Signals, Schemas, Subsidiaries, and Skills: Articulating the Inarticulate

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ABSTRACT Key Words: Michael Polanyi, Susanne Langer, Eugene Gendlin, Daniel Schacter, tacit knowing, explicit knowing, gestalt, schema, signal, symbol, integration, evocation.
This essay examines Michael Polanyi's notion of tacit knowing and seeks to clarify and elaborate upon its claims. Tacit knowing, which is conscious although inarticulate, must be distinguished from tacit processes, which are largely unconscious. Schematization is explored as a primary tacit process that humans share with all animals. This tacit process organizes and secures, in long-term memory, information of interest provided by receptors and those learned skills conducive to survival. Human empirical knowing integrates schematized subsidiaries into articulate explicitness through culturally-embedded symbols evoked in terms of felt fittingness.

The thesis of this paper is quite easy to state: the tacit dimension of human knowing is implicated in all learning and accomplishing. Its processes and capabilities ought to be included in any adequate philosophical system. Yet for a process so central to education and achievement, there is a comparatively limited amount of attention paid to tacit knowing in scholarly writing, and there is surprisingly little consensus about how it functions. The literature in psychology contains disconnected discussion about various non-conscious contributors to knowledge, but nothing quite as comprehensive as a coherent theory of tacit knowing has emerged in psychology so far as I am aware. The most sustained version of a theory about tacit knowing has been produced by the scientist-philosopher who coined the term: Michael Polanyi. This paper is centered in Polanyi's contributions, which are provocative and substantial. However, I do not always find Polanyi's many discussions of tacit knowing to be entirely consistent or clearly defined. Consequently, I have incorporated ideas from other thinkers insofar as they seem able to deepen and clarify Polanyi's insights. The essay also relies on personal experiences and reflections and so must finally be seen as my very modest attempt, still in process, toward explicating tacit knowing and showing its place within philosophy.

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What is tacit knowing? Polanyi does not offer one stock answer, but rather tends to illuminate the meaning of the term through the use of examples. We will later follow the same procedure. Polanyi typically centers his discussion by speaking of the structure of tacit knowing. This structure distinguishes between subsidiary and focal awareness. Polanyi claims that all focal awareness depends upon the tacit integration of subsidiaries to produce a focal whole. His analysis arises out of gestalt psychology, but greatly expands the scope and ramifications of its psychological origins.

To get a clear beginning point for our discussion, let us examine material from three paragraphs of the well known Preface to the Torchbook edition of Polanyi's *magnum opus*, *Personal Knowledge*:

> When we are relying on our awareness of something (A) for attending to something else (B), we are but subsidiarily aware of A. The thing B to which we are thus focally attending,

is then the meaning of A. The focal object B is always identifiable, while things like A, of which we are subsidiarily aware, may be unidentifiable. The two kinds of awareness are mutually exclusive: when we switch our attention to something of which we have hitherto been subsidiarily aware, it loses its previous meaning. Such is briefly, *the structure of tacit knowing.*

Now to the distinction between tacit and explicit knowledge. Things of which we are focally aware can be explicitly identified; but no knowledge can be made *wholly explicit.* For one thing, the meaning of language, when in use, lies in its tacit component; for another, to use language involves actions of our body of which we have only a subsidiary awareness. Hence, tacit knowing is more fundamental than explicit knowing: *we can know more than we can tell and we can tell nothing without relying on our awareness of things we may not be able to tell.*

Things which we can tell, we know by observing them; those that we cannot tell, we know by dwelling in them. (1964, x)

I find the identification of the focal-subsidiary relationship to represent a breakthrough in epistemological analysis. To more fully represent Polanyi's complete vision, the quotation should be augmented by the following claim: "The relation of a subsidiary to a focus is formed by the *act of a person* who integrates one to the other" (1975, 38). Once one becomes aware of some personal examples of attending from some things toward their integrated meaning, one finds this to be a pervasive pattern of how we think and act in the world. Our thought and action are grounded in bodily skills that are easy to overlook, yet if ignored give rise to false forms of understanding and learning.

The structure of tacit knowing, as indicated in the first paragraph quoted, is clearly enough stated, although it should be noted that usually Polanyi speaks of multiple clues at A that are integrated to form B. It should be further noted that in the second paragraph Polanyi calls for a distinction between tacit and explicit knowledge yet analyzes both in terms of the structure of tacit knowing. Should there not be a separate structure of explicit knowing? Yes, I believe there is a more complex structure within one type of explicit knowing: the distinctively human type of knowing utilizing language. Different sorts of explicit achievements may be called articulations, but I will reserve the term "articulate" for states of consciousness and accompanying actions that are shaped by language. Later I will agree with Polanyi that tacit knowing has a <u>from-to</u> structure but suggest articulate explicit knowing is best interpreted in terms of a <u>from-via-to</u> structure. In short, there are both articulate and inarticulate forms of focal awareness, but only articulate consciousness can be largely explicit. As humans with an insatiable need to imbue our experience with language, we usually stress articulate explicit knowing. However, our skillful acts are examples of inarticulate explicit knowing – for example, the playing of a scherzo on a piano, figuring where one is by reading a map, or making free throws during a basketball game.

The sentence in the third paragraph quoted above is suggestive if not yet entirely clear. This seems to be claimed by Polanyi: if we observe an object in order to know it, words are evoked and we can describe it (articulate explicit knowing), whereas if we simply dwell in the subsidiaries, they form a background of understanding for which words are not needed (inarticulate tacit knowing). But is the subsidiary-focal structure, the structure of tacit knowing, involved if we merely dwell in what we have learned? Would it not be helpful to distinguish between passive tacit knowledge in which we dwell (e.g., that which has been internalized and exists in some form of long-term memory) and active tacit knowing such as piano playing,

map reading, and basketball shooting?

What seems missing in the paragraphs under consideration is any mention of what drives or motivates mental activity. But an emphasis on such motivation is not lacking in Polanyi's thought when taken as a whole. In *Personal Knowledge*, Polanyi stresses that intellectual and moral passions are powerful motivating forces, and he also grants an important role to the seeking of satisfactions. In *Meaning*, he and Harry Prosch accentuate the significance of interest in shaping mental activity. Although the role of feelings or emotions in general and passions in particular will not be emphasized in this essay, it should be born in mind that they are the engines powering much tacit activity.

Polanyi indicates in the quotation that we may be aware of the subsidiaries, but that often we are not conscious of them. Indeed, he claims we cannot specify all the subsidiaries involved in tacit knowing (1969, 124). Less clear is whether the focus needs to be conscious. In the quotation, the focal object is said (twice) to be always identifiable. But elsewhere Polanyi indicates we may not be aware of the focal object – as we strain to solve a scientific problem, for instance. "We can focus our attention on the joint meaning of particulars, even when the focus to which we are attending has no tangible centre. It represents our capacity to know a problem. A problem designates a gap within a constellation of clues pointing towards something unknown" (1969, 171). I believe a better – and still Polanyian – way of describing the process of seeking a scientific explanation is to see it as requiring a dialectical interplay between integration (which Polanyi emphasizes), analysis, and evocation (which he sometimes ignores). "All true scientific research starts with hitting on a deep and promising problem, and this is half the discovery. Is a problem a hypothesis? It is something much vaguer" (1969, 118). Thus the scientist begins with a promising but vague problem as a focal whole for which the fitting subsidiaries are sought through evocation. They would serve as the explanatory parts that can be adequately integrated to comprise the articulated whole. Similarly, the pianist focuses on the intuited whole of a piece which evokes the fingers to play correct notes as the fitting subsidiaries to the complete performance. Disaster occurs if the pianist starts observing what notes his or her fingers are playing.

In several places , Polanyi mentions the psychological experiment where a subject is shown the same nonsense syllables before an electric shock is administered. The subject comes to anticipate the shock, but cannot tell what led him to expect it. Polanyi states, "The experiment in question produces a fixed relation between two events, both of which we know but only one of which we can tell" (1969, 142; see also 1966, 7-12). He sees the anticipation of the impending shock as having a gestalt-like character and thus confirming tacit knowing. What is not explicitly known is the experimentally-contrived connection between the syllables and the shock, but it is implicitly known. Should this connection be described as an event as Polanyi does? What exactly is the nature of the integration in this case?

Psychological research carried out during the past several decades has suggested that the non-conscious connections Polanyi wrote about are rooted in an aspect of long-term memory Daniel Schacter labeled the "perceptual representation system" or PRS. This system "is specialized to deal with the form and structure of words and objects, but it does not 'know' anything about what words mean or what objects are used for. Meaningful associations and concepts are handled by semantic memory, which cooperates closely with PRS" (Schacter 1996, 184). PRS plays a role in many examples of priming, where some sort of perception that is not remembered influences a later choice that is fully conscious. Schacter says priming is likely involved in instances of unconscious plagiarism (167). Priming, in turn, is a feature of the hidden world of implicit memory. "Ideas pop to mind unattached to any setting or context, and we believe that we have come up with

them ourselves, even though they derive from a specific experience" (189). The non-conscious action of implicit memory has nothing to do with the repression postulated by Freud as essential to unconscious processes. Rather implicit memory is best seen as one of the non-conscious processes contributing to the broader notion of tacit knowing. The notion of non-conscious processing is controversial in some quarters. Joseph LeDoux, after offering two common arguments against the relevance of non-conscious processing, supplies a number of persuasive counterarguments that support the position taken in this paper (see 1998, footnote 47, 311-312).

Further analysis of the three paragraphs above from Polanyi raises more questions. In the first paragraph, B (the focus) is said to be the meaning of A, but in the second paragraph he states that "the meaning of language, when in use, lies in its tacit component." I find this puzzling: the meaning of language when properly used would seem to be explicit, not tacit. This is but one instance of confusion I have about exactly what Polanyi means by "tacit." The basic dictionary meaning of "tacit" is "to be understood without being put into words," and clearly that is often the meaning Polanyi has in mind. That will be my usage: the tacit is the inarticulate. Why then would he say that the meaning of language in use (the articulate) is tacit (inarticulate)? Meaning is intangible – is that what he means to indicate? Or does he mean to state that language is parasitic upon and expressive of tacitly known material (that which, we will see, has been schematized)? I lean toward the latter interpretation.

My purpose in quoting Polanyi and then raising questions about what he means is twofold. First, in talking about tacit knowing it is important to start with a primary source and become familiar with its vocabulary. Second, I also want to indicate that while Polanyi's general perspective is very insightful, it is not without problems. Clarity and consistency in the use of terms is needed. Moreover, new insights have arisen since Polanyi wrote. I proceed as a philosopher ready to make use of helpful insights from psychology, linguistics, anthropology, biology, or wherever they may come from.

Here, then, is a brief summary of what I mean by tacit knowing. It is, positively speaking, an embodied art of skillful accomplishment. It underlies both heuristic achievements and reversible mental functioning. It is also helpful to say what it is not: it is not the symbol-dependent, articulate aspect of knowing that is in the forefront of human consciousness. Tacit knowing is the sort of knowing we humans share with other animals. It is controversial to state whether or to what extent we have instinctual knowledge lent to us purely by our genes. Surely most knowledge at a tacit, inarticulate level is <u>learned</u>: our genes provide us dispositions and aptitudes that must be developed through practice and experience.

Polanyi surveys the development of human mentality in Part Four of *Personal Knowledge*, and he shows how human thought is dependent upon achievements gained earlier by animals during their evolutionary trajectory. There are a great many abstractive and schematizing processes involved in inarticulate learning. Whether the subsidiary-focal structure is pervasive in all animal learning is an empirical psychological question I am not competent to answer. However, from a philosophical perspective Polanyi's structure of tacit knowing results in the unified consciousness that would be necessary for an animal to respond intelligently to the complex challenges facing it. Without a center of individuality provided by the integration of significant particulars into unified knowledge, an animal would be simultaneously pulled in many incompatible directions and would not be able to survive.

Polanyi speaks of two types of awareness, the subsidiary and the focal. I find it useful to place these

two types of awareness in the context of three levels of responsiveness that have emerged in the evolutionary history of life. Most basic is the stimulus-response provided by receptors. Even the simplest forms of life, like the archea and bacteria, have receptors leading to food. These chemical machines have no center of decision-making as individuals; their survival depends on the viability of their genetic coding for specific activities within a given ecological niche. This first level sort of mechanistic stimulus-response activity characterizes as well the relative complexity of plant functioning. But with the advent of animal life, individual centers of responsible decision-making enter the picture. As we shall see later, at this second level, individual learning emerges within what can now be called consciousness. Animals process and select among the incoming signals provided by receptors, and we shall later explore with Polanyi three types of inarticulate learning. For reasons mentioned in the last paragraph, it makes sense to see the subsidiary-focal and from-to distinctions emerging within this level of responsiveness. The language permeated third level is found only (with controversial exceptions) among humans, and personhood emerges. The use of symbols allows for a great expansion in the power of the individual person, as attested to by our technological prowess. Our focus will be upon the tacit knowing that emerges in many degrees of complexity at the second level, but with Polanyi our attention will not be upon animals studies per se. Our concern will be with the tacit intelligence humans have inherited from other animals and continue to rely upon even as we have superimposed our noisy linguistic learning upon these inarticulate forms of intelligence to such a degree that our less intrusive tacit knowing has been overlooked by most interpreters of our humanity. But not by Polanyi.

Polanyi wants to restrict tacit knowing to conscious states (1975, 41). In order for this restriction to be honored, it is important to distinguish tacit knowing from tacit processes, such as PRS, which may be fully unconscious contributors to the conscious dimension of tacit knowing. Acts of integration, such as the integration of the visual field provided by each of our eyes into three-dimensional vision, are usually not conscious acts. Polanyi sees integrative acts to be the quintessential tacit power (1969, 140), but these include the coordination of muscular particulars in performing some intentional act – they are hardly the subject of conscious attention. Consequently, tacit processes can be understood to be comparable to non-conscious or unconscious processes. Sometimes the unconscious has been reified and treated as a substance or realm (as by Freud), but that is problematic on any score, and what is tacit will not be treated in such a manner. Tacit knowing will be understood to always have a conscious dimension, but tacit processes need not necessarily be conscious.

Why is it important to learn about tacit knowing? First, there is a tacit dimension to all knowing, so if one is to comprehend what makes knowing possible, it is vital to understand the root processes that contribute to the construction of the content of knowledge. Second, once one appreciates the significant contribution tacit knowing makes in the construction of any knowledge, one will not be misled by the objectivism that for years has plagued Western philosophy and contributed to false, unreachable standards regarding what counts as knowledge. Third, when objectivism falls by the wayside, so do objectivist philosophies that have failed to offer helpful vision and guidance for human existence. Positivism and scientism, which reject tacit processes as subjective and unreliable, offer truncated epistemologies based on an illusory objectivity. Fourth, when it becomes clear that our use of language depends upon tacit, non-verbal skills, then the various philosophical schools that tend to assume that knowledge is totally enveloped in language will be called into question. The philosophy of the later Wittgenstein, post-modernists like Rorty and Derrida, and, on some readings, Kuhn, tend to fall prey to some form of relativism or, worse yet, eventuate in incommensurable forms of life. The incoherence introduced into the world by such philosophical views results when language is regarded as inescapable and the reality of the tacit is forgotten. Fifth, a clear rendering of tacit processes eliminates the

need to refer to the dubious reified realm of the unconscious, most famously advanced by Freud, but influential in much speculative theorizing outside psychology as well as within it. Yet clearly there are many non-conscious processes affecting human thought and behavior, and a carefully developed theory of tacit processes and tacit knowing can explicate unconscious dynamics in a helpful way.

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Let us begin exploring the varieties of tacit knowing by comparing how we come to know in four different cases (each example being inspired by Polanyi's writings). In the course of examining the cases, key factors involved in tacit knowing will be identified and discussed.

1) I come across an unknown person in a crowd and suddenly recognize her face.

2) I spend quite a bit of time trying to solve a calculus problem by different methods and then later while in bed suddenly the answer comes to me.

3) I learn how to ride a bike.

4) I learn the dimensions of a small chamber branching off a dark cave by using a probe.

* * *

1) When I first come face to face with the unrecognized person in a crowd, she looks vaguely familiar, but I have to scan her features several times before I can recall who she is. Her face has a gestalt that allows me to identify her. How do I accomplish this?

Security concerns, heightened by the threat of terrorism, have accentuated the interest in understanding the process of identifying who persons are. Joseph Atick, seeking to develop face recognition technology, tried to imagine how the mind actually processes facial images. "It seemed like a data-crunching problem, how to process millions of subtle pieces of information. But he realized . . . the solution lay in the opposite direction. It was about using as *little* information as possible. . . . [His system] looked at a few dozen points on a face and used those points to create a face print" (O'Harrow 2005, 161). Another recognition technology, fingerprint identification, relies not on recording skin loops and ridges, but on targeting pattern anomalies. Are there clues here to how humans use tacit features to recognize entities?

To recognize a face, we observe certain key features – perhaps cheekbone position, type of chin, extent of lips, size of eyes, length of head, and so on – and integrate them into a comprehensive pattern as we seek to match a remembered pattern. The particular details we integrate are not observed as separate objects, but are indwelt as subsidiaries in a particular pattern (Polanyi 1969, 182). We are aware of these features insofar as they bear in an integrated way upon their joint meaning, the face that is the focus of our conscious attention. Our resulting consciousness has a from-to structure. We are conscious <u>from</u> the subsidiary features <u>to</u> her face as a recognized whole. The integration that occurs is different than a linear summation of clearly described particulars. It is an unspecifiable, tacit act. "Specifiability remains incomplete in two ways. First, there is always a residue of particulars left unspecified; and, second, even when particulars can be identified, isolation changes their appearance to some extent" (1969, 124). Presumably if no specific gestalt from among the reservoir of accessible gestalts served to identify her face, attention to additional details would be attempted: one might examine the person's hair color, clothing, general body shape, manner of moving, etc., for the distinctive characteristics or anomalies that provide the clue to her identity.

Often the person's name will come to awareness at virtually the same time I recognize her, but not necessarily. As a professor who has taught many years, frequently I may recognize a person I have known (quite possibly a student), but out of context, I cannot come up with that person's name at that moment. This example supports our intuitive sense that the process of recognition is a tacit skill in which language has no essential place.

A crucial notion for understanding tacit knowing is the schema. Humans and animals alike depend upon schemas to instantiate lessons learned. Once mentally implanted, they facilitate purposeful responses to the changing demands of the environment and order actions, perceptions, and conceptions. It was mentioned that in order to identify a face, I needed to compare the gestalt I was viewing with similar gestalts I have known. These remembered gestalts are examples of schemas. The notion of a schema was used by Kant and has been used in different loosely connected ways ever since. Ann Brown states, "The use of the term *schema* is widespread, vague, and not always overladen with meaning" (1979, 231). It is therefore incumbent on me to be as clear as possible about what I mean by the term and to indicate why I find schemas to be so important for understanding tacit processes (for further elaboration, see Gulick, 1992-93, 17-20).

Kant introduced the notion of a schema as an embodied rule that would allow one to generate an imagined representation (say, of one's home) to fit and illustrate a concept or word ("house"). "Images can be connected with the concept only by means of the schema to which they belong" (Kant 1933 [1787], A 142, B 181). The Kantian categories need to be schematized before they can be applied to empirical data. Thus schemas are utilized by our imagination to connect the abstractness of concepts with (real or imagined) instances in the empirical world to which they refer. The term "house" functions as a general gestalt under which many different real or imagined examples of houses can fit. While Kant restricts schemas to being rules for going from concepts to percepts, I see no reason that one couldn't do the reverse and go from empirical example to the general concept under which it fits. In fact, I find the notion of a schema to be highly useful for explaining a wide range of learned processes that require commerce between language and imagery, our muscles and their performance, or consciousness and empirical reality.

The influential work of Frederick Bartlett on imagination has proven most helpful as a starting point for elaborating on the notion of a schema. Bartlett is famous for arguing that remembering is more a matter of reconstruction than of retrieving stored information. He suggests that stories are remembered originally through a combination of structuring schemas and specific content, but that with the passing of time specific details are forgotten and the schemas take on a greater role in creating a memory. Different people hearing the same story would recall it according to the lessons about life they had internalized and under which they had categorized the story. Thus increasingly over time their recounting of the story is interpreted through their experiences and prejudices so that it deviates more and more from the original content.

For Bartlett, schemas are unconscious and linked to perception, imagination, and constructive thought (13) as well as to long-term memory. I would extend Bartlett's understanding of schemas to suggest that all lessons learned (as well as specifics retained) are encoded in schemas. On such a conception, schemas exist as the organizing components of all the systems of long-term memory and are relied upon insofar as what has been learned is applied to new (or even remembered) situations. Schacter identifies four different primary systems of long-term memory: episodic, semantic, perceptual representation (PRS), and procedural (1996 – see especially chapter six). Episodic memory enables us to recall specific details from the past; procedural memory "allows us to acquire various kinds of skills" (292); and semantic memory includes "the general

network of concepts, associations, and facts that constitutes our general knowledge of the world" (169). The schemas of long-term memory are thus implicated in sensed connections (via PRS) and skills as well as the perception, imagination, and thought that Bartlett indicated. If so, then those involved in all types of education must take these tacit schemas very seriously.

I see schemas as functioning like maps or codes or models in the mind that provide persons with expectations about what might occur, based on their previous experience. They also provide the frameworks within which new experiences must be assimilated. There is thus a connection between this view of schemas and Piaget's theory of assimilation and accommodation and Langer's account of abstraction in her three volume *Mind: An Essay on Human Feeling*, but it is with Polanyi's understanding of inarticulate learning that I resonate the most. In a section of *Personal Knowledge* entitled "Inarticulate Intelligence," he set forth three types of tacit knowing in animals, three ways of learning that humans also participate in.

The first type is called "trick-learning." This type is based on the motility of an animal and arises from the animal stumbling upon useful actions in the course of moving about. In some classic animal psychology experiments, it was observed that rats in a cage sniff and paw at their cage and in that way accidentally trip a food releasing lever. The site of feeding will become a site of more active investigation, and the rat will soon learn to trip the lever to secure food. "We may say the rat has learned to *contrive* an effect that is useful to it, or else it has discovered a useful *means-end* relationship" (1964, 72). It has internalized a schema for hunger satisfaction – a pattern in procedural memory.

The second type is called by Polanyi "sign-learning," but consistent with the general tendency to consider all units of meaning (including symbols) as signs, I will substitute the more specific term "signal" when Polanyi uses the term "sign." In signal-learning experiments, an animal "is taught to expect an event by recognizing a signal foretelling the event" (1964, 72). Animals learn when impelled by desire or fear, so environmental signals foretelling sexual pleasure (the odor of a bitch in heat) or danger (the smell of a predator) serve as good examples of meaningful patterns that are perceived and schematized. This type of learning exemplifies perceptual representation memory.

"Latent-learning" is the title of the third type of tacit knowing. This occurs when an animal constructs a mental map of a situation that allows for problem solving if normal avenues of desire satisfaction (or escapes from danger, etc.) are blocked. It has achieved that basic form of understanding encoded in semantic memory. Polanyi contrasts the heuristic act of learning in any of the three inarticulate forms just discussed with the routine, reversible performances made possible by learning, operations occurring within an existing framework of knowledge that functions as the basis for understanding. The existing framework is the schema of that learned behavior. If utilized on a regular enough basis, it can be called upon again and again to solve problems.

It can be seen that schemas are general patterns – gestalt-like in nature – that allow many specific manifestations to fit within their purview. Mark Johnson thinks these patterns "emerge as meaningful structures for us chiefly at the level of our bodily movements through space, our manipulation of objects, and our perceptual interactions" (1987, 29). Robert Howard is even more inclusive in his use of schemas. He says they "are used in perception, comprehension, learning, remembering and problem-solving" (1987, 176). Because we have seen that schemas instantiate so many types of long-term memory systems and are developed is so many types of inarticulate learning styles, the broad scope claimed by Howard for schemas makes sense.

I have emphasized the importance of schemas, yet they manifest themselves as, at best, shadowy presences in human experience. It may be suspected that they are merely handy explanatory tools, or useful black boxes patching over vast regions of cognitive ignorance. In fact, I think we have access to schemas in several ways that might boost our confidence in their actuality. Psychologists have trouble studying schemas experimentally because each person has a unique set of schemas representing what that person has learned. It is therefore difficult to devise empirically-based research programs into such diverse phenomena subject to so many variables. The study of persons with injuries to different sections of the brain has been of great importance in psychological research. But access to schemas can also be obtained by individuals – by study of their own feelings (of which more will be said later). It is also possible to observe schemas indirectly by observing how people organize their experience in terms of background information. Roy D'Andrade mentions that one support for schemas began developing during the late 1970's as researchers in artificial intelligence tried to create computer programs that could interpret and understand stories. To provide the computers with definitions of the vocabulary used and the grammatical rules employed was not enough to allow them to paraphrase and interpret the stories. It was also necessary to understand the background relationships and gestalts that were being presupposed and made the story coherent – the background cultural schemas (1995, 125). So while an individual may have no direct articulate access to his or her personal schemas, indirect access is provided by examining his or her behavioral patterns and the cultural patterns with which the individual identifies.

One way of looking at schemas is to see them as Kantian schematized categories no longer constrained by an ideal of pure reason but encompassing all that a person has learned and used in the structuring of that person's experience. This move represents an empiricizing of philosophy, removing it from its rationalistic pretensions and placing it in the embodied world of history and experience. Several works by Lakoff and Johnson represent one outworking of this experiential and empirical approach to philosophy, one emphasizing the findings of the second generation of cognitive science. They present evidence from many domains of research that strengthens confidence in three notions (the cognitive unconscious, the embodiment of mind, and metaphorical thought) that are closely related to our discussion of schemas and tacit knowing. They have argued eloquently for the significant unconscious role played by cognitive metaphors (which I see as having a schematized existence) in shaping thought and action. Experimental techniques that provide convergent evidence for the role played by cognitive metaphors include "*priming, problem solving, inferential reasoning, image analysis, classification, verbal protocol analysis*, and *discourse comprehension*" (1999, 83).

Image schemas are particularly significant cognitive metaphors. Image schemas are based on the common objects and embodied actions of human experience: containers, force, paths and goals, links, and so on (see Lakoff 1987, 271-278). They structure experience prior to and independently of any concepts. In the following passage, Lakoff and Johnson discuss how the experience of space (a Kantian primitive form of intuition) is shaped by image schemas: "We experience space as structured by image schemas (as having bounded regions, paths, centers and peripheries, objects with fronts and backs, regions above, below, and beside things). Yet we now know that space in itself has no such structure" (1999, 508).

I suspect that the abstract patterned relationships characteristic of schemas correspond to networks of neurons in the brain. After all, schemas represent idiosyncratic learned relationships just as brains develop unique networks based on and influencing experience. So in speaking of schemas, we are referring to the way individual learners understand the world in all its complexity. They are the storehouse of personal truth.

Schemas are not only abstract representations of environmental regularities (such as the gestalt of a remembered face in a crowd, the image that provided the impetus for this discussion of schemas), they are also "processing mechanisms; they are active in selecting evidence, in parsing the data provided by our environment, and in providing appropriate general or specific hypotheses. Most, if not all, of the activation processes occur automatically and without awareness on the part of the perceiver-comprehender" (Mandler 1984, 55-56, quoted in D'Andrade 1995, 122). That is, schemas are involved in the learning processes of tacit knowing (signal- and trick-learning), provide the content for tacit knowing (latent-learning), and influence and undergird explicit knowing.

Here is one illustration of how schemas function as heuristic sources for the expression of personal authenticity. When I first gain an intimation of a matter of personal significance (and am not simply describing or repeating some insight), I often find myself stumbling for adequate words. My language is not primary in such an instance; rather I am trying to match my words to my as yet vaguely understood intended meaning. That inarticulate meaning is at first largely schematized. Each heuristic achievement is not simply some memorized linguistic piece of information being passed on, but is rather an emergent insight that arises through a personal process of struggle. Polanyi gets at this point by distinguishing "two levels of intelligence: one achieving innovations, irreversibly, the other operating a fixed framework of knowledge, reversibly" (1964, 76). Innovations that make a difference are schematized and, when subsequently utilized, appear as subsidiaries within the structure of tacit knowing. Various sorts of schemas constitute the "from" of much tacit knowing.

Further exploration of how we move from vaguely felt schemas to public disclosure or practice is the subject of our next two examples.

2) The calculus problem is challenging; it is not solved using the procedures I have used before. So I give up for the time being, although the puzzlement lingers. Later I lie down in bed and remember the problem when suddenly the solution comes to me!

The solution is not controlled by me. It does not come about as the result of logical steps arriving at a conclusion, as is true in deductive reasoning. It comes as a gift, a matter of grace, although one contributes the conditions that prepare the way for the coming of the insight. Processes of tacit knowing therefore contribute importantly to the arising and recognition of the solution, even though the solution is stated in explicit terms.

So how does one prepare the way for the solution? Again, Polanyi is helpful for understanding the dynamics of tacit knowing culminating in discovery. He speaks of the process of discovery as a heuristic achievement, and suggests it requires both active and passive stages (1964, 125). We must have an intellectual desire to solve the problem, and then our "heuristic striving evokes its own consummation" (126). Here Polanyi mentions one of the critical processes involved in tacit knowing, evocation.

We have noted that the recognition of a face as a gestalt occurs when facial features are integrated to form a known physiognomy. An integration is a nonlinear sort of synthesis. But a whole can also be analyzed into distinct parts, and that is what evocation accomplishes. Synthesis and analysis, combining and distinguishing, whole and components – like integration and evocation, these terms get at the ongoing

heartbeat of tacit knowing. If a gestalt-like schema represents some lesson learned, one may say it arises through the bringing together of contributory insights, through an integration culminating in an "aha!" But suppose one is seeking for an as yet unknown gestalt that would solve a problem. How does one know what components one should integrate to find the solution?

One approach would be to evoke these components by concentrating our attention on something we don't clearly know. Polanyi quotes from Polya's book on solving mathematical problems. "'Look at the unknown!' – says Polya – 'Look at the end. Remember your aim. Do not lose sight of what is required. Keep in mind what you are looking for. *Look at the unknown. Look at the conclusion*'" (1964, 127, quoting Polya 1945, 112). There are certain likely contributors to a solution that one can be quite confident about, so what one seeks to evoke are the missing components needed to make a coherent whole that solves the problem. This is similar to seeking a word in a crossword puzzle for which one does not know the solution, although there are clues: one knows how many letters the sought word contains, the given definition or verbal clue, any letters provided by known words at right angles to the word one is seeking, etc. "The admonition to look at the unknown really means that we should *look at the known data, but not in themselves, rather as clues to the unknown; as pointers to it and parts of it*" (Polanyi 1964, 127-128). We indwell the subsidiaries. Strictly speaking, it is the missing components that are evoked, but once the correct components are found and put in place as indwelt subsidiaries, they support an integration that is known to be a solution through the feelings of satisfaction that come with the resolution of a problem. When things finally fit coherently together, we experience feelings of relief, harmony, and success. Such feelings are marks of achievement in both tacit and explicit knowing.

Another approach to finding a solution begins in a similar way to the approach Polya advocates, but it is less goal-centered and straining. It begins with a process of priming one's mind by attending to the problem and meditating on ideas or images that seem relevant to a solution. And then one turns to other activities. Sometimes, many hours afterwards, a solution suddenly occurs to one. More commonly, when one returns to the problem one has a clear mind that sees connections and is able to make progress toward a solution. What seems to be occurring in these cases is that the perceptual representation system, in combination with semantic memory, works <u>on an indwelt problem</u> at a tacit or implicit level, making significant connections.

Still another approach to problem solving is easiest to illustrate if the problem has to do with self knowledge, although it is also more widely useful. The idea behind this approach is that direct, although muted, access to schemas is achieved through attending to one's feelings. The author I find most helpfully promoting sensitivity to feelings is Eugene Gendlin, although it must be said at once that Gendlin does not speak of schemas. Rather he offers a technique he calls "focusing," and his primary interest is therapeutic rather than explanatory.

Gendlin begins by observing that patients with personal problems in which they are stuck make progress toward the solution of what is creating the pain or stress in their life when they work with a therapist who shows them ways of listening more attentively to their own internal state. Blaming self or others, ruminating on reasons why one feels as one does, and other sorts of essentially language-based exercises do nothing toward helping the patient come to terms with internal sources of dysfunction (a point Timothy Wilson corroborates – see especially 2002, 167-176). Gendlin offers steps towards making contact with a special kind of internal body awareness he calls a felt sense. This sense is a rather fuzzy global state rather than a prominent emotion. "It is how your body carries *the whole* problem" (1981, 69). It must be accepted and gently queried.

More specific feelings arise out of the global feeling. One knows that one has heard an authentic conscious voice arising from what is otherwise tacit when one experiences a physical release. The felt sense shifts. When one can bring to expression what has been tacitly bothering one, one feels a great sense of relief and freedom.

Gendlin believes his notion of focusing relates one to an internal state that exists prior to the split between body and mind (165). Schemas underlie bodily skills and conscious thought; they have the sort of pre-conscious mind-body relationship Gendlin attributes to what is revealed through a felt sense. Neurologist Antonio Damasio provides an updated, physiological account of the sort of phenomena Gendlin describes. He sees the viscera and skeletal muscles as well as the mind as contributing to background feelings that "help define our mental state and color our lives" (1999, 286). Damasio notes that the "relation between background feelings and drives and motivations is intimate" (286), and it is this sort of schematized tacit material that Gendlin's techniques are designed to illuminate. Such felt background material forms a significant part of the "from" dimension of tacit knowing in many ordinary arenas of action.

Polanyi argues that the creativity employed in scientific discovery – or our example of solving a problem in calculus – is not different in kind from the sort of creativity used in the arts. The artist as well as the problem solver may often follow Polya's advice to look at the unknown in the process of creation. The vague notion luring the painter on evokes responses from his hand and paintbrush which then may be judged as to how well they function as subsidiaries to the focal picture. The judging of subsidiaries must be conducted by the artist at a feeling level, for if they are focused on themselves, they lose their function in support of the artist's overall intention.

In judging a painting or any work of art as a whole, artist and critic alike ought to judge its success from an aesthetic standpoint in which the tacit dimension is significant. In mentioning an aesthetic perspective, I am alluding to Kant's influential notion (see 1951 [1790], 38) that aesthetic judgments arise as an assessment of the relationship between one's feeling (in this case, the collective "voice" of the subsidiaries) and thought (in this case, conception of the meaning and purpose of the whole work of art). One can contrast an artist's ultimate reliance on a feeling of satisfaction with a critic's need to balance feeling with explanation. Take a poem, for instance. On the one hand, the poet can assess how well the poem's subsidiary particulars contribute to a whole that expresses meanings satisfying to the poet. This subjective assessment is not available to a critic. On the other hand, a critic would judge the adequacy with which the felt import of the poem's components – words, imagery, structure – supports a coherent and meaningful overall message. In making an aesthetic judgment about a poem, a critic cannot successfully rely upon a subjective response alone, but is expected to appeal to accepted standards of adequacy to justify the critic's judgment. Much more could be said about aesthetics, but perhaps these few comments are sufficient to suggest the usefulness of the Polanyian structure of tacit knowing to the assessment of art.

3. I was given my first bicycle when I was a second-grader. I certainly felt vulnerable and precarious when I climbed onto the bike's seat and stretched my legs to the pedals – even though my father was holding the bike. He ran alongside me holding the bike upright as I attempted to gain mastery of this wonderful but scary machine. And somehow I did learn to ride the bike myself – an example of tacit knowing if ever there were one.

The riding of a bike requires the learning of subtle coordination between various muscle groups as facilitated by proprioception centered in our inner ear and monitoring information from receptors in our

muscles, joints, and tendons (Leder 1990, 39, 42). In the learning of any skill, including one as complicated as riding a bike, it is natural at first to want to direct one's focal attention to the various muscular components of the act so that one might consciously control them. In learning to play the piano (or type), the temptation is to look at where one is placing one's fingers. To be sure, it can be useful, if a performance is complex, to break it into chunks to be learned in isolation. But once mastery of the chunks is achieved and they are integrated into the artistic whole, such a shift of attention can be disastrous. For only if one's attention is focused on the overall purpose or form of the performance – the "to" dimension of consciousness – will the subsidiaries find their dynamic place in support of the whole. If one focuses on one of the subsidiary chunks, the other subsidiaries lose their place and the intended whole falls into disarray.

Skills are primitive forms of tacit knowing we share with all animals. They represent achievements of motility grafted upon yet more primitive acts shared by all living things. Most basically there is the evolutionarily-selected responsiveness provided by receptors conveying information essential to the survival of the animal, plant or other living thing. More complex than the deterministic pattern of stimulus and response is life-enhancing responsiveness to internal and environmental signals. While this responsiveness to signals attains quite a sophisticated form in human perception, in its origins it is a bare chemical response to a chemical stimulus – however, it is one of a set of coordinated responses serving a living center's purposes. That is, the responsiveness is not a meaningless chemical twitch in the vastness of cosmic determinism; it is a meaningful act because it involves selection that serves a purpose, even if that purpose is as basic as the brute ingesting of food in the service of survival.

Within cells, signals are received by receptors, bridges across cell membranes that link the cell's inside requirements with its outside environment. The inside is purposive in its processes – attuned to its own survival and self-replication. On the outside is potential resource or danger, and if the cell is to survive, it must be able to be related to the outside in order to find food and avoid threats. Particular molecules set off signal-transduction cascades that can be either responses to environmental conditions or proactive attempts to control that environment (see Goodenough 1998, 40-44). This sort of give and take between cell and environment or between cell and cell is a primitive kind of tacit processing far removed from conscious knowing.

With the evolutionary development of nerve cells, the speed and extent of communication is greatly enhanced. Harold Morowitz describes how a nerve cell "receives a chemical signal at a given locus on the surface and converts it into an electrical signal, the action potential. In the electrical form, the signal moves rapidly along the axon and triggers chemical release at contacts with receptor sites of other cells. The axon may be thousands of cell diameters in length, so that a cell-to-cell signal may be sent rapidly over long distances" (2002, 98). The brain is the site of connectivity between neurons. While the overall structure of each brain is the product of evolutionary history encoded in genes, individual brains are also dynamically shaped by the signals that are received and indwelt in learning. Those connections that are reinforced by experience allow their supporting neurons to thrive, while neurons receiving no reinforcement atrophy and die. "The logic of this process is essentially a Darwinian logic: overproduction of random variants followed by selective support of some and elimination of most. . . . Such a strategy, while appearing somewhat wasteful of material, is highly efficient in its use of information. It circumvents the difficulties of planning ahead and allows development to proceed with a minimum of design or regulatory mechanisms" (Deacon 1997, 195-196). Thus brains not only allow animals to use signals to adapt to specific environments, they are themselves shaped by signals in order that their hosts, the entire animal, might be more at home in the world.

Internal signals are the basis of an organism's self-regulation. Signals from the environment are the basis of an organism's survival. Signal responsiveness is the informational heartbeat making tacit knowing possible. Trick-learning is consolidated when essential signals are internalized, and such a process is closely related to the learning of such skills as bicycle riding. Signals are, obviously enough, the vehicles of insight incorporated into signal-learning and relied upon in latent-learning. There is yet more to be said about the significance of signals in a broader philosophical context.

4. Using a long stick as a probe, I can reach into a cavity to determine its shape insofar as its walls are within my enhanced reach. The pressure in the palm of my hand reveals the cavity's limits, and I can map in my mind the shape of the hole as I poke about. This internal map is an example of latent-learning.

Here's what may seem to be a strange rhetorical question: do I really know the shape of the cavity, or do I only know certain pressures on my hand (which is only as far as my body extends)? Those pressures function as subsidiaries that are relayed by the affected nerves to my brain. But my attention is focused at the tip of the probe, not on the feeling in my palm. Thus, as Polanyi notes, the probe functions as an indwelt extension of my body (1964, 59). The subsidiary feelings and the processes of mediation and transduction are tacitly involved in this experience. The stick, felt pressures in my palm, and brain processes all restrict what I can know about the cavity, confining it to a certain perspective, but they are not a source of skepticism about the quality of the perspectival information I can obtain in this way. I truly gain information about the shape of the cavity if the pressures on my hand function as subsidiaries.

Now let us turn to human perception. Do we have reasons to be skeptical of what we perceive visually? My eyes function as highly complex receptors capturing the reflected light from objects in my surroundings. My mind goes through complex activities and caps the spatio-temporal organization of the sensed signals with descriptive language. Suppose we are observing some pine trees. Does the mediating intrusion of words shield me from what I perceive, or are the words agents of revelation without which my visual experience would be much poorer? Consistent with the example of the probe, one might reasonably think words are indwelt as subsidiaries to my focal attention on the pine trees as objects. It would follow that my linguistically-enhanced focusing gives me a certain perspective on the trees as objects. If I conceive of the objects as pine trees, the connotations of "pine" and "tree" allow me to make mental connections between this perceptual experience and many other experiences with trees and what I associate with "pine tree." And in making such connections, we are experiencing the typical human form of consciousness, one expressed in linguistic symbols. Language intrudes itself into almost all human consciousness with unrelenting insistence. So fundamental to human consciousness are linguistic symbols that I have argued that Polanyi's from-to structure of experience ought to be expanded for typical human consciousness into a from-via-to structure, where the "via" represents the mediating influence of language (see Gulick 1992-93, 32-40). We humans think from schematized lessons and schematized information provided by receptors via words structured by grammar to meaningful understanding of subject matter or objects.

To be sure, the from-via-to structure houses a process that moves beyond the tacit dimension into the focal dimension of perception and thought. The brute sensation provided by receptors is scanned for what may be of interest, that is, what forms match the schemas attuned to danger, food sources, etc. What is of interest is lifted via schemas into intelligibility and then by conception (language) it may be brought into more narrow and sharply defined focus as perception. That is, from an encompassing but amorphous background – sensation of which we are momentarily aware, but which slips away if we do not focus upon it – the focal

clarity of perception may arise in a rapid two step process. This background sensation has duration in the half-life of working (not long-term) memory, and at any time during its fading existence it may be seized by schemas and then shaped by concepts that render it into explicit perception.

There is more to be said about this background sensation, but first it is important to distinguish between two ways that what is made focal may be used. These ways are made paradigmatically clear in Susanne Langer's distinction between signals and symbols. Because Langer has masterfully showed how important this distinction is, I will quote extensively from her, substituting "signal" for "sign" in her text as per her wish in the second edition of her work being quoted, *Philosophy in a New Key.*

> A signal indicates the existence – past, present, or future – of a thing, event, or condition. Wet streets are a signal that it has rained. A patter on the roof is a signal that it is raining. A fall of the barometer or a ring around the moon is a signal that it is going to rain. . . .
> The interpretation of signals . . . is the most elemental and most tangible sort of intellection; it is the kind of knowledge we share with the animals, that we acquire entirely by experience, that has obvious biological uses, and equally obvious criteria of truth and falsehood. . . .
> A term which is used symbolically and not signally does *not* evoke action appropriate to the presence of it object. . . .
> Symbols are not proxy for their objects, but are *vehicles for the conception of objects.* To conceive a thing or a situation is not the same thing as to 'react toward it' overtly, or to be aware of its presence. In talking *about* things we have conceptions of them, not the things themselves; and *it is the conceptions, not the things, that symbols directly 'mean.'* Behavior toward conceptions is what words normally evoke; this is the typical process of thinking. . . .
> The fundamental difference between signals and symbols is this difference of association and consequently of their *use* by the third party to the meaning function, the subject; signals *announce* their objects to him, whereas symbols *lead him to conceive* their objects. (57, 59-61)

It is convenient to use the term "signal" in a broader and more substantial sense than the narrower sense Langer indicates in the passage just quoted (but which broader sense she refers to on page x). A signal in the broad sense is some environmental information of interest furnished by one or more of a living being's receptors. Signals in this broad sense are not so much functional responses as qualities involved in autonomic (stimulus-response) processes – sunlight as it impacts plants, for instance. In animals, an example of an autonomic response would be the regulation of the rate of breathing, which is dependent on signaled information about the oxygen and carbon dioxide levels in the blood (Deacon, 232). Instinctual responses to signals from the external environment are fairly rigidly coded by genes in individuals but may shift in a species' evolutionary development when mutant patterns of response are selected .

The narrower notion of signals Langer discusses in the passage above arises in evolutionary development concomitantly with the development of mental ability. Signals in the narrower sense are learned patterns announcing <u>in consciousness</u> the presence of environmental factors of interest to an animal. They are tokens involved in tacit knowing, as we saw in describing signal-learning. Michael Tye suggests that the learning associated with phenomenal consciousness is not restricted to vertebrates. Even simpler organisms display responses to environmental signals in the narrower sense. "Honey bees and fish behave intelligently and they are the subject of phenomenally conscious experiences, but they have no higher-order consciousness.

In the higher-order sense, they are unconscious automata – they have no *cognitive* awareness of their sensory states. They do not bring their own *experiences* under concepts" (2000, 181-182). They schematize what they learn, but their learning is restricted to signal (in both the narrower and broader sense) sensitivity; they are bereft of the ability to move beyond from-to consciousness to from-via-to consciousness.

Now let us return to the issue of the reliability of perception. We have distinguished several layers of responsiveness in our sensing. At the lowest level there is the constant information provided by our sense receptors but not attended to. Receptors sensitive to signals in the broader sense automatically provide such input when we are awake and even some information when we are asleep. While I am typing this paper I am subject to all sorts of background noises, pressures on my body, visual information I do not attend to, etc. This is mere background sensation that if not attended to within a few seconds fades away to be replaced by new sensation. When I stop to look out the window, my visual perception becomes more focused as I scan the scene for interesting information that may be responded to either as signals eliciting action – "I unthinkingly respond to seeing unexpected dark clouds overhead by quickly glancing to see if I left windows open" – or as symbols evoking reflection – "how pretty those crocuses are; I wonder if other flowers are blooming?" Both heightened levels of response to sensation involve me in reacting to my enveloping environment, but in one case I am alerted to a state of affairs – material reality – that may require action and in the other case I am enticed to reflect – become immersed in the reality of intangible meaning – about the presented scene. Error may enter into either response to received information.

At this point I believe some slight modification of Langer's functional understanding of signals and symbols is needed. When humans scan sensations for items of interest, if signals of interesting affairs are found, Langer states that actions are evoked. I would add to her analysis that when such signals arise, symbols as well as actions are typically evoked. As I sit in my living room, suddenly I smell smoke. Quite likely I am impelled to get up and investigate the source of the smoke, but all the while I am also thinking about the situation. Perhaps some yogis can easily exclude language from consciousness, but for most of us signals in the narrow sense are quickly clothed in symbols, in language-saturated thought.

We usually ignore almost all the sensation originating in signals (in the broad sense) and furnished by our internal and external receptors. But this sensation retains great philosophical significance. Our sensation offers us information about the real world that – while limited by the particularities of context**,** the scope of the electro-magnetic spectrum and longitudinal waves utilized, etc. – is veridical within its natural parameters. The reliability of sensation is a product of its evolutionary heritage. If our sensations were consistently illusory or inaccurate with respect to the environment in which we exist, we would not have survived as a species.

Now in order to gain access to and make fullest use of sensation, I must first schematize it (done tacitly) and then subject it to linguistically-shaped consciousness. Left as background sensation, it will just fade away. Thus its veridical nature is something of a tease. To be made the subject of public interest or usefulness, sensation must be thought about (the "via") with the attendant possibility of error. When I focally attend to the world and consequently dress sensation up in words, then I may judge wrongly or be misunderstood. Thus we might say that receptor-mediated sensation, virtually inaccessible to human focal consciousness, is veridical within narrow limits, but that fully clothed perception is fallible. Full-blown skepticism about human perception is not warranted, but neither is unquestioning confidence.

Hence all our perception and systematic thought is fallible even when it is based on empirical evidence. But by being expressed in language, the scope and power of what we sense can be expanded immensely. The achievements of science and technology demonstrate that careful, empirically-based constructive thought, while fallible, is capable of amazing insights. The knowledge gained by a simple probe barely suggests the wealth of information that can be gathered by sophisticated technological probes.

* * *

But our exploration of tacit knowing has now spilled beyond signal-based knowing into the articulate realm of explicit knowing. Two important points remain to be made. First, the intelligent response to signals in the narrow sense of the term constitutes the core process of tacit knowing. Autonomic and instinctual responses to signals in the broad sense are matters of great significance in terms of evolutionary advance from the beginnings of life, and they continue to underlie and support all functions in life today. Many sorts of unconscious or tacit processes have been selected for in evolutionary history. However, it is only appropriate to speak of tacit knowing after conscious awareness and the possibility of learning have arisen. At some point in evolutionary development the threshold of learning was passed and a primitive form of tacit knowing came into being. The great apes live within the boundaries of a sophisticated variety of tacit knowledge.

Second, human consciousness passed another significant threshold. Many skillful feats achieved by humans are pure manifestations of tacit knowing, but in everyday human consciousness, the tacit is obscured by symbol-soaked focal awareness. The necessary presence of language in human thought has misled many philosophers into ignoring the tacit roots of thought and action. A fully adequate philosophical worldview cannot be constructed with such an omission. Comprehensive exploration of all the symbol-generated worlds of culture and knowledge is of vast significance in the scheme of things, but the great temptation has been to conduct such exploration only at the level of explicit, articulate knowledge. In his old age, Polanyi collaborated with Harry Prosch in a brave but flawed attempt to explore the many worlds that the creative use of symbols opens up (see Polanyi and Prosch 1975). To his credit, Polanyi never ignored the tacit roots that contribute a personal dimension to all the cultural worlds. But the work that I think best captures so far the sort of vision Polanyi was aiming for was written by an individual who, so far as I know, has never made use of Polanyi's thought.

In *Considered Judgment*, Catherine Z. Elgin argues that philosophy should change its epistemic target from the pursuit of knowledge to an increase in understanding. By tradition, knowledge is regarded as a permanent achievement grounded in warranted judgments about facts. "Not being restricted to facts, understanding is more comprehensive than knowledge ever hoped to be. We understand rules and reasons, actions and passions, objectives and obstacles, techniques and tools, forms, functions, and fictions, as well as facts" (1996, 123). In encompassing actions, passions, techniques, and functions within the scope of her philosophical vision, Elgin endorses tacit processes in their diversity. A philosophy of understanding illuminates how the inarticulate and the articulate each contribute to the complexity of human existence. Not just the clear and distinct, not just language and logic, but also signals, schemas, subsidiaries and skills – all the dimensions of existence must be embraced if the possibility of comprehensive (although still skeletal) philosophical understanding is to be brought closer to realization.

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Phil Mullins has been the Editor of *TAD* since 1991 and with the emergence of WWW, he also became the person responsible for the Polanyi Society web pages. He has written a variety of Polanyi-related articles published in *TAD* and elsewhere.

Electronic Discussion List

The Polanyi Society supports an electronic discussion group that explores implications of the thought of Michael Polanyi. Anyone interested can join. To join yourself, go to the following address: http://groups.yahoo.com/group/polanyi_list/join. If you have difficulty, send an e-mail to Doug Masini (masini@etsu.edu) and someone will see that you are added to the list.