Abstract

Tacit knowledge is both a ubiquitous and puzzling notion, related to the idea of hidden assumptions. The puzzle is partly a result of the apparent audience-relativity of the “fact” of possessing an assumption. If we think of making the tacit explicit as constructing a certain kind of inference repairing explanation for a particular audience “on the fly” we come closer to an explanation of what happens when we “make our tacit knowledge explicit.” We can account for our capacity to construct such statements for particular audiences by reference to our non-conceptual capacities to understand others. This approach avoids problematic assumptions about shared representations that are common in cognitive science, and the equally problematic notion that tacit knowledge is sentence-like content that we retrieve when we articulate something based on our tacit knowledge.

Key words: tacit knowledge, Michael Polanyi, Mirror Neurons, concepts, precognition, non-conceptual knowledge

The term tacit knowledge is used in a variety of ways, but the most common motivation is this: Some activity, inference, or communicative act depends on both the user and the recipient possessing some inferential element or mechanism which allows them to understand, anticipate, co-operate, or co-ordinate with another. The typical sign of an element of tacit knowledge is that some people can perform the activity, including the activity of inferential reasoning, and others cannot. On encountering an activity which others can perform one hypothesizes that there is such an element, and imputes it, or asks those engaged in the activity to explain it. This explanation or
imputation makes the knowledge explicit, or seems to, in the least problematic cases.

The idea that the tacit can be made explicit—that not only do we know more than we can say, but that we can “say” explicitly at least some of what is tacit—is the source of a number of deep problems. In this article I will make two general points: the first is that the process of making the tacit explicit is misnamed and misunderstood, and that it can be better understood as a different and commonplace kind of explanatory activity resembling translation; the second is that the standard views of the tacit stuff underlying tacit knowledge in the brain are based on faulty analogies and are groundless, but there are alternatives which deal successfully with the important problem of transmission or acquisition.

**Tacit Knowledge: Logical, Psychological, Social, or Collective?**

The concept of tacit knowledge trades on an ambiguity between psychological and logical notions. The difference between the two notions of tacit knowledge can be understood through an example that is marginal to the category of tacit knowledge, but has common features. In the 1980s the following puzzle was posed:

A man is driving his son to soccer practice. The man loses control of the car and smashes headlong into a large tree. The father is killed instantly, however the son is still alive but in critical condition. He's immediately rushed in for surgery for which the hospital was prepared thanks to a police call to the ER. The surgeon takes one look at the boy and says, "I can't operate on him. He’s my son!"

The puzzle: Who is the surgeon?
This was presented as a test of “sexism.” The correct solution was that the surgeon was the mother of the injured son. To quote from one of the comments on the web version, “This classic brainteaser works—and it worked on me—because of the hidden assumption that surgeons are male.”

What is a “hidden assumption”? And what sort of claim is a “because of the hidden assumption” claim? It has the surface form of an explanation citing a fact. But what sort of fact is “the hidden assumption”? Is the “assumption” a genuine fact, or simulacrum of a fact, about something in the mind or brain of the person making the comment? Or is it merely a kind of comment on the failure of this particular inference from the situation to the correct conclusion about the surgeon, with no corresponding psychological fact that resembles an “assumption”? Or is the assumption a transcendentally required condition for the possibility of answering the question in this way, and thus entailed by the answer. In short, was this a conclusion we could not have reached without this assumption, so it was “necessarily,” in a logical sense, in the mind and is therefore a psychological fact.

The answer seems to be this: it is a kind of comment about the failure of the inference. But if that is all it is, the “because” is insufficiently grounded. The first grounding problem is one of indeterminacy: there needs to be some reason to think that someone has in fact failed to make the correct inference “because” of this specific assumption rather than another that would warrant the same wrong inference. This is a problem for the idea that it is transcendentally required and thus entailed: it is not “required” in the sense that this is the only “assumption” that could back this inference. It is equally warranted by the assumption that parents are not allowed to perform surgery on their children, or by many more assumptions that one could make up for
the purpose of justifying the inference. What if the assumption was the more complicated one with the same implications for this case, that mother is an occupational role and that mothers were never surgeons? This would have the same result—it would account for the failure to make the inference. But which would be the real assumption? If we are doing Euclidean geometry, we know how the proof works because the assumptions are explicitly stated. Without an act of assumption, why even think that there is a fact of the matter that would decide between the two explanations?

There seems to be no alternative to thinking of the “assumption” as some sort of psychological fact. But what sort of psychological facts are they? This is a little more mysterious. “Sexism” is a psychological explanation, or an explanation with psychological implications: unless there was something corresponding to it in the mind of the puzzle-solver, the response to the puzzle would not reveal it. But there are other possible psychological explanations. Perhaps the person responding to the puzzle was “primed” by hearing the terms “surgeon” and “man.”¹ Perhaps the person correctly associated the term surgeon with male on the basis of the empirical experience that “surgeons” usually are male, or associated the answer with a type, such as an image of a surgeon that was male. Perhaps the prototype theory of concepts is correct, and the person simply fell into the error of reasoning from a prototypical image of a surgeon as male, an error which is natural if the prototype does result from actual experiences of surgeons as predominantly male. In short, the problem of indeterminacy arises both for transcendental or logical forms of thinking about this case, and causal ones.

If the inference is “natural” for someone, and they have not consciously “assumed” it,

what happens when the failure is pointed out to them and they are asked to explain themselves? Do they invent the explanation on the spot, after the problematic inference is pointed out to them? There are many known cases in which people do invent explanations in this fashion, so, on psychological grounds alone this is a plausible and perhaps likely explanation (Wegner, 2002, pp. 171-86). Do they need to use the language of assumptions, or is this just a bit of common folk psychology? Suppose that this puzzle was posed in a universe in which there were no women surgeons, in which, therefore, there would never be a reason for this inference to fail. Would it make sense then to say that there was a hidden assumption? If so, would it then mean that any feature of the world that allowed for correct inference would also need to be treated as a hidden assumption?

**The Psychologization of Tacit Knowledge**

The problem with any kind of ontologization of presuppositions or “assumptions” is that eventually it must return to the hard ground of the causal world. But there are two families of “tacit knowledge,” each with its own issues in relation to these problems. Both appear extensively in the literature. The first is a “collective” form of tacit knowledge. We can, for example, speak of a shared language as a necessary presupposition of communication as a form of tacit knowledge, and this case reveals some typical problems with this family. In the case of language there is the causal fact of language acquisition, and this constrains our theories of language and our claims about presuppositions. If we treat languages as more or less fixed shared presuppositional structures, for example, there is the problem of language change, and how the
change in the “language” understood as a shared collective fact becomes a change in the “language” of the individual speaker. To make the shared presuppositions story work, in the situation in which there is ongoing change in the presuppositions, one needs a causal story that works like this: the same presuppositional contents are downloaded into individuals and become not only transcendental but causal conditions for the things they explain, such as communication; this shared content is continually updated by some sort of downloading mechanism that assures that the downloaded material is the same for everyone (because sharing is the supposed condition for the thing to be explained, such as communication). Obviously there is nothing in the causal world that conforms to this model, which would require something like a central computer to generate the presuppositions to be shared and to assure that they were downloaded to each brain. The question of how these collective tacit things are acquired and modified is thus a central mystery for this conception.

But tacit knowledge need not be conceived of as a collective object, and neither does culture nor even language need to be understood in this way (cf. Davidson, [1986] 2005). Michael Polanyi’s major work was called *Personal Knowledge* (1958). The example he gave in his earlier work ([1946] 1964) is a starting point, though only a starting point, for understanding the idea of tacit knowledge as “personal.” The example is the personal coefficient of the astronomer—the time it takes an individual astronomer to record an observation of a star as it appears to move across an observation space, which is what allows the star to be located in the sky. The response time of different observers will differ. The difference between the observations by that observer and the correct location is the observer’s personal coefficient.

The result of the correction is the objective position. Objectivity, of course, is the centerpiece of the Kantian picture of knowing, the possibility of which the existence of
categories of space and time is supposed to explain. Here we get a different picture, or partial picture, of the problem of objectivity. It is no longer a matter of the individual observer, armed with the categories, which are not public but in some fashion built into the cognizing subject, making a correct, objective, observation. It is a matter of acknowledging individual difference, and correcting it to a public standard.

This is a quite different picture of tacit knowledge than the “assumptions” picture. And there is a reason for this. From his first formulations of the concept of tacit knowledge, Polanyi was determined to ground the idea in genuine psychology—the concept for him was not a metaphorical or analogical one, like the notion of presupposition and others from the neo-Kantian tradition, but one which was supposed to have actual empirical content. Precognition, focal and distal awareness, the transmission of tacit knowledge from great scientists to great scientists in apostolic succession, as well as the core idea that we know more than we can say, were things in the realm of psychological reality. Polanyi met regularly with the psychologist Donald Campbell, and took this part of his thought seriously. It is thus worth re-asking whether there is in fact anything psychological that corresponds to tacit knowledge or that would make sense of the possession of tacit knowledge, and then ask how this possession could be converted into something relevant to science.

Polanyi gives some important clues to what tacit knowledge might mean that conflict with the way the term later is employed and assimilated to the notion of assumption. Much of his thinking on the subject had to do with the limitations of our own access to psychological processes—itself an important theme of cognitive science. His immediate concern was scientific discovery, and he recognized that this had something to do with precognition, with the sense that a pattern or explanation was there, a sense which had to be actualized and focused on in order to
make a “discovery” that could then be articulated and presented in a publically verifiable form. A simple and commonplace example of this would be the experience of sleeping on a problem and being able to solve it on awakening. Whatever the cognitive processes prior to the solution are, they are not accessible to us. We are not conscious of them, though we may be conscious of some sort of mental effort surrounding them. Similarly for attention. Polanyi recognized that some of what we “know” and use to think is outside of the range of things that we are attending to. So he was fascinated by the difference between distal and focused or proximal attention.

This is material that is inaccessible or poorly accessible to consciousness, even on the most generous construal of the powers of reflection on consciousness, and is indisputably “individual” or “personal.” But Polanyi was also concerned with what could be transmitted, as well as the phenomenon of tradition, which for him consisted of tacit knowledge. In the case of science, he believed that personal contact was important, and especially important for great science. His slogan, “science is an apostolic succession,” refers to the custom of Bishops laying hands on the head of the confirmed in an unbroken chain of such acts of passing on charisma reaching back to the apostles themselves.

**Precognition and Functional Substitutes**

This poses the problem of tacit knowledge in a different way. Polanyi thinks of “… tacit thought as an indispensable element of all knowing and as the ultimate mental power by which all explicit knowledge is endowed with meaning …” (Polanyi, 1966, p. 60). But we have only very limited access to this element of knowing through introspection, reflection, or even consciousness. Nor can much of this be articulated. Moreover, there does seem to be something
passed on by personal contact, or at least some sort of experience that personal contact is important for. What is passed on may include, but not be limited to, what comes under the heading of tradition, which for Polanyi means something growing, changing, and adapting, rather than a sacralization of past habits or a set of unchanging rituals.

The issue of the occlusion of our mental processes in general is not a theme made central by Polanyi, but it can be easily teased out from his remarks on tacit knowledge and precognition. Polanyi’s account of discovery is not limited in its implications to discovery itself. It fits an extraordinarily large set of normal experiences in which we struggle with something—such as the problem of remembering a name or face, or figuring out how to make the next step in an argument—through a process that is not accessible to us, but which we know is a “process” rather than merely a reaction because of the time it takes and our intermittent awareness that we are bothered because we have not come up with the name or solved the problem.

In the case of scientific discovery, it seems that we normally know and come to know something in advance of our recognizing it and articulating it—some pattern is matched, locked onto, and fit with other patterns prior to our becoming conscious of it, or out of sight of our

\[\text{2 Wegner gives a much more aggressive account, based on an extensive overview of psychological research, of the limits and illusions of consciousness, which not only applies to the case of will, but to such things as the sense of collective belonging. Needless to add, many of his most pointed observations, especially on the phenomenon of individuals’ tendency to invent sense-making (and intentionalizing) reasons for behavior that is fact determined by other things, apply } \textit{mutatis mutandis} \text{ to the phenomenon of making tacit knowledge explicit (2002, pp. 171-86).}\]
consciousness or will. There is every reason to think that this is the case more generally: that the data we work with when we do something conscious or semiconscious like “interpretation” is already largely constructed for us tacitly. Put differently, when we use the notion of interpretation broadly, in the fashion, for example, of Hans-Georg Gadamer or Charles Taylor, to cover the whole meaning-conferring activity of the mind, we are making an analogy between a more or less explicit process of providing functional substitutes for passages of text that will make sense for another person with a tacit process of doing the same thing. This is a process similar to the repairing of inferences for a specific audience that we encountered with the sexism example. And it allows for a different account of “making explicit” involving normal social interaction.

Social interaction between individuals requires, for the success of the activities in which people engage, some degree of mutual understanding. If mutual understanding for the purpose of performing particular activities—functional understanding—is not based on “shared assumptions,” if this is only a misleading metaphor, what is the source of, and nature of, mutual understanding? Functional substitutability is an important issue for tacit knowledge because it provides a way of thinking about such things as machine substitutes for tacit knowledge—what Harry Collins calls prostheses (2010). But it also applies more generally. Different people may perform the “same” acts, such as driving or riding a bicycle, in different ways that are functionally equivalent. The same holds for social activities and speech. If we are concerned with such a “social” activity as driving, for example, we are faced with the fact that different drivers have different habits, different experiences, and different styles, and that they notice different things. To some extent these differences are smoothed out by training, an explicit process of learning that provides feedback. But to a large extent the feedback is “wild” and consists of
actual experiences with other drivers and other situations that go beyond the book or the driving school experience, and are individualized, because the individual has different experiences.

Some, indeed many, of these experiences involve other drivers, whose actions must be understood. But understanding, recognizing, representing, and so forth are terms that relate to conscious thought. They apply to the actual processes only by analogy. And this is a point that acquires a special importance in relation to tacit knowledge, for reasons that are made clear if we reconsider the idea of precognition: there is a gap between “knowing” in the sense of working through a problem, for example of recognizing a pattern, and articulating this knowledge. The gap in the case of scientific discovery is very large. We struggle with a problem, which may be a problem that we have been trying without success to articulate or which we can formulate but not solve, but our “struggle” may take place entirely or largely on the pre-cognitive, preconscious level and with preconscious materials.

What do we do when we articulate driving advice, for example to a novice driver? Do we pull something out of a stock of previously unspoken but already tacitly present sayings, which make the tacit explicit? Or do we repair inferences in a way that provides a functional substitute for what we know tacitly for the particular audience in question, a novice driver doing something that we recognize that we would not have done—waited too long to get into the turn lane, for example—which we can then formulate as practical “knowledge” or a rule which is a functional substitute for the driving and lane changing habits that we follow unconsciously. What we do routinely in interaction, for example, when we restate or paraphrase something that we see was not understood or which the hearer made the wrong inference from. As with explanations of our intentions, we are well-equipped to invent these on the spot. They tell us nothing about psychological processes: they are not reports of introspection, nor are they cases of dragging tacit
things of the same kind up from the tacit to the explicit. They are functional substitutes for specific needs, needs defined by and of the person we are speaking to, and we guess or hypothesize what saying will serve as the functional substitute, the aid, or the coaching pointer to repair the failure.

**Representations**

This account rests very heavily on something that is of little significance in either the bicycle model of tacit knowledge or the idea of collective tacit knowledge: social interaction. And this might seem to create its own regress, back to some form of shared tacit knowledge itself. There is a tradition in social theory of thinking in this way: social phenomenology as represented by Alfred Schutz, for example, or ethnomethodology, which would stress that our capacity to invent functional substitutes is a product of pre-existing more or less fixed local shared rules. These accounts run into the same difficulties as those I have outlined above, and are discussed at length in *The Social Theory of Practices* (Turner, 1994), and elsewhere (Turner, 2002), and I will not discuss them further here. As I have argued in these texts, there is no good way to convert these accounts into something that can be made consistent with actual brain processes. What is still to be explained is our capacity for the kind of recognition of the inferences and therefore inferential “errors” or differences of others which we seem to be so good at spotting and responding to with functional substitutes. More narrowly, is there a way of explaining these capacities that does not depend on common tacit knowledge or shared tacit objects? And what sort of cognitive or neuroscience reality would this account connect to?

This also a problem at the heart of the discussion of mirror neurons. Mirror neurons
activate both in the performance of actions and in the perception of actions. It has long been known that certain brain lesions cause individuals to imitate the bodily movements of others. This suggests—though this is still a matter of hypothesis—that the system underlying action works normally in such a way that when the system is activated by the perception of an action, the system prepares to imitate, but the imitative action is inhibited by another mechanism such that the same neurons for action are activated but without action occurring. This means of inhibition or taking the system off-line is hypothesized to be the one that allows for imagination of actions and thus simulation, understood as a brain process in which the same neurons for action (which are also those activated by perception) are activated without action taking place. Simulation is thought to be the means by which we “mind-read,” which thus becomes an off-line process involving the same neurons as those involved in perceiving an action of another person as “minded” or intentional (Iacoboni, 2009, p. 106-83).

The processes involved here are not conscious, or, perhaps it would be better to say, they are part of what is occluded from us about our own mental processes. But the language of the explicit intrudes in the usual descriptions of this work, as does the issue of the relation between the explicit or conscious and the tacit or implicit. Work on empathy and mirror neurons suggests that “we recognize someone else’s action because we manage to activate our own inner action representations using mirror neurons” (Keysers, Kohler, Umiltà, Nanetti, Fogassi & Gallese, 2003, p. 634). But the “we recognize” and “we manage” in this sentence are misleading analogical terms. This process is all tacit and unconscious, though our “recognitions” may become conscious. The process combines two mechanisms. We recognize and also improve our capacity to recognize on the basis of our own abilities to perform similar actions, and especially “from the massive experience we have accumulated over the years in planning and executing
self-produced activities” (Blake and Shiffar, 2007, p. 56). Dancers can see things about dance moves that other people can’t see (Cross, Hamilton, & Grafton, 2006); male and female ballet performers see the typical gender-specific dance moves of their own gender better (Calvo-Merino, Grèzes, Glaser, Passingham, & Haggard, 2006, 1907). The two mechanisms are mirroring or empathy—understood in a very thin sense—and learning by doing or habituation.

The Problem of Representation

But, there is an issue with this way of putting the problem of what the dancers are doing that is similar to the problems we run into with the idea of shared collective tacit objects, and it has to do with the term “representation.” The issue is stated by Goldman in connection with the idea of mind-reading:

Person A “directly” understands the mind of person B if A experiences a mental event that matches one experienced by B, and A’s mental event is caused by B’s mental event, via a brain mechanism that can reproduce such matches on similar occasions. (Goldman, 2010, n.p.)

Goldman asks the pertinent question:

Do babies who experience upsetness as a consequence of hearing another’s cry represent

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3 I provide a discussion of the thin sense in “The Strength of Weak Empathy” (forthcoming).
the latter as upset? As undergoing a matching state? That is debatable. If not, then I don’t think it’s a case of either mindreading or interpersonal understanding. For these to occur, the receiver must represent the sender as a subject of a similar state, must impute such a state to the sender. No such requirement is included in [this description of mirroring]. (Goldman, 2010, n.p.; emphasis in the original)

At what point does “interpersonal understanding” occur? For Goldman, it is not at the point of making explicit statements about them, or even of mentally rehearsing statements about them, each of which would be “social” or refer to a prospective audience, but before this point: at the point of possessing a “representation” of something that can then be matched to something else coming from another person, producing understanding.

It is a short step from this use of the notion of matching representations to the idea of collectively shared representations. This step is implicitly made when the term “concept” is substituted for representation. As a philosophical term, the origins of the term concept are in the idea of an object of thought that is shared in the sense that it is accessible or can be “possessed” by many people. But are there such things as representations—or imputations of mental states, for that matter? And even if there are,—if the baby has a picture that corresponds to the thing being recognized—does it play a role in this kind of interaction? This is at least one site which allows us to think about the relation between social interaction and shared objects, and to make the relevant distinctions. The larger issue is this: what sorts of mental things are needed to account for interaction? Do we need at least something substantial that could be shared or matched—a proto-collective concept of some sort—or does this talk add nothing to what other mechanisms, for example mirror neurons plus our capacity to invent functional substitutes in
speech—already provide?

The “contagion” described by Goldman seems to involve some sort of response in kind: the baby cries in response to the cry of the other baby, rather than responding in some other way. But this, Goldman thinks, is not matching because there is no “representation” made by the responding baby. The idea of a matching representation, however, involves a mysterious process applying to representations. For Goldman, a similar intuition governs the use of the term empathy: contagion is not empathy because the baby is not taking the other baby as an object to empathize with. The hint that empathy, or imitation, or imputation, must be a process modeled on or very similar to conscious, intentional, and explicit versions of the same thing is never far from the surface of these discussions, and this should not be surprising: these are analogies, and making the analogy convincing requires that as many elements are in common between the analogized objects as possible. But we have just seen in connection with tacit knowledge that this analogy can be completely misleading about the relevant mental processes.

In the case of the baby one sees that there is a serious difficulty in making the “matched representations” picture plausible. Somehow, the baby needs to develop in such a way that eventually the “in kind” responses transform into representations and imputations. For Goldman these are strictly mental things—they imply nothing about explicit speech or language. The acts of imputing and representing, however, are “explicit”: attributing them to mental objects is analogical, with all the problems that kind of analogizing produces. Nevertheless, the analogizing allows us to build a picture. The picture is that babies respond in kind first, perhaps via mirror neurons, and later pass into a stage in which they represent, impute, and thus can be said to understand. Later yet they can articulate this understanding. But what would a representation be made of, and how would the baby come to have the same kinds of
representations as others? If we are talking about cultural differences, this representation-making activity of the brain seems to require some sort of mechanism that not only constructs mental representations, but matches them to the representations in the minds of others. It is a short step from this way of thinking to the idea, as Durkheim famously put it, that society is made of representations, by which he meant precisely this kind of shared, or as he called them “collective,” representations (1982, pp. 108-42).

There is no reason, however, to take this path, that is, to require that the baby develop in such a way that representations are constructed (somehow) out of in-kind responses and then synchronized to the culture at large, and then articulated (or perhaps in some other order). The only thing compelling us to do so is the analogy between actual explicit representation and a supposed mental act of representation that is supposed to serve as the mental backing for articulated speech. This is a way of construing the problem that, as Wittgenstein said, is like thinking that there is painted steam inside the painted pot ([1953] 1958, p. 107 §297). A simpler account would be this: the baby responds, through the mirror neuron system, in-kind as “contagion,” and subsequently responds, perhaps through the same mirroring mechanism, to articulated speech, which is “understood” as intended when the baby comes to connect speech with intention and responds through the mirror neuron system to intentional actions as a kind. The use of speech serves to stabilize or crystallize the mirror neuron systems’ in-kind responses, and to add to them, as experience adds to the dancers’ ability to discern distinctions. This in turn produces more or less standardized usages in speech that can be constructed by an observer as a language.

What work could mirror neurons do in this? The current evidence is that the mirror neuron system is not limited to motion related parts of the brain, but that mirror neurons are
widely distributed in the brain. There is also evidence that the kind of imitation that occurs through the mirror neuron system is not limited to motions: that imitation of goal-seeking works in the same way. Moreover, there is a great deal of evidence about how early in the developmental process babies become attuned to intentions. So it is plausible to think that a great deal of tacit knowledge is acquired before children speak, and that the system is activating “action” neurons as well as allowing for feedback. In short, they know something, and perhaps a lot, about action and understanding others, tacitly. This has an effect on our way of thinking about action. Representation is traditionally understood to be a precondition of action—the act is an attempt to achieve the represented goal. But if goal-oriented action is already imitated (unconsciously) through the mirror neuron system, it does so before representations, or shared representations, play a role. The explanatory need for “representations” and the problem of explaining how the representations got there disappears.

The interesting problem then becomes explicitness. The developing child lives in a world of people whose conduct, including goal seeking, is mirrored in the child’s mind, in a tacit way. What happens when the child begins to speak about mental life? The developmental evidence here is compelling: children apply this language to themselves and to others at the same time, and begin to use the words that relate to mental life in stages. At each stage the situation is the same: they begin to explicitly impute states to others at the same time they explicitly impute them to themselves. This is at least suggestive: imputation is something that is learned socially, and the words are applied in the context of mirroring, a situation of mutual in-feeling which provides a basis for understanding the mentalistic words.

Polanyi’s notion of precognition in scientific discovery provides a model for this situation of language learning. For Polanyi, in the course of discovery the scientist already “knows” or has
tacitly made the discovery in advance of being able to articulate it or represent it. Making a
discovery involves a struggle to articulate. But it is a struggle to articulate something that is
already there, or has already been arrived at in thought, in a precognitive form. The situation is
similar to Goldman’s contagion: the babies know what crying is, and that others are doing the
same thing. They cannot yet articulate it or “represent” it. But when they are presented with the
term “cry” in the context of joint attention to the act of crying, they can learn to articulate their
inchoate knowledge. So in language learning they do not need to rely solely on trial and error to
learn the correct words. They can rely on precognition produced by the experience of mirroring
others and “know” that they are talking about the same things.

Which of these accounts of the acquisition of common competence to communicate is
more plausible? The implausible account is this: that there is “contagion” and other mirror-like
responses first, then representation, then the matching of representations with objects, all of
which is tacit, and then some sort of additional matching of representations to articulate speech,
which allows the mental things that are tacit to become explicit. The implausibility comes in at a
familiar point: the matching of representations in one head with those in another head, or in the
collective head in which these shared representations are stored, ready to be downloaded. The
more plausible account, though of course only a sketch, is that the kind of non-matching
response Goldman calls contagion comes first, gets refined through feedback, and then, in this
more advanced state, gets engaged with the intentional act of speaking, which in turn, through
repeated interactions with others who provide feedback, produces regularized habits of speech
which copy the goal-seeking or intentional aspects of the speech that the child is exposed to, and
the inferences that others are seen to make. These patterns become regularized between people
by the same discipline: to understand and to be understood one must perform the kinds of speech
acts that others understand, and in this way “mean what one says.” They get knit together into a “whole” within the individual by virtue of the inferential connections, and, because this whole is in rough but imperfect correspondence to others, there is a loose sense in which there is an external “shared” thing, a concept or representation, that corresponds to the individual’s habituated patterns. But only a loose sense, because the mechanism is not one which downloads exact copies, but rather downloads matches in behavior that are good enough for the purposes of interaction, including such things as joint attention, and making oneself understood.

**Representations and “Concepts” Reconsidered**

In this sketch, representations are superfluous. But of course there is a whole range of thinking in which representations do perform explanatory work, and they do so, as Eduard Machery notes, in connection with “the cognitive processes underlying categorization, induction, deduction, analogy-making, planning, or linguistic comprehension” (2009, p. 110). Moreover, representations or concepts are the sorts of things we can “make explicit.” And these other cognitive functions raise questions about whether we can ignore representations as part of our explanatory account of tacit knowledge and its transmission. The literature in this area, nicely summarized in Machery (2009) is complex and problematic: it does not yield a clear picture of “concepts” as a psychological phenomenon that integrates the various roles that the concept of concept has played in past literatures. It specifically fails to provide any support for the idea of “matching” representations. The alternative is an even more speculative and groundless idea: that there is a common pre-established language of thought that assures that each of us possesses the same stock of representations, which would enable matching. But this idea, even if it was
substantiated, would be useless in explaining the highly specific and differentiated kind of mental contents that the term tacit knowledge is used to describe.

The work of a school known as neo-empiricism supports a certain view of the cognitive processes that employ representations, and need to be fitted with a psychology of tacit knowledge. As Machery explains it, the “central insight” of this school (Barsalou 1999, p. 586; Prinz 2002, p. 148; Stein 1995) is that “these cognitive processes involve tokening and manipulating perceptual representations,” and that “retrieving a concept from long-term memory during reasoning or categorization consists of tokening some perceptual representations. For example, retrieving the concept of dog consists of tokening some visual, auditory, etc., representations of dogs” (Machery, 2009, p. 110). This amounts to a form of “simulation” or “reenactment” which produces an experience like the original perceptual experience (Machery, 2009; see also Barsalou, 1999, p. 578; Barsalou et al., 2003, p. 85; Prinz, 2002, p. 150).

The key to this account, however, is the process of retrieval, and what it consists of. What does one retrieve? A concept? And is a concept a stable object in memory, or something else. One of Barsalou’s and his students’ experiments (Barsalou, Solomon & Wu, 1999; Wu, 1995) involves making a tacit concept explicit by listing the properties of the concept. Subjects are presented with a word, for instance, “dog,” and are asked to list the properties that are typically true of the denoted objects. Psychologists of concepts assume that in this task, subjects retrieve their concepts from their long-term memory and use the knowledge stored in the concept to solve the task. (Machery, 2009, p. 112)

The results of these experiments, however, show that subjects list different things when they list
the properties of dogs, that what they list is dependent on the context, that is to say on such things as the expectations of others. This is not a dramatic finding, but it is suggestive: presumably it means that what is in the subjects long term memory about dogs, that is to say something tacit they are making explicit, is personal, a collection of their perceptual experiences, rather than collective, and certainly not collective in the sense implied by philosophical theories of concepts as shared objects of thought which one either possesses or not, and that the “concept” that comes to mind for them, exhibited in lists of properties, is constructed on the fly out of these materials, rather than sitting in the brain in some fixed form.

“Matching” is not a part, or not yet a part, of this account. Indeed, there is a problem with matching and the idea of shared concepts that appears with experiments. As Machery summarizes the findings,

on two occasions (two weeks apart), subjects were asked to describe bachelors, birds, chairs, and so on (a feature production task). Overlap in the properties mentioned by different subjects on a given occasion and by the same subject across the two occasions was calculated. Barsalou and colleagues found that only 44 percent of the properties mentioned by a given subject were mentioned by another subject and that only 66 percent of the properties mentioned by a subject on a given occasion were mentioned by this very subject on the other occasion. (Machery, 2009, 23)

Thus there is nothing like “matching” between subjects with respect to concepts, but rather more or less overlap in properties made explicit, and instability between occasions for the subjects themselves.
Nevertheless, as Machery notes, “Barsalou’s own findings show that the variability of the knowledge we bring to bear in different contexts is small and is thus consistent with the existence of bodies of knowledge being retrieved by default from long-term memory” (Machery, 2009, p. 23). These considerations led Barsalou to argue that “instead of being default bodies of knowledge in long-term memory, concepts are temporary bodies of knowledge in working memory. According to his proposal, concepts are constructed on the fly so that we can reason, categorize, and so on, in a context-sensitive manner” (Machery, 2009, p. 21). As Barsalou puts it:

a concept is a temporary construction in working memory, derived from a larger body of knowledge in long-term memory to represent a category, where a category, roughly speaking, is a related set of entities from any ontological type . . . . Across contexts, a given person’s concept for the same category may change, utilizing different knowledge from long-term memory, at least to some extent. (Barsalou 1993, p. 29; quoted in Machery 2009, p. 22)

This applies to much of what falls under the heading of tacit knowledge: not perhaps the evanescent precognitions that the scientist attempts to articulate in the course of scientific discovery, but to the process of articulation itself, which is a matter of constructing an articulation, on the fly, that is sensitive to context.

The effect of this line of argument is to shift the problem of understanding others from one of matching representations in order to enable understanding to one of responding to the other as a another thinking, acting, being and using ones empathic capacity to guess successfully
how to articulate interventions, explanations, and the like (prostheses which are functional equivalents) in order to facilitate interaction, repair inferences, and so forth. The former requires a set of common representations which can be matched. And this hypothesis requires an answer to the questions of how these representations are acquired and transmitted, how they are kept stable, and more generally how a process like downloading from a common server can be mimicked by the kinds of processes of learning, habituating, remembering, and interacting that humans actually engage in. As I have argued elsewhere, there is no good answer to these questions. But there is no need for an account of concepts, or tacit knowledge, that requires this kind of “collective object” hypotheses.

**Tacit Knowledge Reconsidered**

What does all this have to do with tacit knowledge as it is normally understood? If we think of the problem of mutual understanding in terms of mind-reading, there would be no need to convey tacit knowledge. The ideal mind-reader would already have access to it. Prostheses, such as claims about assumptions, or about what someone knows or believes, have a place where empathy fails. When we explain ourselves to an audience, we guess or hypothesize what it is that would make our actions or claims intelligible. We are guessing at what prostheses will enable them to understand us, or us to understand them. We may guess wrong: this is an act akin to discovery or invention. But we are good at doing this, and especially good at it among people with whom we have learned about language and the world, because we can rely on our mostly successful ability to think as they do, and can identify what we would have had to think to draw the conclusions they draw.
To say this is to radically separate the explicit from the tacit: it is not a matter of saying what is in the mind. What happens when one makes an assumption “explicit” is simply to say, to a specific audience with specific knowledge and inferential habits for whom this is useful, that whatever the psychological facts of the matter are, the people in question are reasoning as if they assumed $x$. The “as if” assumption statement, the prosthesis, is audience specific and an invention. We will be unable to construct this kind of invention, except by lucky accident, unless we have some prior understanding of the thinking of the audience that needs the prosthesis.

This leaves the question of the psychological or neuroscience facts of the matter themselves. But when we add mirror neurons to the story, these facts are already, implicitly, facts about social interaction. Who we are, our skills, competencies, capacities to discern and distinguish, which is to say the conditions of our conscious thought, are a matter of whom we have interacted with and from whom we acquired, through the twin mechanisms of mirroring and feedback, skills, competencies, and capacities to discern and distinguish. The dancers mentioned earlier are who they are for this reason, but the point is more general. It is a traditional idea in the tacit knowledge literature, as noted earlier, that tacit knowledge passes from person to person in the course of close interaction. To the extent that this is true, we, as tacit knowers, are the product of our interactions.

But the boundaries of tacit knowledge are not so precise. We know more, or different things, than the things we get simply through interaction. As with the dancers, there is mirror knowledge and there is feedback. Each works together to form the individual’s unique set of skills, competencies, capacities to distinguish, and so forth. Some of these may be novel and distinctive—a new dance move invented consciously and then learned and embodied as a skill, for example—and can be conveyed to others by the same mechanisms of mirroring and
feedback. But there are also skills that we develop without interaction, through feedback alone, through invention and feedback, and so forth. Of course even these things may have elements from the world of interaction with others. As tacit knowers we are not simply products of our interactions, or of mirroring: there is learning, too.

A few final thoughts of larger significance than the issue of tacit knowledge itself might be added. The “as if” character of assumptions talk extends to the problems that are generated by this language, such as the regress problem. In psychological reality, there is no regress problem, and nothing for transcendental reasoning to reach: there are, rather, inferences that a person makes without reference to any conscious or introspectively accessible source. Jerome Bruner commented that “when things are as they should be, the narratives of Folk Psychology are unnecessary” (1990, p. 40). The same point applies to the term “assumptions.” They repair communication and facilitate understanding. They are a crutch that gets one to the point of empathic understanding. To describe one’s own “assumptions” or those of others is merely to engage in an “as if” exercise, in the language of a special kind of folk pseudo-psychology, for an audience for whom the addition of the “assumption” makes the actions, sayings, or attitudes of the person intelligible to the other person. But they can only repair communication against the background of other things that are tacitly understood in a way that is functionally equivalent for both parties. This is as much “empathy” as we need. Bruner’s point turns the problem of assumptions on its head: the baseline is not the individual knower with a problem of grounding experience, which he or she discovers can only be done on the basis of assumptions, and communicated only when there are shared assumptions. For Bruner, the problem is communicating and understanding others. The baseline is not the individual groping for the intersubjective or collective conditions of understanding, but the fact that we do understand each
other, that we know what the other person is doing when they act, and so forth—not always, but much of the time, and without a process of conscious or introspectable reasoning of the sort analogized as the making of assumptions. This “knowledge” is a product of mirror neurons—a neurophysiological “natural” fact, and not a mysterious invented fact, such as a collective tacit object or transcendental conditions of reasoning.

As I have suggested, the problem with tacit knowledge is explaining how it is transmitted. Explicit knowledge is transmitted through explicit means: speech, texts, and so forth. To the extent that tacit knowledge is transmitted, it requires, by definition, other means. The problem arises from the analogy between the “knowledge” that is tacit and the knowledge that is articulated when what is tacit is made explicit. If we think that these are the same thing, or more or less the same thing, the knowledge will come in the form of articulable assumptions and the like. And we will need an account of transmission that transmits these kinds of things tacitly. This is where the argument runs into a wall, for there are no such means. The reason, however, is that the explicit statements that people make to enable themselves to be understood, or construct to enable them to understand others, do not correspond to tacit knowledge. They are, rather, functional substitutes for bits of tacit knowledge for particular audiences and particular purposes, invented on the fly.

The idea of tacit knowledge contrasts to this. One cannot read a book to learn how to read. What one learns in the course of learning to read, perhaps largely through some process of mirror neuron imitating and understanding together with feedback, is tacit, and it is knowledge of a “knowing how” kind. One can provide many partial functional substitutes for this knowledge in the course of teaching a child to read, for example in the form of coaching pointers about how to see words or associate sounds and letters. But the tacit skill of reading as a matter of
psychological fact cannot consist in the memorization and application of these pointers. A reader
who “read” in this way would be unable to read at the speed of genuinely skilled readers. As the
bicycle riding example suggests, this is a matter of individual learning. The mystery aspect of
tacit knowledge is entirely a product of the mistaken analogy between explicit functional
substitutes with an “as if” character and the actual content of the brain.

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