and extent of this dependence is beyond description. The mechanism of this dependence is socialization, which we don’t understand. It has something to do with personal contact or immersion, so it operates in ways unlike the ways that ordinary explicit communication with strings operates. The result of its operation is fluency, and fluency consists in sharing collective tacit knowledge.

4. Durkheim for the metaphysically bashful

The basic structure of the argument as a whole is this: Much of what passes for tacit knowledge, namely the individual part, can be done by or imagined to be done by machines; the rest cannot be done by machines, or at least machines can’t be fluent at it, so this remainder must be
collective. The reasoning is transparently faulty. This is why:

a) The fact that machines can simulate something that humans do tells us nothing about how humans do it. This is a point Collins himself makes. So the entire discussion of string transformations is irrelevant: he gives us no reason to believe that what people do when they communicate has anything to do with strings, string transformations, or anything like it. This is just an analogy.

b) There is no reason to think that ‘fluency’ depends on anything collective, other than circular definitions of socialness—a Collins invention—in terms of fluency and fluency in terms of socialness, and both in terms of collectiveness. The driving example points in the other direction: people vary in their ease and competency in driving, but at the same time they are not uniform in their driving habits; they develop driving skills in different settings, have different driving skills, respond to others in different ways, based on their experiences and on other mechanisms—perhaps mirror neurons—and drive differently, while being aware of the driving of others and responding to it. Drivers in Italy may have, as an aggregate, different habits than drivers in Britain, or New York, but there is nothing collective that corresponds to these differences. There are plenty of mechanisms to account for the fact that people learn to respond to others without invoking anything collective.

So both the starting point of the argument and its conclusion are groundless. So is most of what comes between. Collins concedes, repeatedly, that there is a mystery about how the collective stuff gets into individuals. The only reason to accept an explanation which depends on
some casual process that is a mystery would be that the fact to be explained is so indisputable that it cannot be dismissed, given an alternative description that avoids the mystery, or something similar. Instead, we get explanations that rely on terms that have more or less the same problem: practice, culture (especially as in cultural distance), society, and so forth. Crucial ideas, such as cultural affordances, are dropped into the discussion with no explanation of how they are supposed to be produced by culture. Do these get transmitted by personal contact? Is culture generally different from collective tacit knowledge, and transmitted differently? Collins grants himself a free pass on these questions, but they are the Achilles heel of all collective mental concepts and anti-individualist social theories.

Collins says that he is providing an account for the ontologically bashful, meaning, presumably, that it doesn’t carry the burdens of Durkheim’s notion of the collective consciousness. But Durkheim doesn’t just make this idea up out of ontological chutzpah. He arrives at this problematic notion because he is trying to answer the question of how something can be collective and mental and influence the individual (Turner 1986). Collins’ parallel discussions of the location of knowledge are mystifying and inconsistent on their face. In his previous discussion of individual tacit knowledge, neural nets were rejected as repositories of knowledge and dismissed as irrelevant because describing them did not result in usable knowledge. They ‘can do no more than the equivalent of Pavlov’s dog’, and ‘are simply string transformers whose operations merge into the ordinary world of cause and effect’ (p. 76). But in the later passages quoted above, where Collins embraces the extended mind thesis, knowledge is located in neural nets that connect multiple brains. Elsewhere we are told that knowledge is largely located in language (p. 135)—something he also takes to be collective, but presumably in
a different sense than something to be found in a neural net connecting multiple brains.

Perhaps the best case he makes for his grand claims about the specialness of humans involves meanings. The argument involves getting meanings out of jumbled words. People, he says, are very good at problems involving jumbled words and are good at unjumbling them correctly. Why? Because people can supply context that is learned through their being embedded in society (p. 116). Machines cannot. And this is the result of the way machines learn. They can mimic human movements, as with the bicycle. But although machines can ride bikes, they cannot negotiate traffic successfully. Why? Because dealing with mistakes involves judgments of intentions, and these are social judgments (p. 120).

This encapsulates the argument of the book: machines can’t do something, because the something is social. ‘Social’ means it comes from being embedded in society. Being embedded in society means it comes from a collective source. Therefore the fact that machines can’t do something—like handle driving in traffic or decoding meanings of scrambled words—means that there is a huge collective set of tacit things. This conclusion is treated as so obviously true that we can accept the fact that we have no idea how any of this works: how being embedded in society produces these results, or transmits this collective stuff, or even what the totality of this collective stuff is. We can even dismiss child development studies, despite the fact that they tell us a lot about how this kind of ‘social’ knowledge is acquired by children, because we are so sure that collective solutions are the right ones. But this reasoning depends throughout on equivocations, circularities, and dubious definitions. What is the cash value of ‘being embedded in society’? That we learn it in relation to the sayings and doings of other people? If so, it implies nothing about anything collective.
Much of what Collins claims about what humans can do, and what is collective, seem, in any case, to be simply false, or ‘true’ only if we apply very odd standards, and then apply them inconsistently. Collins thinks the ability to read badly scrambled words is a remarkable human achievement. But machine procedures involving word games in general show that machines are in fact very good, and as good as humans, at tasks like getting the gist of a paragraph even when the words are mixed up (Bruza et al., 2009; Griffiths et al., 2007; Landauer et al., 1997). In the case of bicycle balancing, the standards allowed us to use a thought experiment about bicycling on a small asteroid to conclude that this wasn’t really tacit knowledge, except in a contingent sense. With machines and their supposed limitations, however, the standards seem to be different. Is it really true that machines couldn’t learn to respond to ‘social’ cues in traffic if they were given the right inputs? Or learn what inputs to respond to, or ‘afford’, without relying on a ‘culture’? Even on a large planet where cars moved very slowly and social cues were limited to grimaces and screams? Why not? Why is this fantasy any different from the ones that Collins employs?

One of the great virtues of Collins’ earlier writings on expert systems are his critiques, which are repeated in this book, of arguments that use the existence of a functional computer substitute for a human process as evidence that the human process is therefore something like the computer process. His point in these contexts is that functional substitutability implies nothing about similarity in underlying casual structure. This kind of argument can be readily applied to the supposed cases of tacit collective knowledge that transfixed Collins—indeed, his stress on the ineliminable role of interpretation seems to point in that direction. In order to understand other people, to co-operate with them in a division of labor, including the kind of distributed
knowledge division that is characteristic of large scale scientific experiments, requires functional interaction. The big question is whether there is any reason to think that there has to be anything in the way of tacit knowledge that is shared or collective, that is, whether functional substitutability is enough—that each of us can get by with sufficient tacit knowledge of our own to function in a group, and generate utterances that others can interpret, without ‘sharing’ anything tacit. Nothing Collins says implies that it is not enough. But Collins, characteristically, avoids this question in favor of his own inventions.

References

