REVIEWS

Gerd Gigerenzer. *Gut Feelings: The Intelligence of the Unconscious*. New York: Penguin Books, 2007. Pp. viii + 280. ISBN 978-0-14-311376-8 ($15.00, paper).

Michael Polanyi's well-known observation, "We know more than we can tell," serves as an epigram for Part I of *Gut Feelings.* It is an appropriate use of the quotation, for this book, by the director of the Center for Adaptive Behavior and Cognition at the Max Planck Institute for Human Development in Berlin, who attempts to articulate what that "more" is. Gigerenzer calls it intuition, gut feeling, or hunch, by which he means "a judgment that . . . appears quickly in consciousness . . . whose underlying reasons we are not fully aware of, and . . . is strong enough to act on" (16). His goal is to uncover intuition's hidden rationale in order to "understand when intuitions are likely to succeed—or fail" (19). He does so in two steps, the first of which is by offering an extended description of what he calls "unconscious intelligence." In the second step, he applies those insights to five different domains (recognition memory, decision making, health care, moral behavior, and social instincts) in order to uncover when intuition works and when it does not.

While the book may be formally divided into two sections, there is considerable overlap. Overall, Gigerenzer's argument consists of three main points. The first point is that intuition operates by means of "rules of thumb," i.e., heuristics that enable fast action (18). Gigerenzer identifies several different heuristics over the course of the book. One of them is the recognition heuristic, which suggests that when offered a choice between two items, one should choose that which one recognizes. For example, when German students were asked to identify which city was larger, Detroit or Milwaukee, more of them did so correctly than did American students. Gigerenzer explains the better performance of the German students by noting that they were more likely to have heard of Detroit than Milwaukee, thereby inferring it was the larger of the two cities (7-8). Put differently, their judgment represented an intuitive leap based on name recognition.

A second heuristic or rule of thumb is what he calls "take the best," a heuristic that builds off of the propensity of people to base intuitive judgments on a single reason (or at most a few), thereby excluding information rather than gathering more (this heuristic also bears affinities with a heuristic Gigerenzer calls "less is more"). For example, Gigerenzer and his associates studied dropout rates in 57 Chicago schools. After gathering information on eighteen variables such as SAT scores, demographic information, and support systems, they identified the actual dropout rates. They then set about testing two different strategies for predicting the dropout rates of two schools. They set up one computer to perform a complex multiple regression analysis of all of the clues. They programmed a second computer to sort through clues and make a prediction when the first clear difference between schools appeared. They found that a strategy of "take the best," i.e., stopping when a clear difference first appeared, did a better job of predicting actual dropout rates than the complex analysis—and did so after considering on average three clues, rather than all eighteen (83-84).

Gigerenzer identifies several other heuristics as well. One is what he calls the "gaze heuristic" that applies when playing baseball and says to "Fix your gaze on the ball, start running, and adjust your running speed so that the image of the ball rises at a constant rate" (11). Another is "tit-for tat," the rule of thumb that says that in a relationship, it is better to be kind first, remember the last behavior of the other person in the relationship, and imitate it (51). Still another is the "imitation heuristic," i.e., to do what one's peers do (191).

Gigerenzer's second main point is that these rules of thumb make use of the evolved capacities of the brain such as language, recognition memory, object tracking, imitation, and emotions. Here it is important to note that Gigerenzer acknowledges that these capacities have evolved in response to *both* natural selection *and* the environment (58-59). Thus cognition is, for him, always embodied in both bodies and society and thus "one will not understand human behavior by studying either cognition or the environment alone" (79). Another key point is that an evolved capacity can be used in multiple ways. Take for example the gaze heuristic used by baseball players. While it builds on capacities for maintaining balance while running, for tracking objects, and for making finely-tuned adjustments between visual and motor input, it did not evolve for playing baseball. Its more likely evolutionary origins lie in hunting, as humans learn to track and kill prey for food (61-63).

Gigerenzer argues that rules of thumb not only make use of evolved adaptive capacities, they are themselves adaptive for at least two reasons. The first is that one feature of our environment is uncertainty, a corollary of which is that optimal solutions are often out of reach, even when problems are well-defined. In such environments, simplifying strategies like "take the best" actually work the best (79-92). Another reason that rules of thumb or intuitions are valuable is that logic has its limits; it cannot go beyond explicit information and is therefore blind to the particularities of content and culture, as well as environmental structures that reinforce some behaviors over others (103). One example of this failure of logic that Gigerenzer discusses is the sentence "We invited friends *and* colleagues." According to Gigerenzer, strict rules of logic would lead one to conclude that the invitation was extended to people who are both friends and colleagues, whereas people intuitively (and correctly) infer that the invitation went out to two different groups of people, those who are friends and those who are colleagues (98).

Gigerenzer's final point is that we can identify both those times when we should rely on our hunches and when we should not. Take, for example, the rec-ognition heuristic by which German students were more likely than American students to identify Detroit as a larger city than Milwaukee, a case in which less knowledge is more. Gigerenzer and others have found that this effect disappears the more one knows (119-124). The heuristic, "take the best," is better than complex analysis in those circumstances in which one has to predict what would seem to be a murky future with little information. In situations where one must explain the past, or the future is fairly clear, or when large amounts of information are available, "take the best" does not do as well (151). Likewise, the imitation heuristic works in relatively stable environments where little feedback is available and mistakes can be dangerous (218).

Along the way, Gigerenzer connects his analysis to many features of everyday life, such as explaining the mechanics of advertising's emphasis on brand recognition in light of the recognition heuristic (126-129). Nor is he afraid to do more than explain. At times he suggests ways to alter the social environment in order to make best use of the possibilities and limits of intuitive judgments. For example, he tells of how emergency room decision-making was improved significantly by developing a simple decision tree based on "take the best," which recognizes that less information is sometimes more (169-178).

This analysis of intuition certainly resonates with Polanyi as it admirably and consistently argues that cognition (mind) is embodied and embedded in bodies, as well as natural and social environments. What Gigerenzer adds to Polanyi is grounding these perspectives in the latest psychological research. While Gigerenzer's goal is not to defend Polanyi, his analysis certainly reinforces the conviction that Polanyi was, in many ways, ahead of his time. Unfortunately, Gigerenzer refers to Polanyi only in this epigram and therefore, like many who know this "sound bite," he misses the fact that Polanyi is concerned with much more than intuition. It could be an interesting and potentially fruitful exercise to explore how Polanyi's epistemology might enrich this work.

Overall, Gigerenzer accomplishes what he promises to do. He provides a largely persuasive account of intuition along with an analysis of when it is appropriate to trust intuition. Gigerenzer does this, as well, with a degree of clarity not often seen in works of this sort. The book should therefore be accessible to a wide audience. The biggest weakness of the book is that sometimes the evident enthusiasm may trump more careful analysis. One wonders, for example, if all of the heuristics discussed are as discreet as Gigerenzer's language indicates, as "less is more" and "take the best" often seem to overlap. One is therefore left wishing for a bit more conceptual clarity, as well as more insight into how intuition can be trained. It would also be interesting to explore how work on intuition relates to work on wisdom, much of which is also being done at the Max Planck Institute. Nevertheless, the book makes this intriguing line of work available to non-experts and contributes to a richer understanding of epistemology, anthropology, and morality.

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Robert E. Innis. *Susanne Langer in Focus: The Symbolic Mind.* Bloomington, IN: Indiana University Press, 2009. Pp. xvi+ 278. ISBN 978-0-253-35278-1 ($65.00, cloth), 978-0-253-22053-0 ($24.95, paper).

If the quality of an academic book can be judged by the density of underlinings and marginal notes it inspires, then my copy of Robert Innis's study of Susanne Langer would merit giving the book a grade of A+. To be sure, I am a fan of Langer's thought, but hardly an uncritical one. Much more than most authors, Langer has provided me with stunning, memorable insights, but at other times her writing seems murky and convoluted. Innis's perceptive commentary has augmented and sharpened both my appreciation and my much more limited criticism of Langer's accomplishments in philosophy.

Innis examines Langer's leading philosophical writings in chronological order. He especially emphasizes the ideas developed in *Philosophy in a New Key, Feeling and Form* and the three volumes of *Mind.* By pointing out persistent themes and shifting emphases in Langer's intellectual development, and by casting light on some of her murkier passages, Innis provides persons investigating her works with the sort of assistance one might expect from a map and a flashlight. However, just as a map cannot wholly ease the passage over difficult terrain, and just as illumination of an overgrown swamp will not create pastoral beauty, so even Innis's expert guidance cannot transform the journey through the jungle-like areas of Langer's writings into an easy stroll in the park.

Lest I leave the reader of this review with false impressions, let me emphasize three things. 1. The study of Langer's thought is worth the effort involved. 2. Her ideas both overlap and helpfully extend Polanyi's work. 3. Innis does much more than merely paraphrase Langer's philosophy; he interprets its significance within the context of twentieth century philosophy. Let me deal with this last point first.

Langer was the translator of Ernst Cassirer's *Language and Myth*, and Innis on a number of occasions points to the seminal influence of Cassirer's study of symbolic forms on Langer's thought. "Langer, like Cassirer, wanted to show how the world *at every level* is accessed, projected, and interpreted through the construal as well as the construction of signs and symbols"(4). Langer's work of interpretation, it is crucial to understand, is not simply carried out at the levels of language and culture. She is particularly interested in the interpretive aspects of what Polanyi termed the tacit dimension. Cassirer and Whitehead, to whom she dedicates two of her most important books, each bore witness to themes of fundamental importance for Langer: process (act), pre-linguistic experience, and the linked reach of abstraction and symbolism.

Langer wrote a text on symbolic logic, but her philosophical accomplishments have little to do with the sort of logical or linguistic analysis and the empiricism that have characterized so much Anglo-American philosophy in the twentieth century. "Symbol and meaning makes man's world, far more

than sensation," she claimed (Langer quoted by Innis, 32). Innis points out, however, that in many respects Langer's thought is best interpreted as a continuation and extension of the thought of classical American philosophy. He particularly compares her thought to the ideas of Peirce and Dewey. He also foregrounds (one of Innis's favorite terms) the semiotic aspect of Langer's philosophy and comments on how it relates to many contemporary theorists, including Deacon, Lakoff and Johnson, and such interpreters of Langer's thought as Rolf Lachmann, William Schultz, Donald Dryden, and himself in earlier writings.

Susanne Langer in Focus is primarily an exposition of Langer's work rather than a critical reconstruction of it. Sometimes Innis signposts his possible disagreement with Langer through such phraseology as "Langer contentiously claims that . . ." Occasionally, he is more explicit in his criticism, but he typically does not go on to construct superior alternatives. His focus is on what Langer claims, not on going beyond Langer. He disputes Langer's reliance on Donovan's theory of the festal origins of language (see 54-55 and 218-219), and he suggests that her reliance on Charles Morris's classification of signals and symbols as species of signs tends to replace her functional analysis with a reified account of meaning (see 39 and 97).

While I would acknowledge the danger Innis points to in the latter case, I would also note the importance of reified signals and symbols in Langer's thought: stop signs, sirens, and lightning as examples of *signals*, and words, propositions (discursive symbols), and works of art (image-based presentational symbols) as examples of Langer's two varieties of *symbols*. The sort of conception that Langer claims is the mark of human consciousness is dependent on our indwelling and utilizing the reified conventional objects that comprise a culture. As Innis notes, Langer "speaks of the function of words as carving out and fixating objects, thus giving them a defined status and allowing them to maintain their identity across situations and perceptual occasions" (220; see also 112 and 133). Object and process each have a crucial place in Langer's theory of meaning; I am unconvinced that

"signal" and "symbol" need to be replaced as terms.

Innis is a reliable and perceptive interpreter of Langer's philosophy; his book is an outstanding, sophisticated accomplishment. In the balance of this review, I will turn, all too briefly, to several ways his book helps us see how the philosophical visions of Langer and Polanyi reinforce, call into question, or augment each other (point number 2 above). I will try to avoid replicating the comparisons and criticisms I have made in my article on Polanyi and Langer in *Tradition and Discovery* 36:1.

First, Langer's understanding of logic as "a relational structure" (see volume I of *Mind,* 84, quoted by Innis on 157) correlates nicely with Polanyi's informal understanding of logic. Innis claims Langer develops "in a very different way the philosophical dimensions of logic without contradicting the main thrust of modern developments in logical theory" (11). In seeking to expand the scope of philosophical rigor (developing philosophy in a new key), she deals with such processes as the logic of sentience, of consciousness, of cultural forms, even as she avoids all forms of logocentrism (62, 256). The correlation with Polanyi's notions of a logic of discovery or a logic of achievement is evident.

Second, Innis convincingly interprets Langer's overarching vision as fusing together a philosophy of experience with a philosophy of meaning (254). This also seems like a good summary of where Polanyi's philosophical journey ends up. There are suggestive parallels between Polanyi's (and Prosch's) project in *Meaning* of outlining the different ways meaning is created and Langer's ongoing project of articulating the many ways humans create and find meaning. Langer thinks dreaming exemplifies meaning creation in its simplest form where there is "no thematic difference between object and meaning" (67; Langer asserts that there is a similar identity in the art work). Polanyi stresses the role of integration in creating meaning. This suggests there is a difference in emphasis when the two are compared: Langer tends to highlight the felt objective presence of meaning when

discursive and presentational symbols are experienced, while Polanyi tends to focus on the creative process of meaning creation within the from-to structure of consciousness. But I think these different tendencies are complementary rather than disjunctive.

Third, Polanyi makes a powerful case for viewing "understanding" as a better term than "knowing" for articulating cognitive depth and for acknowledging the presence of the tacit in all cognitive acts (see *SM* 20 in particular). Langer sometimes correlates knowing with discursive (language-based) thought, and understanding with presentational symbolism (61). This leads to an intriguing way of looking at cognition. If understanding is grounded in images, in the realm of presentational symbolism, this would explain the reason spatial part-whole distinctions and Gestalts, in contrast to the narrative and logical attributes of discursive symbolism, are of such importance to Polanyi. Some form of presentational symbolism would form the realm of intelligibility, of meaning, to which we attempt to adjust our language so we can say what we mean. Since presentational symbolism is also for Langer the realm of artistic significance, we can see why she regards understanding the arts as crucial for her epistemology. For Polanyi, the basic model of understanding is perception, another variety of presentational symbolism in Langer's view. Both the imagery of perception and feelings of artistic significance convey the elusive, embodied sense of meaning that forms the basis for existential understanding, which may be contrasted with the thinness of strictly verbal information.

I have barely suggested the richness of Innis's book. It is worth careful study. It evokes fruitful reflection.

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What Technology Wants (henceforth WTW) is an ambitious book whose purpose is to help us find our way "to optimize technology's blessings and minimize its costs" (17). It is a bold attempt to figure out where technology is headed in order to bring humans and their freedoms into a convivial relationship with it and its "wants." Kevin Kelly, its author, freelanced in the 80s for Stewart Brand's *The Whole Earth Catalog*, helped found *Wired* magazine in 1992, and in 1994 wrote the bestseller *Out of Control* (one of the three books the producers of the movie *The Matrix* required their actors to read). Kelly, as he reveals in his introductory comments to WTW, has devoted most of his life to thinking about technology and how it might be used to liberate and elevate rather than enslave and eviscerate the human spirit.

WTW begins tracing the origins of technology on earth to reveal that it pre-dates our humanness, appearing in primates and even earlier, and that its present dominance of the planet derives from the same emergent cosmic forces responsible for the existence of galaxies, life, and mind. Then we are introduced to the "imperatives" of technology, i.e., its insistence on existing and playing out its hand. Kelly claims that technology's large-scale outlines are "pre-determined," as evidenced by the astounding number of cases of equivalent technologies independently invented (152). He puts his ear to the machinery and listens to its wants, noting that it wants to get smaller, faster, and lighter—all things, he says, it will accomplish "regardless of the social climate" surrounding it, so all we can really do is choose the inevitable, i.e., "choose to modify our legal and political and economic assumptions to meet the ordained trajectories ahead . . . [W]e cannot escape from them" (173). Kelly takes his readers on a journey into the paranoid musings about technology found in Unabomber Ted Kaczynski's anti-technology manifesto, explores the Amish's systematically delayed and highly selective uptake of technology, and implores his readers to opt for neither approach, although he

is surprisingly sympathetic with elements of both approaches. His advice is that we get on board emerging technologies early on so we can ride them from the start, training them to yield convivial effects, i.e., effects "compatible with life" (263).

In the concluding section of WTW, Kelly discloses the underlying anthropological premise of his outlook on technology: "Our role as humans, at least for the time being, is to coax technology along the paths it naturally wants to go" (269). There are two related and never quite resolved tensions sustained through this book that are discernible in this quotation, tensions that Kelly acknowledges but dismisses as merely temporary: (1) a tension of agency where the presumed efficacy of human intentionality often pulls in the opposite direction of technology's ever increasing autonomy, and (2) a tension of ultimacy where human invention and deployment of technology to serve human interests often seems to go against technology's use of humans to serve what it wants. In the few comments to follow, I will try to highlight these conceptual stresses and then bring them to bear on WTW's relevance for readers of this journal.

Kelly's book orbits around what he calls the "technium," a word he coined to denote "the global, massively interconnected system of technology vibrating around us" that includes "culture, art, social institutions, and intellectual creations of all types" (11-12), as well as bird nests and beaver dams—an organism of techniques and technologies moving inexorably towards self-awareness. He sees the technium's evolution as a natural outgrowth of the same forces behind the evolution of life and mind (118-119). It is thus the "seventh kingdom of life," a self-organizing system of information that has formed its own evolutionary trajectory and has "grown its own agenda" (186), wanting to evolve from simplicity to complexity, from uniformity to diversity, from profligacy to efficiency, from matter to mind, and from mind to an immaterial flow of information (334ff). According to Kelly, human volition operates at the micro-level of the technium, but at the macro-level the technium

calls the shots—our "freewill" is like the jostling of molecules in the wheel whose macro momentum rolls us where it will. The forces of the technium stretch all the way back to the Big Bang, before which actuality was compressed into an absolute uniformity because the infinite density of the original singularity gave no space for difference. The Big Bang was the beginning of a cosmic force seeking the expansion of space for possibility and difference—something both the evolution of life and the evolution of technology are all about (i.e., what they *want*). In fact, technology is the means by which this ancient cosmic force channels into human minds the drive to evolve more possibilities of evolvability (342). Kelly takes what might be called a "technology-eyed view" of the world (17), i.e., a view of the world from the perspective of the seventh kingdom of life and argues that the technium is oriented toward "mindfulness" (328) and de-materialization/disembodiment, noting that our present economic trend away from a material-based industrial economy to a information economy of intangible goods (e.g., software, design, and media products, etc.) is just the latest indicator of the technium's cosmic path from "it to bit." The universe is self-organizing for an "irreversible liberation from the ancient imperative of matter and energy" (69).

WTW is suffused with Kelly's endorsement of a "proactionary" approach to, rather than a precautionary hesitance toward, new technologies. He believes the best way to harness a new technology's gifts to humanity is for us to ride technology with both hands around its neck (262), doing our best to deflect its selfishness in our direction. Kelly's understanding of technology's ingress into our lives is, at times, disturbingly fatalistic. For example, he claims "technologies can be postponed but not stopped" (243), that "[t]here are no technologies without vices and none that are neutral" (246), so precautionary prohibitions will only serve to slow down the inevitable, making the endeavor of maximizing a technology's benefits and minimizing its costs a slower and more difficult process. He admits that of all the spheres of influence on the technium, the human mind "may even be the

weakest" (15). "[O]ur response to the technium should be similar to our response to nature" he counsels. He is alarmingly comfortable conceding that "[w]e can't demand that technology obey us any more than we can demand that life obey us" (17).

As the title of the book so clearly reveals, Kelly isn't afraid of the "pathetic fallacy" or the anthropomorphisms it underwrites. This is because the technium has shown him that the line separating life and technology is, like the ozone layer, thinning out. As he says, there "must be a certain equivalency between the made and the born." In fact, he believes that "[t]echnology and life must share some fundamental essence," surmising that computers and DNA share an essence not to be found in the materials they harness—whether silicon or protein. Rather, their common essence is found in "immaterial flows of information" (10). And although Kelly notes that the technium doesn't yet have an idea of self or conscious desires, it has developed tendencies or "wants" through its complex of billions of amplifying relationships and circuits of influence such that it has gained widespread and significant degrees of autonomy, making its trajectory through time and space increasingly independent of the intentions and designs of its human sub-systems. This "ever-ripening superorganism" of which we are a part, is following "a direction beyond our own making," and we, according to Kelly, should not be concerned about whether to embrace it because "[w]e are beyond embrace; we are already symbiotic with it … our choice is to align ourselves with this direction" (187). He suggests that we rely on technology itself to "help us make better choices about how we adopt it" (216). In fact, to reject technology, says Kelly, is tantamount to "self-hatred", because "[b]y following what technology wants, we can be more ready to capture its full gifts" (188). He has a genius for drawing together a welter of captivating facts and less than mainline theories and spinning them all to support his belief in the good news that ultimately "technology wants what we want" (269).

Devoted readers of Polanyi will likely find this book both enlightening and infuriating. On the one hand, Kelly's discussion of how our genes coevolved with our inventions and his observations about the role of language in the development of our minds (26-37) helpfully fill in some fairly large gaps in Polanyi's own discussion of the role that the invention of language played in creating a lasting articulate framework of thought (PK 388-389). On the other hand, however, I suspect that despite Kelly's account of the emergence of life and mind sounding familiarly reminiscent of Polanyi's account of emergent strata of being in the epic process of anthropogenesis (PK 389ff), followers of Polanyi's post-critical philosophy will struggle with Kelly's placing of human personhood and its responsible agency in the wake of the technium's ascension to cosmic sovereignty, reducing human beings to mere "reproductive organs of technology" (296). Although Kelly's entrancing discussions of the history of convergent discoveries and inventions are recognizably cognate to Polanyi's speculations about the heuristic function of gradients of meaning and finalistic fields, readers who side with Polanyi's vision of the indeterminacy of discovery will likely chafe at the necessitarianism in Kelly's claim that "the conceptual essence of an invention or discovery is inevitable" (143), and that the "technological fate" this portends is something we "should lurch forward in preparation [for]" rather than "reeling back in horror of its inevitability" (173). In spite of recognizing in Kelly's technium something vaguely similar to de Chardin's "noosphere," a notion Polanyi himself called upon to describe the layer of meaning generated by the rise of the human mind and its overcoming of mere subjective interests with universal intent, Polanyians will surely want to challenge Kelly's ascribing to humans the status of a transitional species and the primacy he gives to the technium, making humans "but an intermediary, smack in the middle between the born and the made" (356) whose mission as humans is to discover their "fullest selves in the technium" (237). Neither will those who align themselves with Polanyi's vision of a society of explorers immersed in potential thought (TD 91) be happy with Kelly's subordinating human thought to the technium's "selfish nature" which he predicts will "increasingly maximize its own agenda" (352),

effectively reducing human agency to just a little above an epiphenomenon of the technium. He argues that we are at a tipping point "where the technium's ability to alter us exceeds our ability to alter the technium" (197). Whereas Polanyi's commitment to liberal humanism and his vision of a stratified ontology situate humans at "the top of creation" for their capacity to transcend their "self-centeredness" in pursuit of truth for its own sake (SM 62), Kelly's transhumanist techno-libertarianism leads him to place humans not at the top of creation nor in the service of truth for its own sake, but in the service of the technium's *wants*. If we play our cards right and deflect our inevitable technologies into more convivial forms, we might just find that the technium's wants will include the multiplying of our options of things to want (307-311).

WTW is a must read for anyone interested in technology and in what one of the most influential technophilic voices in contemporary technoculture is saying about our role in technology's colonization of our lives.

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David W. Long, *Body Knowledge: A Path to Wholeness: The Philosophy of Michael Polanyi.* Bloomington, IN: Xlibris, 2011. Pp. 237. ISBN 978-1-4568-7035-5 ($19.99 pb); 978-1-4568-7036-2 ($29.99, hb).

Body Knowledge, by David Wesley Long, Emeritus Professor of Philosophy at the University of California at Sacramento, is unusual. Let me note some of the ways. It is a self-published dissertation in philosophy (not religion or one of the social sciences) and not rewritten since its approval in the 1960s by the faculty at Florida State University, a department which, although it contained Eugene Kaelin and W. H. Werkmeister, was heavily oriented toward Positivism and Logical Empiricism. In fact, one member of

that faculty was a student of Rudolf Carnap, and he nearly refused to sign the dissertation. Also, the book is sometimes critical of Polanyi.

It begins with a lengthy autobiographical Prologue (40 pages, including the annotated footnotes) that provides, among other things, an account of Long's 20-minute trance/epiphany on the acropolis in Athens, where he felt a call to study philosophy; an explanation of his pedagogy (based on the paradigm of the *Heyokha*, a Lakota word for a sacred clown, and Socrates as storyteller); ten stories he used in his classes; a description of several international conferences he helped plan and in which he participated; and an account of his heart problems. It focuses on Polanyi's thought rather than how Polanyi's epistemology may be useful in elucidating and advancing other disciplines, and in that sense and also because it is amazingly lucid, being devoid of stilted dissertationese, it could serve as introduction for those unfamiliar with Polanyi.

Literary profiling to this point, however, is misleading. What truly makes the book special lies elsewhere, namely, in elucidating Polanyi in the philosophical world of his time, and that renders the book valuable even for those already well acquainted with Polanyi. Early chapters deal with Polanyi's biography (Ch. 1); his theory of tacit knowing and personal knowledge (Ch. 3); and with appraisal, commitment, and universal intent (Ch. 4). Chapter 2 begins to lay the groundwork for the most significant part of the book by sketching the philosophical background of Polanyi's era. Long identifies Polanyi's "antecedents" (Karl Popper, Henry Margenau, Wilhelm Dilthey), his "supporters" (Maurice Merleau-Ponty, A. D. Ritchie, Stephen Toulmin, Jacob Bronowski, Norwood Hanson, Konrad Lorenz, Thomas Kuhn, Gerald Holton, Chaim Perelman, and A. I. Wittenberg), and his "opponents" or "competitors" (Ernst Mach, Hans Reichenbach, H. Mehlberg, Bertrand Russell, R. B. Braithwaite, Clark Hull, E. C. Tolman, and Gilbert Ryle).

The remaining chapters (5-10) are the most significant ones, in my estimation. They seek to explain

to Positivist philosophers (doubtless, including Long's own professors) what Polanyi's strange (to them) enterprise is all about and to lay out a justification for it in terms Positivists would understand, even if they did not agree with it. To them, Polanyi was sidetracked into history and psychology, rather than the proper domains of logic and epistemology.

To accomplish these purposes, Long makes heavy use of Polanyi's Duke Lectures (still unpublished, but just now available on the Polanyi Society web site) to construct a "dialogue" (not in the strict literary sense but by using alternating chapters) in which the Objectivists (especially Mach, whom Long regards as Polanyi's main target) and Polanyi engage the fine points of each other's positions on such topics as meaning, truth, the ideal of strict detachment, the bifurcation of experience, discovery and justification, the criteria of theory evaluation, and the presuppositions of science. To deepen the engagement between Mach's conventionalist position and Polanyi's commonsense realism, Long takes advantage of his thorough grounding in both Polanyi's thought and in the mainstream philosophy of the time to expand on and sharpen their sometimes cryptically-stated views and even to construct responses each side could make to the other in the back-and-forth of the "dialogue." This part of the book was unique in my experience and invaluable.

Finally, Long appraises the strengths and weaknesses of both positions, siding often, but not always, with Polanyi. Long argues, for example, that Polanyi can be criticized, especially where he treats Copernicus's thought (in the Duke Lectures and the first part of *Personal Knowledge*) and where he makes the case for theory acceptance, for his "ambiguous use of *predictive content*, for his misuse of the fertility criterion, for his misreading of the development of De Broglie's wave theory, and for his misreading of Mach." Long calls the last item a "caricature." Yet he judges that none of these deficiencies is fatal.

Although I was introduced to Polanyi's work by William H. Poteat at Duke, taught Polanyi multiple times as part of a course in the Philosophy of Science, relied heavily on Polanyi in my own thinking, and wrote about Polanyi in both of my books, I believe Long has helped me, especially in the "dialogue" chapters, to understand Polanyi significantly better than ever before. I wish I had had his book many years ago (but with an index).

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