

Ineffable, Tacit, Explicable and Explicit: Qualifying Knowledge in the Age of “Intelligent” Machines

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Harry Collins’ Tacit and Explicit Knowledge is engaged to clarify and expand the notions of tacit and explicit. A broader continuum for tacit knowledge and its indirectly or only partially explicable components is provided by complementing Collins’ exposition of tacit knowledge with a discussion of formal systems and Polanyi’s exposition of tacit knowing. Support is provided for Collins’ distinction between strings and language, mechanical modeling as a form of explication, and the notion that machines lack tacit knowledge and language. While Collins emphasizes the inexplicability of cultural fluency as tacit knowledge, Polanyi emphasizes the functional dimension of skillful performances. The conceptual strengths and weaknesses of Collins’ and Polanyi’s approaches are examined. Collins’ emphasis on string transformation and his division of tacit knowing into Relational (RTK), Somatic (STK), and Collective (CTK) are helpful tools, but should not flatten Polanyi’s multiple levels of knowing and being into a dualism that may encourage reductionism.

Since Michael Polanyi coined the term, “tacit knowledge” has been understood and applied in many different ways. As a trained sociologist and seasoned explorer of the tacit dimension, Harry Collins, in *Tacit and Explicit Knowledge*, takes on the difficult task of more clearly defining and better understanding tacit knowledge.¹ He attempts to correct uses of the term that might misdirect us and attempts to show us the heart of the truly tacit by emphasizing its presence in cultural knowledge and linguistic fluency.

In crafting his distinctions, Collins takes inspiration from both Polanyi and the later Wittgenstein. Collins’ approach reduces the mystery involved in bodily performances and the mastering of a craft, but he also increases the mystery involved in how innovative social adaptations take place. In contrast, Polanyi’s approach would keep some of the mystery all the way through and Wittgenstein would like to see all the mystery dissolve.

In providing his new map of the conceptual territory, Collins shows us a different perspective that highlights some important features of the landscape, but other important features become shadowed. Collins crafts a sharper distinction between the domain of mechanical causation and meaningful interpretation than Polanyi does, but Collins may make too sharp a distinction between the sort of tacit knowledge that a boxer or a master craftsman might use and the linguistic fluency that allows us to adjust to new social situations.

Collins’ approach to tacit knowledge is especially helpful in adding clarity to the discussion about how we should think about computers and artificial intelligence; he shows what humans can do and what computers and most animals cannot. He also provides magnificent examples, such as driving in China, that show how more than one sort of tacit knowledge is typically involved in any tacit-dependent activity. But Collins’ analysis of the tacit is also incomplete in what might be a dangerous way for some of his own conclusions.

Collins makes advances on Polanyi in understanding certain aspects of tacit knowledge, rekindling Aristotle’s own approach to practical wisdom in the process, but he should perhaps be more Polanyian in developing

a general conception of the tacit. A study of tacit *knowledge* is incomplete without proper attention to the process of tacit *knowing* that Polanyi emphasizes. Attention to those processes more clearly opens an area for the tacit that lies in between the ineffable and the explicit, and shows how knowledge must be personal in Polanyi's sense of the term.

Problems with “Tacit Knowledge”

There are several different sorts of activities that involve what we, as intelligent members of our language community, would normally be inclined to call “tacit.” Riding a bike, for instance, is something many of us can do, but we cannot say *how*. Mastering an art or craft is also said to involve tacit knowledge; to learn what the expert knows and develop a similar level of skill one typically needs more than an instruction manual. Even the ability to understand a joke requires tacit knowledge, so unless we have a similar set of background experiences we might not get the punch line or might not be in a position to judge if the joke is funny. Having the right sort of experience or background knowledge to perform these skills or to have the right understanding is the sort of thing we'd identify as having tacit knowledge.

Collins quotes Polanyi, who famously said “we can know more than we can tell” (TEK, 4; TD, 4), and who also made the stronger claim that “all knowledge is *either tacit or rooted in tacit knowledge*” (TEK, 6; KB, 195). The experience of tacit knowledge is now so commonly recognized that Collins believes there are people who would deny the existence of explicit knowledge. Collins says, and Polanyi would agree, that the explicit does not get entirely swallowed up by the tacit. “Polanyi's very formulation shows that a distinction between tacit and explicit has to be preserved, though it doesn't show us exactly where the distinction lies or how it works” (TEK, 6). Collins does an excellent job helping us to see where an important distinction lies, but Polanyi is still better about showing how it works.

There would appear to be problems with any formulation of tacit knowledge, be it Collins' or Polanyi's. First of all, to a critical reader, the term itself can appear to be an oxymoron. Isn't all *knowledge* necessarily explicit? If something is not explicit but somehow veiled in silence, can it properly be called “tacit *knowledge*”? There is a second problem as well. If tacit knowledge, somehow operative in the background, can be made explicit, can it then properly be called “*tacit knowledge*”? Isn't the term merely a placeholder for something unknown that, we hope, will someday become known? Putting both these problems together, “tacit knowledge” seems to present a dilemma: either it is tacit or it is knowledge, but not both.

Though neither Collins nor Polanyi formulate the problem in quite this manner, we can see that Collins' way of moving past this dilemma involves separating knowledge from our contingent experience of coming to know and restricting what we should properly call tacit. Polanyi gets past this dilemma by emphasizing intentional awareness and the functional nature of what he called “tacit inference.”² I'll explain what I mean by that later, since I think it shows an important part of the landscape that Collins colors over, but first I will look more closely at how Collins approaches these problems and the insights he draws.

Collins begins mainly by addressing the second horn of the dilemma. He agrees with Polanyi that “tacit knowledge” is not merely a way station on the road to explicit knowledge.³ For Collins, the *proper* use of the word tacit, directly *opposes* the explicit—it is that which *cannot* in a strong sense become explicit.⁴ Background knowledge and bodily skills that can become explicit are “explicable” and therefore are not properly called “tacit” for Collins. So riding a bike or mastering a craft are not, in the end, proper examples of tacit knowledge, although the experience we have when we ride a bike, drive a car, or learn how to make a good pair of shoes can fool us into thinking those tasks are inexplicable.

In crafting this hard line, Collins is by no means indiscriminant. When he says the tacit “cannot” be “explicable,” he will provide eight different grades of “cannot” ranging from inconvenient to impossible (TEK, 89) and he will give four different ways that something unknown or unrecognized might become “explicated” (TEK, 81).⁵ Yet in spite of the variation in scales, Collins still wants to keep this hard line between (1) the tacit as inexplicable, and (2) the explicit, which includes the explicated and, ultimately, the explicable.

The danger here is that Collins may lose any firm footholds on the ground in between the inexplicable and the explicit. Without a robust conception of this in-between ground, the tacit runs the risk of collapsing into the ineffable, i.e., that which cannot, in the strongest sense, be put into words or modeled. This is ultimately the mistake I see Wittgenstein making: he pushes the tacit into the ineffable, and then the ineffable drops out as a supplementary nothing or nonsense. When Wittgenstein asks, “what does imponderable evidence *accomplish?*”,⁶ we can read “imponderable evidence” as “tacit knowledge,” and his implicit answer is “nothing,” it is an idle wheel.⁷

Pushing the “properly” tacit too much together with the ineffable, can lead to the results I called “dangerous.” If the ineffable comes to look like nonsense, the safer bet is that all knowledge is explicable, though some sorts are more complex to untangle than others. Inexplicable social meaning drops out as ineffable nonsense and we are left with a reduction to causal and mechanical transformations in the physical world.⁸ Thus by aligning the tacit with the ineffable, the very things that define us as human for Collins are at risk. In contrast, I see a need to distinguish between (1) **the ineffable**, i.e., the tacit which cannot be made explicit; (2) **the tacit**, which can be made (a) indirectly explicit or (b) inexhaustibly explicit; (3) **the explicable**, i.e., the tacit that can be made completely explicit; and (4) **the explicit**.⁹ Polanyi’s exposition of tacit knowing also provides this same spectrum and secures the ground between ineffable and explicit knowledge, as I’ll show later.

Although it is in tension with the strong distinction carved out in part one, Collins will allow for the use of the word “tacit” to modify that which is explicable, if it has not yet become explicit. Ordinary language use seems to force his hand here. But, in another way, Collins welcomes this use, since this concession also allows him to build his “three phase model.” He separates Relational Tacit Knowledge (RTK), e.g., learning the skill of a master craftsman; Somatic Tacit Knowledge (STK), e.g., riding a bike; and Collective Tacit Knowledge (CTK), e.g., knowing when it is appropriate to laugh at a joke. Collins rank-orders these phases on a scale ranging from easiest to explicate (RTK), to more difficult (STK) or impossible to explicate (CTK). But ultimately, for Collins, both STK and RTK are, in principle, explicable, so without a use for “tacit” as that which may *become* explicit, there would be no relational or somatic tacit knowledge *per se*. Only collective tacit knowledge would remain. Collins thus widens his use of “tacit” to include the explicable, but he will occasionally remind us that the proper understanding of tacit comes from its contrast with the paradigmatically explicit.

Making It Explicit

And what is the paradigmatically explicit? According to Collins, the notion that most knowledge is explicit or explicable only came into prominence in the mid-20th century. Collins says that “the enthusiasm for science and computing typical of the 1940s and 50s made the explication of everything seem easy” (TEK, 7). Before then, Collins notes, it was taken for granted that most people could not explain very well how they knew things. Collins here is indirectly describing the movement in thought that flowered in analytic philosophy and gave it its dominance in the philosophy of science. This, indeed, is the right place to look for paradigmatic

efforts at making knowledge fully explicit, but fleshing out the history here will show where Collins may be a bit unsteady in recognizing the implications of the hard-line distinction he forges.

In Collins' insightful conceptual analysis of explicit knowledge, the key distinction is between *strings* and *language*. Strings are "bits of stuff inscribed with patterns" (TEK, 9) such as the dark spots on this page we call letters. They are metaphysically continuous with physical causes and effects (TEK, 10, 50). Language, in contrast, takes place with the interpretation of those marks.

Strings can undergo physical transformations. If you read this sentence aloud, someone in the room might hear the vibrations in the air, i.e., the string is transformed from dark marks on a white background to a pattern of vibrations. But in order to understand that spoken sentence the person also must have language, i.e., the ability to interpret the string into meanings.

Strings of signs must be interpreted in order to be language. As Collins notes, "This book in itself contains strings, not language; therefore it does not in itself contain knowledge" (TEK, 45). The conditions that help allow strings to communicate meanings can include the length of the string (e.g., more words might be required for a fuller explanation), the affordances of the medium (e.g., intonations are possible with spoken words that are not easily achieved in a printed medium), and certain transformations in the receiver (one might transform one's own "string" or affordances, e.g., brain structure, to become capable of interpreting different configurations or sorts of strings).¹⁰ String transformations allow for the explicit communication of knowledge where it is not at first present.

Collins' four senses of explication thus center around what we can do with strings. Knowledge can be made explicit 1) by "elaboration," i.e., providing a longer string; 2) by "transformation," e.g., translating a secret code (one string) into English words (another string); 3) by "mechanization," e.g., modeling human activities (one string) with a machine (another string); and 4) by "explanation," i.e., transforming "mechanical causes and effects" into "strings called scientific explanations" (TEK, 81).

Explicit knowledge according to Collins should be defined as "knowledge that can, to some extent, be transferred by the use of strings in the right circumstances" (TEK, 80) and the right circumstances are outlined by his five enabling conditions (TEK, 31).¹¹ Given the way knowledge is communicated by strings, explicable knowledge becomes, for Collins, unknown or unrecognized knowledge in one string or sequence of causal chains that can be transformed into a string that we can interpret. (And here, of course, there is an assumption that there is a continuity in how the original string *should be* interpreted and how the resulting transformed and possibly expanded string is interpreted.) Tacit knowledge, according to Collins, is thus knowledge that cannot be transformed into an interpretable string.

In short, according to Collins, if we can represent knowledge, or a *knowing how*, in a string, e.g., if we can write it down, then it is explicit, and if we cannot then it is tacit. And there are "three main kinds of reason for not being able to write things down" corresponding to RTK, STK and CTK (TEK, 80). But we must continue to keep in mind that without an interpreter, such transformations bear no meanings and convey no knowledge; they are strictly in the domain of material cause and effect.

When Collins looks to computer programming for the distinction between string transformations and translations, or interpretations, he is on the mark (TEK, 16). We can see this clearly, and perhaps further sharpen the notion of a string and explicit knowledge, by looking at the history of analytic philosophy. The distinction Collins charts between strings and language can be found in mathematical logic as the difference between "syntax," i.e., the concatenation of signs and the rules for transforming them, and "semantics," i.e., how those signs may be interpreted. Work in mathematical logic eventually led to the Turing machine and

to the invention of the computer, so we see Collins is on tack. Early on in the history of logic, with Gottlob Frege in the 1890s, syntax was seen as setting up basic conditions for meaningfulness, but by the 1930s syntax became completely divorced from meaning and takes on the character of Collins' strings. Syntax no longer described the role of concepts and objects (e.g., subjects, verbs, adjectives, etc.) but simply the material signs and their transformations.¹²

The mathematical-logical tradition, reaching back to Frege and passing through Wittgenstein, emphasized the idea that knowledge becomes fully explicit when we can translate ordinary sentences, or sentences from various scientific fields, into a formal language or system. Transformed into that language, those sentences were now seen as unambiguously distinct propositions that are capable of being judged true or false, but they were also knowledge, rather than merely meaningful statements, if proofs leading to them could be derived from basic, true assumptions. In the analytic tradition, presenting a full analysis, or proof, in a formal system is the paradigm case of making knowledge fully explicit.

In this model of explanation, there are two notions of making *explicit* at work that should be distinguished, and a third fundamental underlying notion that is necessarily involved in making either of those two phases explicit *knowledge*.

First, there is making explicit via (1) a transformation or translation into a formal system, i.e., the transformation of one string into another string that can be further transformed or manipulated mechanically by explicit rules. This first transformation qualifies as a translation because the new string/series of signs affords an *interpretation*. And, second, there is making explicit via (2) the production of a proof inside that formal system, i.e., the manipulation of the signs by explicit rules, which can show the reduction of postulates to basic axioms, or more generally, show the analysis of knowledge to simpler parts and rules that fully account for them. It is important to note that strings embed this reduction of meaningful wholes to basic parts, so the reduction or analysis that constitutes the proof takes place on the same metaphysical plane as strings and things. The translation is fixed in the system, so the primary task of making knowledge explicit in sense two here is no longer to provide a translation into a formal language but to provide a reduction or proof within that language.

So tacit knowledge, in contrast to explicit knowledge, might be (in sense 1) identified with an inability to transform knowledge into an interpretable string (this comes to be Collins' explicit definition of tacit knowledge) or it might be (in sense 2) identified with an inability to analyze some piece of knowledge, or whole, to its parts (and this is the sense Collins comes to use in distinguishing between RTK and STK on one side and CTK on the other). Both (1) transformation into a formal system of signs,¹³ e.g., putting something into words and (2) manipulations of signs into a proof, e.g., providing an explanation, are involved in making knowledge *fully* explicit, but only (3) the contrast between strings and language, is required for a basic sense of tacit, and neither (1) the explicit transformation into a string nor (2) the explicit proof, can be *knowledge* without (3) an interpretation. Thus in the analytic tradition there is a strong distinction between proof, as a syntactic notion (characterized by strings and their transformations), and truth, as a semantic notion (characterized by interpretations). And the fundamental notion of the tacit one should garner from the strings *v.* language distinction derives from sense three (3), *how background information is used by a person to give the signs-strings their explicit or focal meaning*. As Polanyi says,

. . . nothing that is said, written, or printed, can ever mean anything in itself: for it is only a *person* who utters something—or who listens to it or reads it—who can mean something *by* it. All these semantic functions are the tacit operations of a person (SM, 22).

Collins worries, with good reason, that the distinction between strings and language is too often confounded (TEK, 27). And when it is, we mistake animal behavior and artificial intelligence for meaningful

behavior and human knowledge. Failure to recognize the distinction can make it seem as though causal processes are inherently meaning-laden and detracts from the importance of the distinction between the strings as material and language as social. Polanyi will also stress disjunctive space between the physical or physiological and the social, but his approach, as we'll see, allows for senses in which some mechanistic processes do possess meaning.¹⁴

But because we so automatically interpret strings, it is also very easy to let the meaning-making and meaning-identifying process submerge into the tacit background and then to see the tacit *v.* explicit solely in terms of (1) whether or not a transformation of one type of string into another is possible or (2) whether or not the presentation of a formal proof or a reduction to constituent parts—at the level of signs, strings and things—is possible. And this tendency seems to be what pushes human productive skills closer to STK for Collins, when by virtue of a stronger share in artifactual and linguistic meanings, they may be closer to CTK.

Because of this emphasis on string transformation, Collins will sometimes inadvertently make a necessary condition for explicit knowledge, i.e., transformation into a string, into a sufficient condition.¹⁵ So whereas the force of the string-transformation *v.* meaning-interpretation distinction should inspire Collins to agree with Polanyi's contention that "wholly explicit knowledge is unthinkable" (KB, 144), Collins dissents, suggesting instead that fully explicit knowledge without a tacit underpinning is a matter of course. He will identify "explicit knowledge without tacit knowledge" with "string transformation" (TEK, 70). Collins thus feels the need to "fix" Polanyi's formulation by saying "strings must be interpreted before they are meaningful" (TEK, 70). True enough, but strings also must be interpreted before they are *knowledge*; there is no truth without semantics. String transformation alone does not make for explicit knowledge, just as the strings of signs in his book would not become knowledge if they were merely read aloud.

Focusing on (3) strings *v.* language shows us that there is always an element of the tacit in any meaning construction or meaning interpretation; the explicit signs are not knowledge without it. But the impetus of the second sense (fully analyzable in a proof *v.* irreducible) is what pushes Collins to sometimes suggest that the properly tacit is present only in creative adaptations marked by fluency rather than in *any* meaning event. The true home of the tacit is in how explicit meanings are produced and identified. This sense underpins the mundane use of language in at least RTK and CTK; innovating with language in CTK is a further sort of activity that also relies on tacit knowing.

Collins' emphasis on making something explicit by transforming one string into another is a result of his insight that an ability to model an animal process of "knowing how" (one string) into a mechanical model (another string) is a form of explication (i.e., his third sense, "mechanization"). But insofar as Collins is right not to call unknown or unrecognized mechanical processes "tacit knowledge" but instead "the way the world unfolds" (TEK, 80), so it is wrong to call any purely mechanical processes, i.e., mere string transformations, "explicit knowledge." That, too, is just the way the world unfolds, unless meanings are involved.

How mechanical modeling can make somatic functions explicit, and what makes us distinctively human, are the topics of the next section.

What Computers (and Most Animals) Can't Do *or* Why Data Can't Dance

Collins draws important lessons from this sharp divide between strings and things on one side, and interpretations and meanings on the other. He makes it clear why computers and more complex AI machines

cannot understand in terms of meanings the way that humans do. The answer is basically that humans can operate with tacit knowledge (CTK) and most animals (if not all, for Collins) and all machines (made to date) cannot operate with tacit knowledge (TEK, 116). As Collins says, “The computer does not really ‘read’ anything except in a metaphorical sense; what it does is string transformation” (TEK, 54). Likewise, unconscious performances, i.e., the “knowing how” common to humans and most animals, are seen by Collins as mechanical and, in contrast to the properly tacit, explicable.

The complaint Collins lodges against those who see calculators and computers as performing acts of intelligence is apt and important. I see it as a re-incarnation and expansion of the complaint that Frege lodged against the mathematical formalists in the 19th century. Frege claimed that without the mathematical meanings of the signs, i.e., the semantics, symbol manipulation is just a hollow game of transformation, and it may run off in directions that do not increase our understanding of the meaningful content we are interested in. In effect, Frege argued that syntax should be tethered to semantics. To use Collins’ language, Frege saw that these formalists were unwittingly engaged in “social prosthesis” when they saw the mechanical game of transforming signs as mathematics proper. Without the interpretation, there is no intelligent understanding and no knowledge; without the interpreter—and this must be a human interpreter or a very similar sort of animal for Collins—there are only physical transformations.

Although we can train bodies to accomplish tasks without conscious thought, Somatic Tacit Knowledge can in principle be mechanically modeled. Just as we can build a machine that can simulate riding a bike, we might even build a machine that could play soccer (TEK, 112). Performing such skills is explicable for Collins, not only because we can describe how they are done abstractly in scientific terms (i.e., his sense four explication)¹⁶ but also because we can build a machine that can perform the same tasks (i.e., his sense three explication).

This keen insight regarding mechanical modeling is substantiated by the development of the notion of a formal system in mathematical logic. We saw that presenting an analysis, or proof, in a formal system is the paradigm case of making knowledge fully explicit. Proofs in a system are seen as a series of transformations from one set of sentences (premises) to another (conclusion).¹⁷ Also, around the 1930s with Gödel’s famous proofs on completeness, proof came to be more sharply identified with mere *mechanical* transformation. Syntactically, signs came to be seen as mere marks, and transformation rules tell us how to manipulate these marks mechanically. This sense of proof lends force to Collins’ notion that if one can model a so-called tacit process, e.g., an animal hunting or a person riding a bike, mechanically, then one has made that process fully explicit. By modeling the process mechanically, one is (1) transforming the string into a formal language of sorts and (2) obtaining the right conclusion, e.g., the machine catches the prey, balances the bike, or plays soccer.

We have the sense, Collins says, that once a process has been mimicked by a machine it has been explicated and made explicit (TEK, 51). This sense comes not only from the idea that “mechanical causes and effects are made of the same metaphysical substance as string transformations” as Collins states (TEK, 51). Mechanical modeling in a machine is an explication both because strings and machines are of the same basic stuff *and* because we have explicated the process in a way analogical (or stronger) to the way we might explicate a causal process in a scientific theory. This is explication because we interpret that mechanical model as a formal language in which the process has been successfully embedded, and the working mechanical model acts as a syntactic proof.

Our ability to use tacit knowledge is often seen as something we share in common with animals, Polanyi, too, stresses the tacit powers of animals and infants (PK, 132). But for Collins this is a common misunderstanding; tacit knowledge is what makes us distinctively human. For Collins, human and animal

bodies are basically machines and their tacit performances can in principle become fully explicit. He sees it as misleading to focus on somatic processes as good examples of tacit knowledge because then we confound mere strings together with human meanings. Cutting the other way, this can also make human meanings come to look like mere strings. Focus on the somatic as properly tacit leads us to push humans and animals together too closely and also leads us to push humans and computers together too closely. Protecting what is distinctly human is the impetus of what Collins calls his “main project... to demote the body and promote society in the understanding of the nature of knowledge” (TEK, 8).

The difference between an animal body, a human body, and a machine for Collins lies mainly in the affordances of the medium. The body and brain are flesh and cells; a computer can be metal and silicone, but although the affordances of one are different than another, both are, or can be translated into, an interpretable string. Just as an analogue string can in principle be transformed into a digital string (TEK, 49), so the functions of the brain can be reduced to a digital computer. So while Hubert Dreyfus emphasizes the affordances of the human body as that which makes us distinct from the computers and AI machines we can build (TEK, 107, 167), Collins sees this as a mere logistic or practical problem rather than a principled difference (TEK, 50). The strings that human affordances can accommodate are in principle capable of being accommodated in a different medium, though logistically another medium might require strings so very long that it would be impractical to construct such a machine.

Collins puts the notion that a computer, or a body, is merely a string transformer and not a string interpreter at the forefront of any discussion about the differences between mind and machine, or between humans and animals. Even “neural nets,” machines that are programmed to learn, do so in a fashion that is mechanical in the same way that operant conditioning is mechanical (TEK, 74-75).

In contrast, understanding meanings requires tacit knowledge because there is no sufficient mechanical procedure for successfully interpreting meanings. A lookup table mechanically tells how one string should be transformed into another by, for example, equating a series of written marks with a series of vibrations in the air, thus transforming a written word/string into a spoken word/string. But as Collins says, “though strings are sometimes used to represent meanings, their relationship to meanings cannot be stabilized with lookup tables in the way that the relationship between one string and another can be stabilized” (TEK, 44).

The distinction between mechanical transformation and meaningful interpretation also leads Collins to a criterion, adopted from John Searle’s Chinese Room scenario (TEK, 129-130), for when an artificial intelligence, or an animal, might legitimately be said to employ tacit knowledge: when it can fluently respond to the right *language* input with the right *language* output.¹⁸ When it employs a skill that goes beyond what using a look up table or following some mechanical algorithm can provide, it will be more than a machine.¹⁹ To extend Collins’ example from *Star Trek: The Next Generation*, a machine will have real intelligence and use tacit knowledge when Data can dance; until there is fluency and innovation, we must assume that what we witness is string transformation and mechanical manipulation rather than interpretation.

The distinction between strings and their interpretations distinguishes between machines and most animals on one side, and humans as language speakers on the other. We have the ability to understand signs as meaningful and to artfully interpret a string beyond what a machine or a body can do via something like a look up table, operant conditioning, or other rules of transformation. The construction and interpretation of meaning is thus the true mark of the tacit for Collins as well as Polanyi. Interpretation takes place in language, and language is indeed social not only in genesis but in significance. Collins is thus on tack with an emphasis on the string *v.* language distinction and with an emphasis on collective tacit knowledge as special and distinct from somatic and relational knowledge, but some aspects of the tacit get obscured in his approach.

Relational and Somatic v. Collective Tacit Knowledge

Collins is sensitive to many of Wittgenstein's insights including the role of social practices in language, the idea that there can be no private language, and the realization that a word may be used in multiple ways via different language games. He also sees how Wittgenstein's discussion about rule following can exemplify the sort of knowing that cannot be made explicit (TEK, 46 fn #15; Lowney, 2009, 43). Formulating a general conception of the tacit, however, is a very un-Wittgensteinian task. Wittgenstein might say there is a family resemblance between the many uses of "tacit knowledge" and leave it at that. To attempt a rigorous definition and come to a general understanding will inevitably invite some relatives to the party and disown others.

Wittgenstein's main technique in the *Philosophical Investigations* is to juxtapose different examples of how we use, or might use, a word. In providing his examples, however, Wittgenstein has a very different purpose in mind than either Polanyi or Collins. As we start to think about different uses of words in different language games, we see different similarities and dissimilarities, and we start to break free from the conceptions that bind us. This is a therapy for Wittgenstein because attention to different language games ideally undermines mystery. Philosophical puzzlement tends to arise from the false expectations that come from pushing together language-games that do not belong together.²⁰

Grouping different uses for a term will provide certain insights, but it will also cloud over others. Polanyi and Collins select and organize their examples of tacit knowing differently. Both groupings lead to insights we might not normally see, but both views can also obscure.

Collins' choice of examples draws body-knowing together with purely mechanical processes; it also draws the knowing of a master craftsman into that same circle of skillful processes. Although this reduction flies in the face of conventional understanding and trends in philosophy, evident in the work of Polanyi, Merleau-Ponty and Heidegger (via Hubert Dreyfus in Collins' book), it is perfectly consistent with an emphasis on the distinction between strings and meanings and the way Collins want to use the phrase "tacit knowledge."

Collins groups activities such as an animal hunting with activities such as riding a bicycle and using a probe, and he runs these together with the way a computer works. Just as we come to see an animal hunting as something that is not driven by conscious intentional activity but as behavior programmed by evolution and operant conditioning, we come to see unconscious human activities in a similar way.

The inclusion of a sieve in this group of examples is particularly striking (TEK, 76-78). An inanimate object with no moving parts is shown to perform the function of sorting stones in a skillful way. There is indeed complexity involved in making the right size stones fall through a sieve, and surely there is a similarity in that identifiable physical processes are involved in all these examples, but thinking about a sieve also directs us away from any intentionality involved in hunting, or biking or finding your way through a dark cave with a stick.

The examples Collins groups also push together somatic productive activities with other skillful human productive activities. Relational Tacit Knowledge surrounds the transmission of knowledge in specialized fields and in crafts. The masterfully skillful productions, which many see as harboring great funds of tacit knowledge, are explicable and capable of transmission via an instruction manual or mechanical modeling according to Collins.

While Dreyfus shows how driving a car skillfully in traffic goes through five identifiable stages, similar to those that the apprentice goes through in order to be a master craftsman (TEK, 102), Collins emphasizes that all these skillful doings are still based on identifiable strings, and the knowledge is difficult to convey for

merely contingent reasons. In fact, they are the easy cases. Whereas we may have to build a complex machine or make a scientific advance in knowledge to understand a somatic process, in most cases all we need to do to explicate RTK is ask the right question. Then a “longer string” is made by adding that verbal or written explanation to what we already know (i.e., Collins’ first sense of explication, “elaboration”), and we might successfully mimic the process with an additional step. Again, for Collins, the affordances of the medium (human or machine) can make the production more or less difficult to achieve, but productive processes are eminently explicable for Collins.

Surely, more often than not, further explication can help communicate knowledge. Asking the master can even get the master to start thinking about exactly what it is she does, and then that activity might be put into words. But we normally conceive of a master craftsman or a virtuoso as someone who can also creatively adapt in the production of her work; we see “the resourcefulness with which the master handles every new and unprecedented situation” (KB, 129). We also see the master as producing a unique artistic product each time. By pushing craft skills together with a skill in copy typing, Collins undermines not only intentionality but any creativity that our bodies and particular practices contribute to somatic and craft skills.

Generally a craftsman is looking for a consistent quality of product, producing the same again. But the juxtaposition of sieve, copy-typist and master craftsman also seems unfair. In copy typing—stealthily brought in under the guise of expanding rather than contracting the different types of skills represented (TEK, 102-103)—the very goal is a transformation, i.e., a transcription from one medium to another, and its inclusion pushes the other crafts towards the goal of mimeomorphis.

To the extent that we are performing a bodily skill or producing a product, for Collins, “We are just like complicated cats, dogs, trees, and sieves” (TEK, 104). While performing these “mimeomorhic” actions “we are just complicated sets of mechanisms ... It is all just a matter of one kind of mechanism versus another” (TEK, 104-105).

“Polimorphic” actions, those that display linguistic fluency, go beyond what machines can do (TEK, 55). But we so typically interpret the end product of a string or causal chain into our social meanings that we do not see clearly the line between polimorphic and mimeomorphic activities. We engage in what Collins calls “social prosthesis” or “repair”; we weave things and strings into our own network of meanings.

When Collins puts the expert driver or master craftsman in the same category as a sieve and copy typist, it both instructs and obscures. As the sieve example benefits our understanding by emphasizing the mechanical nature and explicability of somatic processes, the example of a copy typist benefits by emphasizing how craft knowledge can, after the fact, be flattened into the mechanical transformation of strings; it shows us that any one of the master craftsman’s end products can be more fully explained and mechanically replicated. But as the sieve de-emphasizes intentionality, which is important for tacit knowing, the copy-typist de-emphasizes how the practices of the craft might creatively contribute to the production and determination of a *good* end product.

Collins wants to separate the final product from craftsman’s judgment. Polanyi, in contrast, would affirm that the uses of the body and a discipline’s special practices have a role in these judgments. Choices and repairs are made at every level in the development of the skill. Because, in the end, we might flatten out the production into a series of instructions, doesn’t take away from the *use* of tacit knowledge in making creative judgments all along the way, nor does it take away from the special use of that knowledge by a master in adapting to new situations. Polanyi says that “any rules laid down for carrying out empirical inferences must be highly ambiguous” (PK, 370). Being involved in the practices is what reduces the ambiguity and brings one towards understanding what is true and good in a craft or field of knowledge.²¹

For Collins, the craftsman's knowledge can become explicit in an instruction manual (his second sense of explication, "transformation"), and—in the same way the somatic skill of riding a bike can be modeled in a machine—we can build a factory to do the craftsman's job. Any creativity or artistry in determining the final product is drained from its connection with hands-on practice and is relegated to social sources. In the factory, "social prosthesis" and "repair" weave the mechanical back into the social fabric.

If we begin with the examples of a sieve or a copy typist, we might be inclined to agree with Collins' division between STK and RTK on one side and CTK on the other. But, the division would be less clear if Collins chose different examples. For instance, STK looks different if one takes examples from fighting arts, where, yes, the goal is to defeat your opponent, but one's body might respond to a strike not encountered before in a creative, adaptive and *right* manner. Different emphases would also arise if Collins chose examples of tacit knowing from other arts, like playing improvisational jazz. Is it the body or culture that is determining the *right* next chord? Is the mechanical practicing of different songs integral to the production of the new improvised piece, or is social fluency the critical factor in deciding what is right about the new music? Can the two be cleanly divided? Perhaps when the water settles the fluid pond can be distinguished from the stringing shore, but muddy water is primordial and precedes the conceptual tools used to analyze it.²²

The examples Collins groups together ultimately will also push somatic skills and productive crafts together with artistic activities. Collins pays little attention to the arts, but why take what are, from his perspective, the hard cases first? In Collins' approach, the artistic activities would involve *more* social tacit decisions than the crafts, but the body is not seen as possessing its own intentionality and creativity, as it would from Polanyi's approach.

In the next section I will briefly look at Polanyi's structure of tacit knowing. A different association and ordering of the phases of tacit knowledge will emerge from his examples, and we will come to see how the basis for linguistic meaning is set in somatic processes.

Tacit Knowing and Meaning in Nature

Unconscious body skills and craft skills are explicable. What gets in the way and produces the mystery, according to Collins, is the subjective psychological feeling we have when we humans perform tasks unconsciously or have a talent; we come to believe we have a special sort of knowledge that cannot be explicated. Collins is thus at pains to separate the psychological affects surrounding knowing from knowledge proper. This is the right thing to do when it comes to contingent subjective feelings and arbitrary assessments, but it can obscure the intentional structure of knowing and the personal nature of judgments. Our judgments about facts, while rooted in culture and language, are also rooted in the body, practices and personal experience.

In developing STK and RTK, Collins closely aligns productive activities that do not appear to involve goal-oriented intentionality and creativity with those that do in order to emphasize the difference between the mechanical and the social. Polanyi will group his examples in a way that brings out the intentional and creative aspects of the body, and brings out the meaning intrinsic to machines.

Polanyi groups activities such as using a probe, seeing in three dimensions, riding a bike, and playing the piano (i.e., activities Collins can see as mere string transformations), together with mastering an art, understanding meaning in language, and making a scientific discovery (i.e., activities that would go beyond mere string transformation). From all these activities Polanyi distills the essence of tacit knowing.

The general structure of tacit knowing (or tacit inference) is the movement from *subsidiary* clues to a *focal* joint comprehension. In tacit knowing, “clues” are gathered together into a joint comprehension, and, for Polanyi, that joint comprehension is a gestalt, which is not fully analyzable into the simple sum of its parts and rules.²³ Even in purely physiological processes there is this intentional “from-to” structure, in which tacit subsidiary knowledge functions to provide explicit focal knowledge.

“Tacit knowledge” can describe both this *from-to* structure itself or the knowledge is that is *attended from* when we *attend to* some explicit piece of knowledge or thing. Tacit knowledge thus comes to be identified not with “inexplicable knowledge” or an inexplicable *know how*, but it is seen in the light of the function of tacit knowing. Contrary to the impression Collin’s gives, Polanyi affirms that much tacit knowledge can be made explicit (e.g., KB, 124-125, 194), but even after we explicate a tacit process by analyzing and making explicit important clues involved, this knowledge can still sink into subsidiary awareness and *function* tacitly. Knowledge functioning tacitly is thus still properly called “tacit knowledge” from Polanyi’s perspective.

For Polanyi there is much in the process of tacit knowing that we can make explicit, but there is always a tacit residue (KB, 124), which protects the ground between the ineffable and the explicit. First of all, we cannot look directly *at* the *from-to* process itself, since when we objectify it as a “to” or “at” we miss what we were after.²⁴ Secondly, and similarly, there is a sense in which we can’t make any of the tacit clues or knowledge explicit, since they will be functioning differently when we *attend to* them in isolation than they do when we *attend from* them. Here we *indirectly* make the tacit explicit, since to focus on a tacit clue or part misrepresents it and flattens its functional role.²⁵ Thirdly, while we can indeed analyze and specify many clues indirectly, and thus bring tacit knowledge into the explicit, we will inevitably miss many clues.

Here on this third point, what I called the *inexhaustibility* of tacit knowledge, Collins and Polanyi overlap in agreement. Some of this tacit knowledge, as Collins points out in discussing RTK, is not specifiable for contingent reasons, i.e., we cannot explicate all the clues at once due to the contingency of our missing something or needing to discover more. He says, “while there is no principled reason that any particular piece of unrecognized knowledge could become recognized, one cannot imagine *every* piece becoming recognized. There will always be a frontier with things just beyond it waiting to be discovered” (TEK, 98). For Polanyi, we will miss clues for these contingent reasons, but we will also miss clues for principled reasons. So whereas the *inexhaustibility* of the tacit here can collapse into the explicable for Collins, for Polanyi it retains the sort of *inexhaustibility* that Collins might connect with CTK. Even in craft knowing, we miss clues because we do not know what to look for. Clues, in isolation from their joint meaning, “get lost among the irrelevant details of their surroundings” (KB, 135). It’s not just human error or the *inexhaustibility* of scientific discovery that foils our current endeavors to specify the tacit, we miss clues because we are inextricably dealing with the analysis of meanings. That is, we miss the tacit because of the sort of *inexhaustibility* and indeterminacy we find in Wittgenstein’s rule-following discussion, rather than merely the sort of *inexhaustibility* we find in the progress of scientific discovery. While Collins sees this indeterminacy only in CTK, for Polanyi it runs deeper.

The general structure of tacit knowing is *from* subsidiary clues *to* a focal joint comprehension. Joint comprehensions are also called “meanings” for Polanyi (KB, 128). This makes sense in examples that involve acts of understanding, where we see *from* discrete parts *to* meaningful wholes, but it does seem forced in cases of somatic tacit knowing, and Polanyi applies the term even to acts of visual perception (KB, 161). When we see a three-dimensional object, we *see from* tacit bodily clues and *see to* a focal image, and that image is a *meaning* for Polanyi.

This is indeed pushing together several sorts of different language games. Perhaps a class of joint comprehensions that are pre-linguistic “proto-meanings” would help reduce the forcing together we feel here.

But while pushing together these examples distorts, it also reveals. It brings out analogical processes at work both in perception and understanding, and it brings out how meaning is involved in our focal identification of even the most basic *things*. The sharp line between our knowing processes and the ontological structure of the world, meanings and things, disintegrates at a certain point of analysis for Polanyi. Whereas from a traditional analytic perspective the psychological/epistemological is thought to always be cleanly divisible from the real/ontological, and the genetic sources of knowledge are thought to be cleanly divisible from the justificatory standards of knowledge, Polanyi, like the pragmatists, is, at a certain level, breaking these distinctions and providing a new approach. Polanyi shows how strings and meanings weave together so that our meanings can catch real things.

Polanyi's functional approach shows more easily how there can be hierarchies of from-to knowing processes woven together. We can attend from physical strings, but we also attend from meanings. In interpreting language we attend from both. For example, the letters are attended *from* in attending *to* the meaning of a word, the words are attended *from* in attending *to* the meaning of a sentence. The sentences can be attended *from* in attending *to* the meaning of a story.²⁶

Similarly, there is a hierarchy of ontological levels in the world that we might discover. There are emergent realities that cannot be completely analyzed into their parts. To use Collins' example, "gratin dauphinois" is more than just the aggregate of "a pound of potatoes, some milk, cream, and flavorings" (TEK, 36). According to Polanyi these emergent realities include living organisms, artifacts and machines. While most physical and natural wholes are fully explicable and reducible to physical and chemical parts and their laws, these are not.

To identify something as a machine is already, according to Polanyi, to see more than a physical string in the same order as the physical and chemical properties that govern its parts. Something is ontologically as well as epistemologically a machine by being what Polanyi calls a "dual control" system (KB, 154). Higher organizational principles are involved, and these ultimately challenge any hard boundary between the physical and physiological world, on one side, and human language/meanings, on the other.

According to Polanyi, organisms, machines and other human artifacts require higher-level explanations that defy a physicalist's attempt to explain all in terms of the general laws of physics. While this may seem inconsistent with the notion of explanation I brought to light in discussing formal systems and proofs above (i.e., knowledge is fully explicit if analyzable in terms of premises and rules), it is inconsistent only if one insists that the basic premises must be the basic elements of physics and their properties and if one assumes that reductive explanations cannot be complemented by holistic explanations.²⁷

Collins is right to show a sharp difference between mechanical processes and human social meanings. The danger that Collins may be encouraging, however, is that focusing on our ability to translate all such hierarchies into interpretable strings can *mask the differences in ontic levels and the correlative explanatory levels*, which leads us to mistakenly think that one flat explanatory level can fully account for all material phenomena. Collins is right, we can provide explanations for somatic and machine-like processes, but these do not fully reduce to the most primitive "atoms" and are not without tacit residue.

This flattening of hierarchical levels is evident in how Collins orders his three phases. Collins orders varying examples by how difficult a case of knowing might be for us to explicate: from RTK (in craft and special field knowing) to STK (in body knowing) and on to CTK (in social knowing). The jump to CTK is indeed a difference in type for Collins, but in his approach it is one without precedent. Also his ordering and focus on strings make it seem that the inexplicability of CTK is a matter of complexity. Collins offers his division as a "hostage to fortune—a falsifiable claim" (TEK, 144), but is betting that CTK will not reduce to the same

order he allots to RTK and STK. Collins presumably envisions either no explication for CTK or a new type of explication that we will master once we have solved the “socialization problem” (TEK, 171). Starting as he does, however, with no conception of emergent meaning or being, the reduction of CTK into a string on the same uniform ontic level as all other phenomena comes to seem an inevitable result of the progress of science.

Polanyi would see a more natural ordering of “phases” as one that follows the developing levels of emergent activities: from STK (as biological, behavioral, and individual achievement) to CTK (as social, linguistic and collective) and then perhaps to RTK (as special knowledge in particular fields, crafts or arts).²⁸ This alternate ordering would be appropriate if CTK provides a general sort of fluency that comes from speaking the language, and if RTK reflects a specific expertise. But Collins talks of CTK as being more than just the ability to interpret and understand a language. Perhaps “LTK” should be added, i.e., Linguistic Tacit Knowledge. Then the hierarchical order that follows the phases of emergence might move from STK at the bottom, to LTK next, to RTK and then CTK at the top. This would be a more natural hierarchy if CTK is reserved to describe instances of practical wisdom in league with Aristotle’s more special sense of that term.

Practical Wisdom and CTK

The way Collins orders his phases (RTK, STK, CTK) is misleading, but it is also revealing. Removing RTK from proximity with CTK seems wrong because we tend to see productive crafts as good examples of the use of *practical wisdom*. We see a master as one capable of employing practical wisdom, and if this is what is relayed in the relation between apprentice and master, then it seems the very essence of the fluency that Collins points us toward in CTK. But there is ambiguity in use of “practical wisdom” and Collins’ exposition can help to clarify it.

Practical wisdom is the sort of from-the-ground-up wisdom that cannot be reduced to rules. According to Aristotle, practical wisdom, i.e., *phronesis*, is the ability to figure out which general rule to apply to a particular situation. It is also the power that allows us to formulate a new general rule from particular instances.²⁹ While we tend to see the master craftsman’s skill and judgment as a good example of the use of *phronesis*, Collins’ way of dividing the mechanical from linguistic fluency reminds us of the proper and more specialized use of *phronesis*. For Aristotle, *phronesis* is *the* master virtue and here, as Collins’ division emphasizes, there is a strong distinction between the productive arts and the human virtues. To have expert courage or expert moderation means that one also has *phronesis*, and vice versa. But a master craftsman, or fighter or fisher does not necessarily have this form of expertise; the virtuous person does, and the virtuous person is not an expert at all crafts.

So, in Collins’ terminology, the “contributory expertise” of a craftsman can be discriminated from “interactional expertise” of the social and rational animal. Collins associates this interactional expertise with CTK. But is CTK equivalent to *phronesis*?

Interactional expertise is something we gain by “mastering the language,” and, according to Collins, you cannot master the language without understanding the people. “Mastering the language *means* understanding the people” (TEK, 135). The mastery of the language and culture, what Polanyi would call “indwelling” in the culture, is indeed necessary for *phronesis*.³⁰ One important thing Collins reveals by dividing interactional expertise and CTK from contributory expertise and RTK is that one can master a language, and understand a people, and have insight into their practices without engaging in *all* their practices.

Collins emphasizes that no particular type of human body and no particular practices seem required to gain interactional expertise.³¹ Collins says, “It seems that the body is necessary to the acquisition of even collective tacit knowledge” but he opts for the “minimal embodiment thesis” rather than a full-fledged “social embodiment thesis,” which would put too much weight on how concepts and language directly relate to the body and practices. He notes how the blind can speak well about color and says “not every individual needs the typical body in order to draw on collective tacit knowledge. This is because collective tacit knowledge is, to a large extent, located in the language of the collectivity rather than in its practices” (TEK, 135).

For Collins, “interactional expertise” can give one the ability to understand some important aspects of a craft, but it doesn’t require being immersed in the practices of that craft (TEK, 136-137). Similarly, for Aristotle, the virtuous person, the *phronimos*, need not understand each craft from the ground up to inform her judgments. Although there is an internal logic and development within a craft, the goals of each craft were subordinated to social goals. The craft of saddle-making, is subordinated to the goals of horsemanship, which is subordinated to the role a horse has in cavalry, and so on. All productive processes are ultimately subordinated to the goals of politics, for Aristotle. The good statesman must have some knowledge of the subsidiary crafts, but not all can be ground-up knowledge. What the good statesman should have, according to Aristotle, is *phronesis*. This social and moral expertise seems similar to Collins’ interactional expertise, but is also both more comprehensive and more specialized. Collins says we gain the capacity for interactional expertise by mastering the language. While this is undoubtedly true, there seems a stronger sense of “mastering” the language or ethos at work in the creativity and knowledge Collins allies with CTK, and there is an even stronger sense of linguistic mastery in *phronesis* than in interactional expertise or CTK.

While anyone who speaks a language well might have interactional expertise, and contributory expertise is more specific to a craft, *phronesis* is both more general and more specific; to have it one must master the entire language *and* have the knowledge of the right thing to do, at the right time, for the right reasons in any particular situation. *Phronesis* is not a virtue we all possess by virtue of having language or culture, but a master of the culture could have it and then would be capable of knowing the right thing to do in any social situation.

For Aristotle, the judgment of the virtuous person, using *phronesis*, is not reducible to a rule or algorithm; the judgment of the virtuous person is itself the rule. While the same might be said of the master craftsman with regard to his expertise, Collins’ distinction between RTK and CTK leads us to a more general (than crafts or arts) and yet more specialized (than language at large) conception of practical wisdom, and shows how it may be teased apart from the sort of skill and knowledge that the craftsman possesses.

In developing the notion of CTK, Collins may be seeing what Polanyi would call an “emergent, joint comprehension” in the collective; as such it can be dwelled in, and be seen *from* or *through*, when we look back *to* particular clues to understand their meaning.³² CTK presents a new level of meaning and perhaps even a new ontic level, which necessarily involves some of the bodies and practices of individuals but is not sufficiently explained by them.³³

When Collins says, “At least one major component of the self (and it may be the entirety of the self), is society” (TEK, 116), he is recognizing how the emergent culture or language can express itself in the individual. Polanyi allows for a “higher level of individuality” such as the human mind, to exercise marginal control over the “lower centres of individuality, such as the muscles and organs that comprise it (KB, 135-136). To extend Polanyi’s notion of the human mind as an active center, Collins’ collective might be a higher center that can, to some extent, organize its parts—us—in terms of its own emergent goals. But though Collins

seems to lean in this direction, he is also happy talking about an individual's ability to *draw on* collective tacit knowledge (TEK, 137), thus putting our minds as active centers in the driver's seat.

Polanyi agrees on the importance of the social in constructing the individual. He says, "to ask how I would think if I were brought up outside any particular society, is as meaningless as to ask how I would think if I were born in no particular body, relying on no particular sensory and nervous organs"(PK, 323).

But Polanyi sees both the emergence of the social, and the emergence of the individual, to be rooted in a process of tacit inference and emergence that can be traced even to the mechanical way in which our bodies produce a three dimensional picture from the two dimensional images given by each eye.

Collins wants to look at what knowledge is apart from what it is for human knowers (TEK, 6), and he believes that Polanyi made the mistake of making knowledge too personal. But although knowledge may be held collectively in language, it is developed and affirmed personally and there is no knowledge without an interpreter. Knowledge, though objective, is intrinsically dependent on meanings and personal judgments. Polanyi thus sees the "personal" as a category that transcends the subjective even as it subsumes the social.

I think we may distinguish between the personal in us, which actively enters into our commitments, and our subjective states, in which we merely endure our feelings. This distinction establishes the conception of the *personal*, which is neither subjective nor objective. In so far as the personal submits to requirements acknowledged by itself as independent of itself, it is not subjective; but in so far as it is an action guided by individual passions, it is not objective either. It transcends the disjunction between subjective and objective (PK, 300).

Our judgments can be objectively true and reflect reality, according to Polanyi and still remain *personal* in this sense. Collins tends to follow critics like Alan Musgrave and Karl Popper, in that Collins too condemns Polanyi as being too subjective about knowledge (TEK, 149).³⁴ The ambiguity of terms like "personal," "judgment" and "intuition," which can retain psychological associations, can lead to this interpretation of Polanyi. But while Polanyi believed our passions do play a role in the pursuit, discovery and recognition of knowledge, he also distinguished between validation and verification (PK, 202).

Collins also worries that Polanyi makes tacit knowing seem too mysterious. While Polanyi's use of terms such as "ineffable" (in contrast to my own use) to describe "the domain of skillful knowing" (PK, 90 on TEK, 76) can indeed make tacit knowing seem mysterious and completely inaccessible, Polanyi also indicates how the tacit dimension may be indirectly or inexhaustibly approached and explicated.

Polanyi was bucking against trends in the analytic tradition that promoted what he saw as a false and destructive ideal of objectivity in knowledge, but he was still committed to the objectivity of reality, even to the point of being a Platonist.³⁵

Conclusion: A Richer Picture

As Collins says, "the simplest things are the hardest to see if one starts from the wrong position" (TEK, xi). Neither Collins nor Polanyi begin their search for tacit knowledge from the wrong position, but both starting points have their advantages and their dangers. In the end, I believe that both views can complement and enrich each other. Polanyi's approach tends to collapse different sorts of tacit inferences, especially those in bodily achievements with those in interpretive understanding, but it reminds us that there is an intentionality, a creativity, and a gestalt at each level and in each family type of tacit knowing.

Collins' approach tends to flatten out hierarchical ontic and explanatory structures. This makes it appear that there is just one important division, but it reminds us that there is something remarkable about human social meanings and that they are different in kind from the "meanings" or proto-meaning found at lower levels of emergence. While Polanyi emphasizes the structures that we have in common with an animal's skillful practices and a machines' dual control, Collins sees the danger in making us look too much like other animals and machines. For instance, his main complaint against the Dreyfus model is that "it entirely ignores the most fundamental subdivision of human expertise; that between expertise of the sensory motor kind and expertise of the social kind" (TEK, 124).

In order to stress that important division, Collins emphasizes our ability to embed somatic, productive and mechanical processes in strings. Our distinction as the creators and interpreters of meaning proper is thus given its due, but this approach also flattens out other tacit processes and emergent structures makes it seem that we are distinct from everything else in the universe in an inexplicable way. This flattening can thus lead to Descartes' matter-spirit dualism or Collins' "Social Cartesianism" (TEK, 125-126). In contrast, Polanyi's dualities of (1) attending from v. attending to and (2) dual control systems show us that we are different from everything else in the universe because we are a new emergent creature with new capacities and meanings.³⁶ By looking at Polanyi's conceptions of tacit knowing and emergence we see continuity and development in the evolution of life and consciousness—but that does not make the differences between hierarchical levels less disjunctive and less real.

Collins' work shows us both the promise of mechanization and the limits of artificial intelligence as he helps us see what distinguishes us as human beings. We humans have language and use collective tacit knowledge, but there is no such tacit (or explicit) *knowledge* involved in what computers and complex artificial intelligence machines do, in what animals do by instinct, and in what humans learn to do automatically. These are proto-meanings at best, in the same way that the altruistic behavior of chimpanzees is proto-moral rather than moral in the fully human sense.

Examples that show the body adapting creatively and that show how practices inform the assessment of the product may break Collins' isolation of the tacit to language, more generally, or to social fluency, more particularly—or, if we choose, we can keep Collins' distinctions and then talk about the artistic and creative aspects of these activities as being linguistic or social, i.e., CTK mixed in with STK and RTK.

Whereas at first the distinction between STK, RTK and CTK grated on my sensibilities—because tacit knowledge was not seen as genuine or proper in STK and RTK—once tacit knowledge is seen more fully in the light of tacit knowing and not strictly in terms of inexplicability, the terms grow useful and lend order (and perhaps better order with the addition of LTK). Attention to tacit knowing adds legitimacy to explicable background knowledge as tacit knowledge, and it shows that there is something like the tacit inference of CTK in both STK and RTK though each represents a distinct level of analysis.

Collins successfully separates out what Polanyi has pushed together in an instructive way. And so long as we do not lose Polanyi's insights regarding tacit knowing, or flatten hierarchies that display real differences in type, Collins' analysis complements and expands on Polanyi's work.

Endnotes

¹TEK will refer to Collins' book, *Tacit and Explicit Knowledge* (Chicago: University of Chicago Press, 2010).

²Another way to get by this problem is to expand knowledge to include "know how", i.e., the ability to perform a task, but Collins will ultimately identify *know how* with string transformation rather than with properly tacit activity.

³Collins believes that Polanyi also wanted to preserve tacit knowledge as that which *cannot* be made explicit. As explained below, I don't think that's entirely true in the end, but to the extent that it is true I believe Polanyi came to see "tacit" as most properly modifying the word "knowing."

⁴Here "cannot" is in the sense of logistic practice, technological impossibility, or higher (TEK, 89, 138).

⁵I also set out four different sorts of knowledge which might be explicable to certain extents, ranging from fully to not at all [Lowney, *The Tacit and the Ineffable: Frege and Wittgenstein on the Distinction between Language as a Calculus and Language as the Universal Medium* (Boston: Boston University, 2005), 412]. My focus, however, was on the expressibility of logical and linguistic notions in the early work of Wittgenstein. While all my sorts focus on semantics, Collins' four sorts of explication deal mainly with strings (TEK, 81), i.e., the "syntax" in its mathematical-logical sense that supports the semantics.

⁶Ludwig Wittgenstein, *Philosophical Investigations*, trans. G.E.M. Anscombe (Oxford: Blackwell, 1953), henceforth "PI", page 228.

⁷On how Wittgenstein collapses the tacit into the ineffable, and how that is a natural progression of ideas in the universalist tradition within analytic philosophy, beginning with Frege and culminating in W.V.O. Quine, see my *The Tacit and the Ineffable* (2005). Wittgenstein achieves this collapse mainly by undermining Frege's insights into the tacit realm. For a summary of five ways in which Frege foreshadows distinctions that Polanyi makes explicit, see my "The Tacit in Frege" (*Polanyiana*, 17:1-2, 2008, 19-37). For differences between Wittgenstein and Polanyi's conceptions of the tacit dimension and the costs each view faces, see my "Seeing, Saying and Being the Gestalt" (*Appraisal*, 7:1, 2008, 21-38).

⁸The way Wittgenstein undermines metaphysics and the tacit dimension can lead directly into the flat-footed physicalism of Quine [See Burton Dreben's, "Quine and Wittgenstein: The Odd Couple" in Robert L. Arrington and Hans-Johann Glock, eds., *Wittgenstein and Quine* (London and New York: Routledge, 1996, 39-61)]. Collins might believe he can welcome this, since he believes materialists could welcome his understanding of knowledge as being held collectively (TEK, 131, 132), but he cannot without giving up on the existence of his firm divide between string transformations and language.

⁹In *The Tacit and the Ineffable* (2005), I determined there were various types and levels of expressibility by studying what was sayable and unsayable for "universalist" thinkers, such as Wittgenstein and Frege, in contrast to "calculus" thinkers, such as Ernst Schröder and David Hilbert, all in the analytic tradition. My understanding of Polanyi was tacitly in the background here. I see the differences between the universalists and calculists as a debate about how much of the tacit conditions for knowledge can be made explicit. It is interesting to note that Martin Kusch, who co-wrote *The Shape of Actions: What Humans and Machines Can Do* (Cambridge, MA: MIT Press, 1998) with Collins, also worked extensively on the universalist v. calculus distinction, applying it to the continental tradition in philosophy. See his *Language as the Universal Medium vs. Language as a Calculus: A Study of Husserl, Heidegger and Gadamer* (Dordrecht: Kluwer Academic, 1989). For more on this distinction as Jaakko Hintikka originally developed it, see Hintikka, *Lingua Universalis vs. Calculus Ratiocinator, Selected Papers*, vol. 2 (Dordrecht: Kluwer Academic, 1997).

¹⁰See Collins' "five conditions of communication" on page 31 and his "four meanings of 'explicable'" on page 81.

¹¹Collins seems to be hedging his bets a bit too much with “to some extent.” The work of that phrase seems to be in measuring human and computational limitations, and this seems mostly covered already by “in the right circumstances” though those circumstances may never present themselves. To tighten the definition in line with Collins’ intent, we might then say: “Explicit knowledge is knowledge that can, in principle, be transferred by the use of strings in the right circumstances.”

¹²Perhaps Collins is wise to keep away from the terms “syntax” and “semantics” since, in contrast to their special logical use, both these expressions are colloquially identified as meaningful parts of a language. For Collins, only the syntax in this special use as a string, together with the semantic would qualify as language. See Lowney (2005) page 342 for more on the semantics of “syntax.”

¹³Here “formal system” is less ambiguous than “formal language.” In a “formal language,” often “language” merely means a system of signs and mechanical rules for their concatenation, whereas a “language” is necessarily an interpreted string in Collins’ use of the term.

¹⁴See Lowney, “Re-Thinking the Machine Metaphor since Descartes: On the Irreducibility of Bodies, Minds, and Meanings” (*Bulletin of Science, Technology and Society*, 31:3, 2011, 179–192).

¹⁵The slippage here might be rooted in too strong a connection between “knowledge” and “information.” Collins must agree that there is no knowledge in the string itself, but he also wants to say there can be information in the string itself (TEK, 16, 25, 87). There are indeed differences and patterns in a string that can make a causal difference, also information can be transferred without conscious awareness and then it can act tacitly, but we must be careful not to equate information outside of tacit knowing with knowledge.

¹⁶Collins will acknowledge that scientific explanation, usually cannot be directly used to help the prospective bike rider or soccer player develop their skills (TEK, 61).

¹⁷Proofs were initially modeled on axiomatization in geometry. This aspect of explication goes back to Euclid but had its renaissance in Descartes’ analytic geometry, which provided a reductionist paradigm for scientific knowledge that heavily influenced the 19th and 20th centuries’ conceptions of explanation [see Lowney, “Re-Thinking the Machine” (2011)]. In math-logic, proofs can now be seen in a less grandiose manner, as transformations executed by mechanical procedures.

¹⁸Here language is comprised of signs/strings and meanings together. The idea that one response is right rather than just what happens seems important here for Collins to maintain the distinctiveness of CTK as more than just a random selection.

¹⁹Of course, determining *when* it has actually done this will always be a matter of what Polanyi calls personal knowledge or judgment, since there can be no mechanical procedure to tell us.

²⁰For instance, because one can legitimately state in some contexts “You cannot feel my pain,” one starts to think that pain is a uniquely private sensation. Sentences such as “I have a pain in my arm” gets confused with the way we use sentences such as “My arm is *mine* and not yours.”

²¹See Lowney, “From Science to Morality: A Polanyian Perspective on the Letter and Spirit of the Law” (*Tradition and Discovery*, 36:1 [2009-2010], 42-54) for more on how the practices in a craft or a science lead one to transcend the explicit rules and, similarly, how social practices such as obedience to the laws can lead one to transcend the explicit laws in a creative and moral understanding of how to go on.

²²I expand here on Collins’ excellent analogy.

²³A criticism of this notion of joint comprehension might be developed from Collins’ arguments that analogue strings can be transformed into digital strings. The joint comprehension would thus not be an irreducible gestalt but would be fully analyzable in terms of parts and rules. Such a criticism, if legitimate, would also affect Collins’ understanding of the inexplicability of CTK.

²⁴This aspect of the knowing process is something Polanyi does not emphasize, but early thinkers in the universalist tradition stress that we cannot know our *knowing processes* in the same way that we know *objects*.

²⁵The tacit can also be made indirectly explicit in the way balancing a bike can be made explicit through a scientific formula. Polanyi does not see any contradiction in discussing balancing a bike as an example of the tacit and, several pages later, providing a scientific formula that provides the parameters for how that is done (KB 141-142, 144). Collins, in contrast, sees irony if not contradiction here (TEK, 100-101), because he sees scientific explanation (i.e., his fourth sense of explication) as a full and direct way to make explicit subsidiary tacit knowledge.

²⁶On page 115, Collins provides a nice example of how this movement to focal meaning is automatic, and how good we are at moving from clues to meanings. When the letters in a word are scrambled with first and last remaining in their proper position, we can still understand the words holistically (with the clues provided from both the letters and the projected joint meaning of a sentence).

²⁷See Lowney, “Re-Thinking the Machine” (2011) for more on how good explanations need not be fully reductive. Also see William Wimsatt, “Reductionism and Its Heuristic: Making Methodological Reductionism Honest” (*Synthese*, 151, 2006, 445-475).

²⁸This order seems appropriate if “Relational Tacit Knowledge” is fixed to designate what is acquired in the progression from apprentice to master craftsman. Since there are many aspects of the transfer of knowledge that are contingent, just as Collins describes, we may want to use another name for the tacit knowledge transmitted in crafts or arts and keep RTK to designate only contingently unknown or unrecognized knowledge in body-knowing, skillful production knowing, and more advanced social forms of knowing.

²⁹This is properly a form of abduction rather than induction—there is no set algorithm for good abduction, whereas induction, like operant conditioning, generalizes a series. For Aristotle’s use of *phronesis* see primarily book six of his *Nicomachean Ethics*.

³⁰Indwelling allows us to see new meanings (KB, 160).

³¹Here Collins is diverging from a standard interpretation of Wittgenstein’s famous aphorism “If a lion could talk, we couldn’t understand him” (PI, 223; TEK, 135). It is not just because we do not have the body and share the practices of the lion that we cannot understand it, as Dreyfus or Wittgenstein might contend. Having the affordances of a particular sort of body would indeed make some practices easier than others. What is wrong about the analogy for Collins is that a lion could never master our language and have access to CTK; a lion could not creatively adapt to new social circumstances in the way that we can.

³²See Lowney, “The Tacit in Frege” (2008), especially page 28, on how concepts collect together particulars and then operate as tacit lenses for the understanding.

³³See Lowney, “From Morality to Spirituality: Society, Religion and Transformation” (*Tradition and Discovery*, 37:1 [2010-2011], 19-38) for a view of this sort of emergence in cultures and religions.

³⁴For these criticisms of Polanyi and defenses against them, see Andy Sanders, *Michael Polanyi’s Post-Critical Epistemology* (Amsterdam: Rodopi, 1988) and Lowney, “The Tacit in Frege” (2008).

³⁵It might be interesting to note here, in the context of strings and interpretations, that Gödel was also Platonist.

³⁶See Lowney “Re-Thinking the Machine” (2011) on how Cartesian dualism is undermined from a Polyanian perspective.