Philosophia Scientiæ

Travaux d'histoire et de philosophie des sciences

17-3 | 2013

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

At the Margins of Tacit Knowledge

Michael Lynch

Electronic version

URL: <http://journals.openedition.org/philosophiascientiae/886>

DOI: 10.4000/philosophiascientiae.886

ISSN: 1775-4283

Publisher

Éditions Kimé

Printed version

Date of publication: 1 October 2013

Number of pages: 55-73

ISBN: 978-2-84174-641-5

ISSN: 1281-2463

Electronic reference

Michael Lynch, « At the Margins of Tacit Knowledge », *Philosophia Scientiæ* [Online], 17-3 | 2013, Online since 01 October 2016, connection on 02 November 2020. URL : <http://journals.openedition.org/philosophiascientiae/886> ; DOI : <https://doi.org/10.4000/philosophiascientiae.886>

Tous droits réservés

At the Margins of Tacit Knowledge

Michael Lynch

Department of Science & Technology Studies,
Cornell University (USA)

Résumé : Michael Polanyi et H. M. Collins opposent la connaissance tacite à la connaissance explicite. Pour Collins, les secrets et les autres formes de « connaissance tacite relationnelle » sont tacites, mais seulement du fait de circonstances et de relations humaines spécifiques. Collins traite cette connaissance relationnelle comme moins intéressante d'un point de vue théorique que la connaissance collective qui est par essence difficile, voire peut-être impossible à exprimer par des formulations explicites. Dans cet article, je me focalise sur la connaissance tacite relationnelle, malgré sa marginalité dans la typologie de Collins, parce qu'elle permet d'attirer l'attention sur les ambiguïtés conceptuelles de la relation entre connaissance tacite et connaissance explicite. Qui plus est, ces ambiguïtés entrent en jeu, au titre de ressources stratégiques, dans l'histoire des conflits relatifs au travail et dans les efforts visant à sécuriser et préserver l'autonomie professionnelle. Au lieu de traiter la connaissance tacite comme une substance possédée par des individus et des groupes, je suggère qu'une alternative empirique et sociologique serait d'enquêter sur les utilisations pragmatiques et polémiques de la distinction tacite/explicite dans des circonstances particulières d'action et de conflit.

Abstract: Michael Polanyi and H. M. Collins contrast tacit knowledge with explicit knowledge. For Collins, secrets and other forms of “relational tacit knowledge” are tacit, but only in relation to specific circumstances and relationships. Collins treats such relational knowledge as less interesting theoretically than collective knowledge that is essentially difficult and perhaps impossible to convey through explicit formulations. In this paper I focus on relational tacit knowledge, despite its marginality in Collins's typology, because it draws attention to conceptual ambiguities in the relationship between tacit and explicit knowledge. More importantly, such ambiguities come into play as strategic resources in historical labor conflicts and in efforts to secure and preserve professional autonomy. Instead of treating tacit knowledge as a substantive possession of individuals and groups, I suggest that an empirical

sociological alternative is to investigate pragmatic and polemical uses of the tacit/explicit distinction in particular circumstances of action and conflict.

Ever since Michael Polanyi wrote on the subject more than a half-century ago [Polanyi 1958], *tacit knowledge* has proved to be one of the most resilient themes in history, philosophy, and social studies of science. It also has an enduring place in psychology and cognitive science, and in business and management studies, among other fields. Although the most original and provocative discussions of tacit knowledge were published decades ago, interest in the topic has remained strong and has intensified recently with the publication of a new edition of Polanyi's *The Tacit Dimension* [Polanyi 2009], Harry Collins's *Tacit and Explicit Knowledge* [Collins 2010], hereafter [TEK], and Mary Jo Nye's biography of Polanyi [Nye 2011].

No doubt, there are many reasons for the persistent interest in tacit knowledge. The most obvious reason is that the theme resonates with the discourse and interests of practitioners as well as scholars (and of scholars as academic practitioners). Scientists and medical practitioners consistently testify to the indispensable role in their practices of tacit knowledge, craft knowledge, and variations on those themes, such as “golden hands”, *Fingerspitzen*, bedside manner, and other informal skills gained through on-the-job training rather than formal education. Scholars in many fields have embraced the theme to challenge philosophical and historical conceptions of science that use textbook accounts of method and autobiographical reflections by prominent scientists as their sole means of access to scientific practice.

Attempts to come to terms with tacit knowledge often contrast it with what it is not: it is not explicit; it cannot be reduced to rules or formulae; it cannot be conveyed through written or verbal instructions; and computer programs cannot replicate it. Nevertheless, as Stephen Turner points out, assertions about tacit knowledge often resort to analogies with explicit rules, perceptions, and interpretations [Turner 2012]. Polanyi uses such an analogy when he defines a “skilful performance” as “the observance of a set of rules which are not known as such to the person following them” [Polanyi 1958, 50]. This analogy with rules appears to be shot through with paradox: the “rules” are not written or recited; they are not even “known” by the person who skillfully follows them. To transpose Donald Rumsfeld's category of “known unknowns” [Rumsfeld 2005], these tacit rules are “unknown knowns”. There are, of course, ways around the paradox. Polanyi's way was to drive a logical wedge between knowing how to do something and being able to verbalize how one does it. Depending on one's disciplinary preference, Polanyi's tacit rules can be assigned to the rules of a language, to cognitive organizations and neurological processes, or to a social ideology or “discourse” that is unrecognized or misrecognized by the docile subjects who act in accord with it [Turner 1994].

Because tacit knowledge is defined as being beyond the reach of rules and explicit formulations, many analysts (including some laboratory practitioners)

associate tacit knowledge with non-rational domains of luck, magic, superstition, and mysticism [Cambrosio & Keating 1988], [Jordan & Lynch 1992], [Lynch 1985]. However, while he insists that the tacit dimension is essentially “inexpressible”, Polanyi places that dimension squarely in the real world. Indeed, it is so down-to-earth that rules and generalizations are too abstract to be able to grasp it. He also endows tacit knowledge with political significance, as it is a reality that shatters the dreams of ideologues and the plans of social engineers. And yet, this reality eludes all efforts to come to terms with it. At best, it can be mentioned, indicated, or alluded to. For Polanyi tacit knowledge is not and cannot ever be made explicit. It is not enough to say that tacit knowledge is unstated but capable of being put into words, should the need arise and the relevant information and communication technology be available—it simply cannot be conveyed in words to someone who does not already “dwell” in the tacit dimension.

Unlike Polanyi, Collins portrays the relationship between tacit and explicit knowledge as more of a continuum from readily explicable to ever-more-recondite forms of knowledge [TEK]. His typology is not simply an array of categories of explicit and tacit knowledge, as the types of tacit knowledge are ordered in terms of “strength” along a core-periphery axis. Collins diagrams “the terrain of tacit knowledge” as a concentric series of circles and squares [TEK, 158], with the innermost circle representing the “strongest” type of tacit knowledge, and the outermost (most marginal, weakest) type representing knowledge that is tacit only as “a matter of how particular people relate to each other” [TEK, 86]. Such “relational tacit knowledge” lies just within the margin between tacit and explicit knowledge in Collins’s typology. This “relational” category includes various types of knowledge that *can* be formalized and transmitted by someone who possesses the relevant communication technology and technical capacity. For example, secrets—knowledge withheld from some persons or groups but not from others—can be made explicit, in principle, though there may be very powerful reasons not to reveal them in some relational circumstances. Collins makes clear that he finds “relational tacit knowledge” less interesting, philosophically, than his other two major categories: “somatic tacit knowledge” (physically embodied skill) and “collective tacit knowledge” (knowledge embedded in forms of social life). “Collective tacit knowledge” is his core category [TEK, 158]—“the irreducible heartland of the concept” [TEK, 119]—whereas “relational”, and to a lesser extent “somatic”, tacit knowledge is, in principle if not in practice, reducible to explicit knowledge.

In this paper, I question Collins’s equation of “relational” with “weak” and uninteresting tacit knowledge. My questioning extends to the very coherence and reality that Collins attributes to the overall “terrain” of tacit knowledge. However, I do not mean to suggest that tacit knowledge is *unreal*. To paraphrase Ian Hacking’s question about social constructionism [Hacking 1999], my question is “Real in relation to *what?*” My argument is that the *very notion* of tacit knowledge is inseparable from the contingent relations in which

it is bound. Treating it as a concept—or as part of a “vocabulary” to borrow C. Wright Mills’ classic account of motives—differs from treating it as a substantive terrain or a pervasive force [Mills 1940]. As I mentioned earlier, tacit knowledge often is defined in relation to what it is not: it is *not* formal (or even formalizable); it is *not* explicit; it is *not* reducible to rules, algorithms, written instructions and protocols. Consequently, the “what” of tacit knowledge is located in relation to “what it is not”. This does not mean that it is unreal, nor does it mean that it is a kind of epistemic anti-matter or dark matter. Instead, I mean to suggest that the reality of tacit knowledge is bound up in uses of language; and, specifically, various conceptions of explicit knowledge that define what it is not. Far from being uninteresting, its marginal relations to conceptions of explicit knowledge are crucial for understanding the meaning (the uses) of tacit knowledge—such relations *constitute* the relevance of tacit knowledge. Among the various uses of the concept of tacit knowledge are polemical uses that serve to enhance and defend the autonomy of academic and non-academic professions. Consequently, my aim in the remainder of this paper is to examine what is *done with* the notion of “tacit knowledge” rather than to define and classify what it *is* as a substantive domain. I will leave it to readers to decide if my treatment simply differs from Collins’s or whether it reveals a basic misconception of the phenomenon on his (or my) part.

In my view, a treatment of tacit knowledge as relational and residual may lead us to question the very unity and coherence of the “tacit dimension” that Polanyi postulates, or the “terrain” on which Collins proposes to “map” tacit knowledge. Moreover, such a treatment can encourage us to focus instead on particular academic and vernacular uses of the concept as well as other, arguably related, terms. This relational turn is a shift away from philosophical debate about what can or cannot be made explicit, in principle or in practice, and toward studies of what counts—and, equally important, what does *not* count—as tacit knowledge in specific historical and contemporary circumstances. Such research examines explicit claims about tacit knowledge, and can lead us to explore what such usage hides as well as what it reveals.

When shifting focus from a notion of “terrain”, which suggests a coherent and substantive ground, to an examination of situated usage, my aim is not to reduce tacit knowledge to mere words or attributions. I mention this in light the way Collins, in a book co-authored with Robert Evans, contrasts “relational theories” with a “substantive” theory of expertise [Collins & Evans 2007, 2]. Collins and Evans elaborate upon this contrast by saying that acquiring expertise involves an arduous social process of learning the knowledge (including, especially the tacit knowledge) possessed by an “expert group”. Such expertise is possessed—as skill—and it can be lost through disuse. Contrary to “relational theories”, which Collins and Evans argue would treat expertise strictly as a contingent “attribution” made by others, their theory treats expertise as something that “individuals may or may not possess [...] independently of whether others think they possess expertise” [Collins & Evans 2007, 3]. Their dichotomous separation of linguistic “attribution” from substantive

possession of expertise ignores complex, empirically evident practices and institutions that define, certify, and test *what counts as* expertise in particular professions, games, and other activities performed in specific historical and cultural circumstances. Importantly, when they theorize about the topic and attempt to demarcate “real” expertise from non- or pseudo-expertise, Collins and Evans *participate* (if only vicariously) in the social practice of constituting *what counts as* expertise. The problem with their theorizing is that it is abstracted from the political and professional circumstances in which claims and counterclaims about expertise are aired, as well as from the activity-specific procedures and forums that demonstrate and test expertise. The concept of “attribution” does not do justice to the substantive, and yet highly variable and situated, organization of such practical tests and professional institutions. In the remainder of this essay, I will make a similar argument about Collins’s treatment of tacit knowledge. In contrast to Collins, I shall argue that tacit knowledge is not simply a real domain or dimension; instead, I shall argue that tacit knowledge is not a unified “terrain”, but that it takes distinct forms depending upon local claims and counterclaims about what it is and is not. Finally, I shall suggest that Collins’s theory is limited by the way he *locates* tacit knowledge on an abstract “terrain”, rather than (as some of his own early work exemplifies) in relation to discursive situations, historical labor conflicts, and efforts to secure and protect professional autonomy.

1 How to locate tacit knowledge

Theoretical and philosophical writings are by no means the only discursive means for locating (defining, identifying, exhibiting) tacit knowledge. Numerous practical situations and conundrums are a fertile source of reflection on how practical and discursive relations are central to the very idea of tacit knowledge. Although Polanyi postulates an abstract “tacit dimension”, his writings on the subject locate tacit knowledge by drawing contrasts with explicit rules, instructions, and plans. And, while Collins also writes abstractly of a “terrain” on which tacit knowledge can be mapped [TEK], in his early work on the subject [Collins 1974, 1975], he locates tacit knowledge by reference to the practical difficulties and polemical contentions attending efforts to replicate experiments and experimental equipment. In his work on “artificial experts” [Collins 1990] he locates tacit knowledge by reference to the practical difficulties with designing artificial intelligence (AI) programs and expert systems that proponents claim can (or someday will) reproduce embodied and communicative activities.

Though Collins has rarely acknowledged any indebtedness to ethnomethodology (the study of practical actions and practical reasoning in ordinary as well as professional circumstances), his procedures for locating tacit knowledge were not unlike those that Harold Garfinkel had earlier used for locating what Garfinkel called *ad hoc* practices in many fields of action within

and beyond the sciences [Garfinkel 1967]. Difficulties with developing early machine translation programs, also were a source of insight into the “indexicality” (the contextual sensitivity and variability of linguistic intelligibility [Bar-Hillel 1954]) that became central to Garfinkel’s ethnomethodology [Garfinkel 1967]. Garfinkel later used the term “instructed actions” to cover relations between explicit instructions and the situated actions of using them [Garfinkel 2002]. Instructed actions are not simply a *kind* of tacit knowledge; they involve a pairing of explicit directions, maps, and other verbal and written formulations with the practices of using them on particular occasions. Tacit knowledge can be made relevant in connection with that pairing; consequently, the *relational* organizations of instructions to their situated uses provide means (certainly not the only means) for locating tacit knowledge (i.e., making it practically relevant). Garfinkel frequently used exercises for his students that required them to describe their efforts to enact a particular protocol, assemble an object from plans, or follow a set of instructions or directions. His aim was not to train the students to become adept at following instructions; instead, it was to attune them to the situated difficulties and contingencies that arise when they attempt to enact plans, act in accord with rules, or follow directions. And, while he required his students to describe those difficulties and contingencies in fine detail, the aim of the exercise was not to develop complete descriptions of tacit knowledge. Instead, the aim was to demonstrate the impossibility of ever developing complete descriptions in an absolute sense of completeness, and to encourage the realization that practical standards of completeness are themselves bound up with relational contingencies. Lucy Suchman’s *Plans and Situated Actions* is an innovative and lucid elaboration of Garfinkel’s procedure for investigating how even the most elaborate plans and instructions for using novel technologies require users to deploy *ad hoc* procedures for getting tasks done [Suchman 2007]. Suchman uses insight from her investigations to critique the determinative role ascribed to explicit plans in AI and related Silicon Valley belief systems.

According to these procedures, tacit knowledge can be located prospectively or retrospectively, even though it can never be described exhaustively. Prospectively, rules, recipes, formal instructions, plans, directions, maps, or protocols implicate unspecified knowledge that enables one to work out just how to follow them in a future course of action. Retrospectively, tacit knowledge is revealed through the deficiencies of written records for gaining access to actual work practices. In many cases, tacit knowledge is implicated by a retrospective-prospective effort to find what explicit instructions are “saying” in light of interpretative and practical problems and temporal relations that emerge over the course of efforts to follow them. While, following Collins, we may simply be inclined to place instructed actions in the category of “relational” tacit knowledge, to do so is to miss the point of Garfinkel’s exercises: the situational, interactional, and temporal relations that arise in the course of the *practices* of instructed action *constitute* the very relevance of tacit knowledge [TEK]. As Garfinkel’s students discovered when performing an exercise to

follow directions for getting from a starting point to a destination in a city, the difficulties and contingencies they encountered were particular and mundane: they did not enter a “dimension” of tacit knowledge, instead they ran into a stream of difficulties during their ongoing attempts to reconcile the sketchy details of their directions with the unfamiliar and overwhelmingly dense “lived” course of the journey. The fact that the directions, when read in isolation from the journey, did not tell the students just what they needed to know in order to follow them successfully, might seem to implicate a qualitatively different kind of knowledge that enabled such success. But, when investigated in detail, the knowledge in question appeared to be commonplace, mundane, and tied to familiar situations and routines. This knowledge did not make up a coherent cognitive dimension or terrain; instead, it was an assemblage of ecologically embedded judgments, actions, and improvisations that were performed along the course of the unfolding journey. Garfinkel preferred the heading “instructed actions” to cover these various practical maneuvers and reactions. He did not contrast a tacit dimension to the explicit knowledge embodied in rules, written instructions, recipes, and other formal devices. Instead, he pointed to the way such formal devices were constituents of instructed actions; they were not causes of such actions, but instead were tools used in the course of them.

In all of these cases, instructed actions are located in the relationship between an explicit rule, directive, instruction, formula, or report, and a particular course of actions that makes use of a rule prescriptively as a guideline and/or retrospectively as a source of evidence, or as a basis for criticizing or justifying the actions taken. This relationship is not limited to an analogy between, for example, explicit rules and “rules” that are tacitly followed. In such cases, rules, formulated instructions, and plans are not analogies for another kind of knowledge; instead, they feature concretely in practices, where they are tools rather than exhaustive representations of the actions in which they are used. In such cases, what is not formulated in rules, plans, and so forth, often can be described in detail, but the details are highly particular—tied to singular situations, local histories, ongoing relationships, and personal idiosyncrasies. An analyst can generalize *about* these particulars, but they are “tacit” by virtue of their particularity in reference to generalized accounts and instructions.

2 A continuum or Cartesian divide?

In his investigations of tacit knowledge, dating back to the mid-1970s, Collins, like Polanyi before him, deploys a contrast with various forms of “explicit” knowledge to define what tacit knowledge is not. In his recent book on the subject, he goes much further than Polanyi to develop an entire cosmology in which “strings” (including but not limited to the sequence of code in a digital program) provide the material and causal basis for transmitting “explicit” knowledge and programs of action. His argument locates tacit knowledge

through a process of elimination: if a practice or domain of knowledge can be encoded and transmitted by a string of words, signs, or electronic pulses, then it is not tacit. He also develops a taxonomy of various orders of tacit knowledge and reserves the most central place in his scheme for “collective” tacit knowledge.

Unlike Hubert Dreyfus, for whom the concept of tacit knowledge is among the various philosophical resources that he uses to make the case for what computer programs “can’t do” [Dreyfus 1979, 1992], Collins in his recent work uses what computer programs (or, more generally, abstract strings of “instructions”) cannot possibly encode and transmit as a way to *define* tacit knowledge. This analytical strategy differs from the procedure described earlier for locating tacit knowledge by describing the contingencies that arise during efforts to follow instructions and rules (a methodological strategy that Collins himself used in his early work). Instead of providing detailed historical or ethnographic descriptions of actions that necessarily go beyond what available rules and instructions specify, Collins now deploys a strategy for considering and classifying a series of candidate types of tacit knowledge. In this scheme, when a candidate type of knowledge or action can be made explicit, it no longer counts as deeply and irrevocably “tacit”—it is tacit only as a matter of happenstance. His categories of tacit knowledge are thus ordered according to their “strength” at resisting eventual re-allocation to the “explicit” side of the ledger. The general category of somatic skill is more difficult to explicate, and the core category of socially founded knowledge defies the very possibility of explication in a foreseeable future in his version of tacit knowledge.

Collins faces a formidable challenge in his attempt to specify types of knowledge that are beyond explication in any foreseeable future. He recognizes that there is no possibility of drawing a bright line between tacit and explicit knowledge, but he nevertheless insists upon a “Cartesian” distinction, however fuzzy at the margins, that demarcates core tacit knowledge from whatever can be reduced to the effects of digital codes, genetic sequences, and other material/semiotic “strings”. Although Collins has a running debate with Dreyfus, like Dreyfus he tries to indicate what cannot *possibly* (or, at least, foreseeably) be expressed in human or machine languages, regardless of whether the relevant expressions take the form of written or oral instructions conveyed from expert to novice, or algorithms designed to “instruct” a computer to play chess, recognize a face, or convert speech to writing. Both Collins and Dreyfus recognize that computer programs are now able to model, perform, or simulate far more than what was possible decades ago when Dreyfus initiated his critique of AI’s ambitions. However, as Dreyfus argued with a memorable line, to claim that incremental advances in computer programs support the idea that there is no essential limit to the potential expansion of programmed systems into previously unfathomed domains of human conduct, is like saying that “the first man to climb a tree could claim tangible progress toward reaching the moon” [Dreyfus 1992, 100]. However, as early critics of Dreyfus were keen to point out [Pappert 1968], a reciprocal difficulty attends the effort to define a

boundary between what can or cannot *ever* be explicated through instructions or programs.

The debate about what machines can or cannot do is complicated by the fact that the computers, calculators, printers, and typewriters that now bear names that once were used for human job titles neither simulate nor duplicate the actions of the humans they put out of work, any more than an automobile duplicates or simulates the actions and capacities of a horse. By and large, efforts to develop novel information and communication technologies seek novelty (just enough to warrant a favorable decision by a patent examiner), without concern for simulating or duplicating how humans think or act [Voskuhl 2004]. Such technological innovations have little bearing on debates about a possible qualitative limit to what can ever be explicated in a foreseeable future. From the pragmatic point of view of many engineers, the question of whether their innovations will ever run up against an essential barrier to explication is a “philosophical” question that can be deferred for as long as there is the immediate promise of incremental success in the effort to design technologies that do jobs *differently* from the way humans do (or once did) such jobs.

Changes in communicative technologies (and not just computer programs) reconfigure instructed actions and challenge any effort to draw stable distinctions between explicit and tacit knowledge. Consider the example of recipes. As noted earlier, one way to locate tacit knowledge is through a contrast between explicit instructions and immediate efforts to follow those instructions. Sometimes, though not always, a written text is treated as the prototype of explicit knowledge. In the case of a written recipe, there are well-known problems. The recipe calls for one type of cooking oil, and we only have another type. It is vague in its description of many practical details, and it fails even to mention many practical requirements, perhaps because the recipe writer assumed that some practices should be elementary for virtually anyone who would set foot in a kitchen. By closely examining a novice’s difficulties, we are bound to find that many situations occur that the recipe fails to mention or anticipate, and that a mastery of the recipe can only be gained through repeated practice and hands-on instruction.

But now consider the difference between a cookbook and an online video or televised cooking show. The video can demonstrate “tricks” that are glossed over in written recipes, such as how to hold or manipulate a particular utensil, what “stir vigorously” might look like, and so forth. The voice-over instructions can be closely coordinated with the visible demonstration of the sequence of actions. Much can be shown as well as said. An effort to enact what the video instructs may present its own problems, and moving quickly from one online version to another of the “same” recipe can be a source of confusion. However, what turns out to be “explicit” and “tacit” varies with the media through which the instructions are conveyed. When a video is used to supplement a written recipe, it seems that the explicit materials have now incorporated at least part of what the written recipe failed to specify.

Now consider an interactive forum, such as an online exchange or hotline [Lynch 2002, 208 ff.]. These forums have the advantage of allowing users to raise questions geared to singular problems that arise in the course of an attempt to follow particular kinds of recipe. Again, while such forums present their own limitations, they also occupy an intermediate position between a written recipe and a hands-on tutorial. Such communication technologies mediate the user's relation to the portrayed practice in a different way than a written recipe. Each case differently configures *just what* is explicit and *just what* is unstated. What is made explicit, and how it is made explicit, reciprocally defines, and is defined by, what is presumed to be tacit. Above all, a consideration of such cases allows us to see that the very meaning of "explicit" (and, by implication, "tacit") is not at all clear.

Collins proposes a "Cartesian" discontinuity between explicit (programmed and programmable) knowledge and a core domain of collective (human) tacit knowledge. Proponents of "Strong AI" such as Paul and Patricia Churchland propose the opposite [Churchland & Churchland 1990]: that there is no essential divide between the two domains. However, there is no dispute on either side over the fact that there is continuity at the margins, and that new communication and information technologies can convert or translate previously tacit knowledge into novel modes of explicit instruction. For the most part, the AI debate is about the ultimate possibility of making tacit knowledge explicit, and marginal cases are of interest mainly as bases for extrapolating what the current state of the art might or might not promise for the future. For different reasons, I shall stay at the margins to examine what Wittgenstein called "intermediate cases"—cases at the margins of Cartesian distinctions [Wittgenstein 1953, § 122]—while remaining non-committal about any essential differences between tacit and explicit knowledge.

The AI debate imposes an artificial condition upon discussions of tacit knowledge—the condition being the possibility of *total explication* of a human practice, so that a machine can *do* the practice, as though on its own and with no residue of tacit knowledge needed to complete what the machine leaves undone. The debate narrows the focus of those, like Collins and Dreyfus, who rise to the challenge of specifying that and how tacit knowledge *cannot ever* be articulated in the way a program would require. Their charge is indifferent to knowledge that is "tacit" in the sense of being unspoken, implicit, not openly expressed, but capable of enunciation. There can be many reasons for why such knowledge is not enunciated besides an essential inability to formulate it [Cambrosio & Keating 1988, 246]. One, apparently clear, example of such a marginal case is secret knowledge.

3 Secret knowledge: What tacit knowledge is *almost* not

As noted earlier, Collins highlights the role of “collective” tacit knowledge as his core ideal type [TEK], while assigning weaker or lesser status to other categories of “relational” tacit knowledge. One of the categories he consigns to the margin is “secret” knowledge. This category includes knowledge that can be made explicit, but which is deliberately withheld or concealed [TEK, 91]. Such knowledge is relational, because the extent to which it is explicit or concealed is selective, often strategic, and related to circumstances. Collins adds that there is no “deep” philosophical puzzle about such knowledge. In the remainder of this essay, I will argue that the category of (possibly) concealed knowledge is “deeper” and more interesting than Collins lets on. Moreover, ambiguities about what is truly tacit (or essentially incommunicable) and about what may or may not be deliberately withheld or disguised, can be of strong interest for historical and sociological investigations, as well as for philosophical analyses and political conflicts.

In principle, secret, deliberately concealed, or undisclosed knowledge is potentially explicit knowledge that just happens to be withheld from some potential recipients on some occasions. A person who keeps a secret knows more than she tells, but not necessarily more than she *can* tell. To be more precise, we need to distinguish between two possible senses of the word “can” in this formulation (Collins distinguishes no less than eight senses of “cannot” [TEK, 84]). One sense has to do with interpersonal situations, interactional norms, and local agreements: a speaker might say, “I can’t tell you” to a particular person from whom she is keeping a secret, but this doesn’t mean that she is unable to tell it to anyone else. Another sense of “can” and “cannot” has to do with the very possibility of articulating what remains unsaid. When Polanyi says that “we can know more that we can tell” [Polanyi 2009, 4], he makes clear that what we cannot tell is *incapable* of being articulated to anyone, and it remains beyond the reach even of the solicitations of a skilled psychoanalyst, interrogator, or torturer. Such knowledge is not simply tacit—in the sense of being understood but withheld—it is incommunicable.

The distinction between secret and incommunicable knowledge becomes more complicated when we recall that efforts to conceal knowledge frequently involve strategies for concealing *that* such knowledge is being concealed. For example, pretexts and alibis used by intelligence agencies when they conduct covert operations not only enable “plausible deniability”, they forestall suspicion by deflecting attention away from the fact of concealment. In contrast to Polanyi’s line about “the observance of a set of rules which are not known as such to the person following them”, covert agents conceal a set of practices from being evident, as such, *to an outside observer*. Even when an outside investigator is convinced that particular agents are concealing or disguising what they easily could articulate if they chose to do so, it can be dauntingly difficult to

expose their secrets or even *that* they are withholding secrets [Lynch & Bogen 1996]. Even in less politically charged circumstances, a group of agents may present a public front that systematically conceals their own understandings of what they are doing, on the assumption that outsiders would be prone to misunderstand and disrupt the actual practices if they were revealed to them [Hilgartner 1990]. Even during an earnest attempt to instruct a novice, an instructor may withhold understandings of the practice that the novice cannot possibly “absorb” without getting confused and discouraged. An expression, such as “you don’t need to know” is exquisitely ambiguous—it may hint at a dark secret, or simply mark that a more complex or subtle understanding is being deferred until the novice has sufficient competence to grasp it. In such contexts, ambiguities between what Collins classifies as relational and non-relational categories of tacit knowledge become strategically useful.

In situations of labor conflict, workers use (and are suspected of using) techniques for holding productive capacity in reserve in a way that is not visible to managerial or administrative authorities. Secrecy in this sense is not a matter of withholding specific statements. It is a more elaborate art of complying with formal requirements, and masking the extent to which such requirements are undermined in practice. A classic example is a phenomenon that Frederick Winslow Taylor dubbed “soldiering” among workers in a steel plant [Taylor 1911]. “Soldiering” was his term for the collective guild-like maintenance of a barrier between insiders’ and outsiders’ (and, specifically, managers’) knowledge of their work-practices (playing off of Collins’s terminology, we could say that it is an instance of “collective tacit metaknowledge”). Taylor suspected that workers under his supervision were conspiring to reduce the pace of work while maintaining the appearance of high productivity.

For Taylor, the tacit knowledge of manual workers offered a *practical* challenge to his efforts to manage labor and improve its efficiency. Initially, he faced a seamless alliance between workers’ secrecy and their possession of tacit skills, and he aimed to break the workers’ “soldiering” in order to formalize, standardize, and control the labor process. Taylor designed his program in scientific management in order to wrest control of the pace of work from the laborers, so that it could be managed and optimized by the industrial engineers [Braverman 1974, 64ff.]. His challenge was to devise a way to make explicit what workers hid from his view through their “soldiering”. Taylor did not aim to *describe* the workers’ practices; instead, he sought to reconfigure those practices by changing the incentives to reward individual productivity at the expense of worker solidarity. He also developed schemes for measuring and regimenting embodied motions that previously had been left to the workers’ discretion. His method was not simply an effort to duplicate, or even simulate, the workers’ practices; rather, it became a means to bypass, supplement, and rationalize their practices. Taylor’s notion of “soldiering” assumed that the workers’ practices were tacit only because they were collectively concealed, and yet they appeared to an outsider to be indistinguishable from the embodied skills and collectively cultivated craft knowledge that a non-practitioner would

be unable to grasp. Taylor's use of slow-motion film and his system of time-and-motion study produced an intervention that (in his view) revealed what the workers concealed, though in Braverman's critical view the intervention reconfigured the labor practice and systematically destroyed the communal solidarity that supported it [Braverman 1974].

"Soldiering" strategically deploys the difference between an insider's and an outsider's perspectives on a practice. Another practice used in labor conflicts that also deploys that difference, though in an inverted way, is "working to rule". Workers, such as air traffic controllers, have used this practice to slow down production during labor actions. It is a kind of strike, but instead of leaving the job, workers conspicuously follow all of the formal protocols and safety rules that, ordinarily, they would bypass with informal shortcuts in order to maintain the workflow. It seems likely that, even when conducting a "work to rule" operation, the workers do not simply "follow the rules", since they would still need to deploy their informal know-how in order to perform situated tasks. Consequently, as in cases of "soldiering", the pace can be slowed surreptitiously while an ostentatious effort is made to adhere to formal protocols. In both scenarios, tacit knowledge has an ambiguous and contentious role. Not only do the opposing parties in such conflicts hold contrary assumptions about what is or is not concealed, as opposed to deeply embedded in the individual skills and collective form of life of the workers, the ambiguity is a substantive and strategic constituent of the "relational" situation.

4 Tacit knowledge as a rhetorical theme and professional resource

In addition to being an attractive theme and explanatory resource for philosophers and social scientists, tacit knowledge and other themes related to it are vernacular idioms. As is the case for so many other keywords in philosophy and social science, analytical uses of the term have an ambiguous and confusing relationship to ordinary, situated vocabularies [Mills 1940], [Winch 1958]. A prime source of confusion has to do with the way ordinary words such as "skill" and "knowledge" are terms of praise as well as analytical concepts. In many situations, skill and knowledge are valued as *possessions* of persons and professions, and as such they are commodities that can command a high price and provide the basis for privilege, authority, and esteem. The concept of tacit knowledge aids and abets such authority. Professions that lay claim to tacit knowledge, not only reserve it as a source of expertise, they also imply that others cannot possess or even fully comprehend it without first undergoing a lengthy apprenticeship—an apprenticeship that is controlled by the profession. As long as relevant non-professionals assume that the tacit knowledge is legitimate, they must trust what the experts say because they have no basis for evaluating it themselves. The lack of public transparency associated with

expert knowledge has long been viewed as a problem for evaluating expert evidence in public forums such as jury trials [Hand 1901]. This property of tacit knowledge also presents an analytical problem for those like Collins who take a realist position toward expertise [Collins & Evans 2007]. In practical situations, the reality of tacit knowledge can be difficult to establish. This difficulty is not just a methodological challenge for a sociological study of tacit knowledge, it is a sociological phenomenon in its own right—and, moreover, it *constitutes* social relations as well as reflects them. Indeed, how the claimed reality of tacit knowledge plays out may be more interesting sociologically than the “fact” of whether tacit knowledge is or is not “real” in a particular case.

Polanyi, Collins, and others who have written on the topic of tacit knowledge express great respect for its role in the acquisition of technical authority. Polanyi, especially, treats tacit knowledge as a basis for opposition to centralized efforts to “manage” scientific production [Polanyi 2009]. Unlike Frederick Winslow Taylor, Polanyi lines up on the side of the workers (in this case, a more highly-educated and privileged class of worker than Taylor’s factory hands), and he invokes tacit knowledge in support of their autonomy and authority. Like prominent contemporaries of his, whose arguments also supported the autonomy of science [Merton 1942], [Bush 1945], Polanyi stresses that autonomy pays off, not only for the scientists who are granted authority over their enterprise, but also for the society as a whole which benefits from the innovations that emerge from free scientific inquiry. Others have suggested that the idea that public outlays for scientific research should be combined with a hands-off policy toward how the public funds are spent is a highly convenient ideology for the profession [Mulkay 1976], [Gieryn 1999]. In that light, Polanyi’s arguments about the autonomy of science can be viewed as *an expression* of a professional ideology. Polanyi was a chemist when not moonlighting as a philosopher of science, and in many ways his writings express strong commitment and admiration for the craft, integrity and “connoisseurship” associated with the best scientific work. Though laudable in many respects, Polanyi’s (and increasingly, Collins’s) orientation to tacit knowledge in the sciences is what sociologists of scientific knowledge call “asymmetric” [Bloor 1976]. To understand what such a treatment implies, I will give two examples of a “symmetrical” treatment of tacit knowledge in medicine.

In an article on the theme of “incommunicable knowledge” in late 19th century British medicine, historian of medicine Christopher Lawrence describes efforts by Victorian gentlemen-doctors to resist the introduction of diagnostic instruments such as the sphygmomanometer and the stethoscope [Lawrence 1985]. Fearful that these items of equipment would open up the more elite ranks of the medical profession to mere specialists, the gentlemen-doctors emphasized the “incommunicable knowledge” necessary to perform the bedside work of examining the patient’s pulse, heart rate, and blood pressure. In addition to referring to the cumulative embodied knowledge that comes with long experience, the physicians mentioned the refined nerves and sensibilities of men raised in the gentle classes.

To defend the autonomy of clinical medicine, these physicians invoked an epistemology of individual experience which, by definition, defied analysis. A similar distrust of applied science, an approval of craft skills and the praise of rule-of-thumb practice, can be found in the language of many other contemporary professions, such as chemistry or engineering. But, in medicine the account of the nature of clinical skill was linked to other things. It was used to show that only the gentleman, broadly educated, and soundly read in the classics, could be equipped for the practice of medicine. [Lawrence 1985, 505]

Lawrence makes clear that the autonomy of the medical profession was at stake, and the Victorian physicians' stress on the importance of experience, cultivated sensibilities and intuitive judgment, was as much a defensive rhetoric and professional ideology, as it was evidence for a tacit dimension that resisted efforts to convert it to mere technical routines.

Warwick Anderson discusses a more recent clash in ongoing efforts to turn clinical medicine into a science [Anderson 1992]. More explicitly than Lawrence, he also relates the case to themes in social studies of science. The episode he describes took place in Australian Hospitals in the early 1970s, and involved a computerized diagnostic system (a precursor to evidence-based medicine). Like Lawrence's Victorian physicians, Anderson's clinicians perceived the new "scientific" technology as a threat to their authority, and they resisted it by stressing the "artisanal" and "craft" knowledge cultivated through bedside practice. After having characterized the two sides in this contest, Anderson proposes to treat

[...] the "craft" and "scientific" representations of diagnosis symmetrically, as discursive resources used in a hospital context to legitimate the divergent competences of the two occupational subgroups. [...] I do not intend to engage in the attempt to establish whether medical diagnosis is indeed, as the traditional physicians argued, inarticulable in principle and practice: rather, what I do hope to show is that it served their interests to represent their work as such. [Anderson 1992, 655]

The diagnostic system that billed itself as "scientific" was computerized, but it was not an attempt to represent human clinical judgment. Like Taylor's method, it was designed to *replace* and improve upon, rather than to reproduce, the clinician's diagnostic methods. Anderson goes on to describe a clash between the competing "rhetorics" and "grammars" of clinical diagnosis, and he makes clear that how the discourse played out was a tangible constituent of the social-historical organization and re-organization of clinical practice.

Conclusion

Lawrence's and Anderson's treatments of "incommunicable knowledge" and "clinical craft" produce a kind of gestalt switch on a realist treatment of tacit knowledge. Instead of treating physicians' accounts as evidence of a resilient type of tacit knowledge that strongly resists rationalization, Lawrence and Anderson treat those accounts as rhetorical efforts to secure authority in specific historical labor conflicts (for related cases in other fields, see [Gieryn 1999], and [Doing 2004]). Their analytical approach requires a detachment that is difficult to attain (or even to want to attain) in an academic profession that values autonomy and resists ubiquitous efforts to manage it.

Although Polanyi's and Collins's arguments are aligned with other efforts to support and defend the autonomy of particular professions in the face of real or imagined administrative encroachments, their realist treatments of tacit knowledge miss an important phenomenon: they fail to take account of how that concept and other concepts akin to it are used to claim and allocate authority and thus to *constitute* domains of expertise in contested situations. Collins is forthright in pursuing a programmatic effort to demarcate legitimate instances of expert knowledge from their *Doppelgänger* (the various pseudo "theories" and dubious forms of skepticism that vie for public attention in the "marketplace of ideas") [Collins & Evans 2007]. In line with that ambition, it is possible that he will come up with a set of "social" criteria for demarcating legitimate tacit knowledge from its rhetorical doubles. However, even if we grant the possibility that he may succeed in that endeavor (a possibility that I doubt), the point of this paper is not to prove that Collins is wrong, but to suggest that Lawrence's social-historical investigation, and Anderson's social-anthropological analysis provide alternatives to Collins's efforts to construct conceptual typologies. The point I have made is a very simple one: tacit knowledge (along with its close cousins incommunicable knowledge, craft knowledge, etc.) is, first of all, a vernacular concept; a concept or theme that is used to do rhetorical work in concerted efforts to manage work and to resist such management. Consequently, one way to study tacit knowledge is to examine how it is used as a tool for constituting epistemic and political authority in particular historical conflicts. We might go so far as to say that this is an empirical sociological alternative to Collins's ideological project.

Bibliography

ANDERSON, WARWICK

1992 The reasoning of the strongest: The polemics of skill and science in medical diagnosis, *Social Studies of Science*, 22(4), 653–684.

BAR-HILLEL, YEHOASHUA

1954 Indexical expressions, *Mind*, 63(251), 359–379.

BLOOR, DAVID

1976 *Knowledge and Social Imagery*, London: Routledge & Kegan Paul.

BRAVERMAN, HARRY

1974 *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*, New York: Monthly Review Press.

BUSH, VANNEVAR

1945 *Science, the Endless Frontier. A Report to the President*, Washington, DC: U.S. Government Printing Office.

CAMBROSIO, ALBERTO & KEATING, PETER

1988 'Going monoclonal': Art, science, and magic in the day-to-day use of hybridoma technology, *Social Problems*, 35, 244–260.

CHURCHLAND, PAUL & CHURCHLAND, PATRICIA

1990 Could a machine think?, *Scientific American*, 262(1), 32–39.

COLLINS, HARRY

1974 The TEA set: Tacit knowledge and scientific networks, *Science Studies*, 4, 165–186.

1975 The seven sexes: A study in the sociology of a phenomenon, or the replication of experiments in physics, *Sociology*, 9, 205–224.

1990 *Artificial Experts: Social Knowledge and Intelligent Machines*, Cambridge, MA: MIT Press.

2010 *Tacit and Explicit Knowledge*, Chicago: University of Chicago Press, [TEK].

COLLINS, HARRY & EVANS, ROBERT

2007 *Rethinking Expertise*, Chicago: University of Chicago Press.

DOING, PARK

2004 'Lab hands' and the 'Scarlet O'. Epistemic politics and (scientific) labor, *Social Studies of Science*, 34(3), 299–323.

DREYFUS, HUBERT

1979 *What Computers Can't Do*, New York: Harper and Row.

1992 *What Computers Still Can't Do: A Critique of Artificial Reason*, Cambridge, MA: MIT Press.

GARFINKEL, HAROLD

1967 *Studies in Ethnomethodology*, Englewood Cliffs: Prentice Hall.

2002 *Ethnomethodology's Program: Working out Durkheim's Aphorism*, Lanham: Rowman & Littlefield.

GIERYN, THOMAS

1999 *Cultural Boundaries of Science: Credibility on the Line*, Chicago: University of Chicago Press.

HACKING, IAN

- 1999 *The Social Construction of What?*, Cambridge, MA: Harvard University Press.

HAND, LEARNED

- 1901 Considerations regarding expert testimony, *Harvard Law Review*, 15, 40–58.

HILGARTNER, STEPHEN

- 1990 The dominant view of popularization: Conceptual problems, political uses, *Social Studies of Science*, 20, 513–539.

JORDAN, KATHLEEN & LYNCH, MICHAEL

- 1992 The sociology of a genetic engineering technique: Ritual and rationality in the performance of the plasmid prep, in *The Right Tools For the Job: At Work in Twentieth-Century Life Science*, edited by CLARKE, A. & FUJIMURA, J., Princeton: Princeton University Press, 77–114.

LAWRENCE, CHRISTOPHER

- 1985 Incommunicable knowledge: Science, technology and the clinical art in Britain 1850–1914, *Journal of Contemporary History*, 20(4), 503–520.

LYNCH, MICHAEL

- 1985 *Art and Artifact in Laboratory Science*, London: Routledge & Kegan Paul.
- 2002 Protocols, practices, and the reproduction of technique in molecular biology, *British Journal of Sociology*, 53(2), 203–220.

LYNCH, MICHAEL & BOGEN, DAVID

- 1996 *The Spectacle of History: Speech, Text, and Memory at the Iran-Contra Hearings*, Durham: Duke University Press.

MERTON, ROBERT K.

- 1942 Science and technology in a democratic order, *Journal of Legal and Political Sociology*, 1, 115–126.

MILLS, C. WRIGHT

- 1940 Situated actions and vocabularies of motive, *American Sociological Review*, 5, 904–913.

MULKAY, MICHAEL

- 1976 Norms and ideology of science, *Social Science Information*, 15, 637–656.

NYE, MARY JO

- 2011 *Michael Polanyi and His Generation: Origins of the social construction of science*, Chicago: University of Chicago Press.

PAPPERT, SEYMOUR

- 1968 The artificial intelligence of Hubert L. Dreyfus: A budget of fallacies, Memo 154, Computer Science and Artificial Intelligence Laboratory, MIT, Cambridge, MA.

POLANYI, MICHAEL

- 1958 *Personal Knowledge*, Chicago: University of Chicago Press.
2009 *The Tacit Dimension*, Chicago: University of Chicago Press, first edition, Garden City: Doubleday, 1966.

RUMSFELD, DONALD H.

- 2005 The unknown, in *Pieces of Intelligence: The Existential Poetry of Donald H. Rumsfeld*, edited by SEELY, H., New York: Free Press.

SUCHMAN, LUCY

- 2007 *Human Machine Configurations: Plans and Situated Actions*, Cambridge: Cambridge University Press, revised and retitled edition of *Plans and Situated Actions*, Cambridge: Cambridge University Press, 1987.

TAYLOR, FREDERICK WINSLOW

- 1911 *Principles of Scientific Management*, New York: Harper and Row.

TURNER, STEPHEN

- 1994 *The Social Theory of Practices: Tradition, Tacit Knowledge and Presuppositions*, Cambridge: Polity Press.
2012 Making the tacit explicit, *Journal for the Theory of Social Behavior*, 42(4), 385–402.

VOSKUHL, ADELHEID

- 2004 Humans, machines, and conversations: An ethnographic study of the making of automatic speech recognition technologies, *Social Studies of Science*, 34(3), 393–421.

WINCH, PETER

- 1958 *The Idea of a Social Science*, London: Routledge & Kegan Paul.

WITTGENSTEIN, LUDWIG

- 1953 *Philosophical Investigations*, Oxford: Blackwell, translated by G.E.M. Anscombe.