

## Polanyi's "Illumination": Aristotelian Induction or Peircean Abduction?

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Michael Polanyi in *Personal Knowledge* strikingly and at length dwells on the "illumination" that is for him an essential aspect and the most dramatic moment in discovery. Speaking enthusiastically from personal experience, he affirms that illumination "is the plunge by which we gain a foothold at another shore of reality."<sup>1</sup> The further one proceeds into *Personal Knowledge*, the clearer it becomes why Polanyi begins the book with "The Lesson of the Copernican Revolution" and then acclaims Ernst Mach's "super-Copernican vision" which was itself a prefiguring of "the great theoretic vision of Einstein" (*PK*, 12). Such seeing in an unprecedented fashion, whether it belong to a great mind on the frontiers of knowledge or to an ordinary individual coming to understand something in the world, plays a central role in Polanyi's philosophical anthropology.

Readers familiar with Polanyi recognize that his celebration of illumination is married to preoccupation with testing and verification. This is to be expected from a world-class scientist. The question that presents itself is whether, in the midst of this emphasis on testing and verification, there is in Polanyi's illumination an autonomous epistemological authority. Within Polanyi's account, is there any sense in which illumination stands alone?

In a recent book, the Canadian philosopher Louis Groarke offers a lengthy discussion of epistemologically autonomous illumination under the heading of "Aristotelian induction."<sup>2</sup> Groarke explains:

On the traditional Aristotelian account, induction is not a matter of proof but of discernment. We observe this or that instance and come to *see* the underlying principle at work. We come to this realization, not through discursive proof, but through *epagoge*, through the sudden grasping of a necessary insight. We do not *prove* through tabulation; we recognize, in a flash of illumination, what must always be the case. (*AAI*, 366-67)

Elsewhere, he adds, “Through a primitive but powerful movement of illumination, the mind is able to hit on concepts, universal claims, and definitions describing the world. This inductive process operates by means of the intellectual faculty of *nous*, which is always true and even more infallible than scientific demonstration” (198). We thereby “discover order in the world...through the kind of creative inductive insight Aristotle champions” (428).

Central to Groarke’s account is the conviction that “[i]nduction has epistemological authority in its own right” (AAI, 196). Nothing is so certain as the insight or illumination it affords. Even if the discerned principle were subsequently to be demonstrated through empirical inquiry, nothing vital has been added. The illumination issuing from Aristotelian induction is epistemologically autonomous. Can the same be said for the illumination that is so important to Polanyi?

Groarke vehemently distinguishes Aristotelian induction from the process of abduction that he quite rightly affiliates with C. S. Peirce. For Groarke, Peirce’s abduction amounts to “brainstorming,” which for him represents faux illumination (AAI, 321 ff.). As part of an extended critique of Bernard Lonergan, Groarke states,

We might distinguish traditional and modern theories of intuitive reasoning, what I will call “the inductive view” and “the brainstorming view.” On the inductive view, we inspect the physical evidence and a light comes on. Intelligence discerns in the evidence what is inescapably true. So-called proof is after the fact. On the brainstorming view, the mind throws out ideas in a provisional way. These hypotheses must be tested. It is not the process of discernment but that of empirical (or logical) verification that has epistemological weight. Knowledge only supervenes when we prove (or disprove) the hypothesis. (AAI, 321)

He adds,

On [Lonergan’s] brainstorming account, it is as if discernment is postponed until after the proof. We are blind and empirical corroboration makes us see. But this is not how successful science proceeds. In successful cases, the scientist discerns what must be the case and then proceeds to prove it. Confirmation plays an

important role but it is logically *a posteriori*. It is not, initially, what makes us understand anything. (AAI, 324)

Prominent in Groarke's account of brainstorming is the assertion that whatever illumination or insight that occurs therein is hypothetical. Something is seen but it is genuinely known only subsequent to a process of testing and verification. This is in contrast to Aristotelian induction where, says Groarke, while the scientist may elect to test his insight, genuine knowledge exists at the moment of illumination.

Groarke affiliates brainstorming with the process of abduction that plays a vital role in C. S. Peirce's logical theory. He is clearly justified in doing so, as we see from the following passages from Peirce.<sup>3</sup> (To set the stage for later, fuller discussion, each passage will be accompanied by brief commentary.)

- 1) "Abduction...is merely preparatory. It is the first step of scientific reasoning...and abduction is, after all, nothing but guessing" (from 1901).<sup>4</sup> Note abduction's orientation toward the future, and also its fundamentally conjectural character.
- 2) "All the ideas of science come to it by the way of abduction. Abduction consists in studying facts and devising a theory to explain them. Its only justification is that if we are ever to understand things at all, it must be in that way" (1903).<sup>5</sup> The term "devising" will prove of considerable interest. The general significance of abduction captured in the second sentence helps us to understand why Peirce (also in 1903) states, "If you carefully consider the question of pragmatism you will see that it is nothing else than the question of the logic of abduction."<sup>6</sup>
- 3) "Abduction is the process of forming an explanatory hypothesis. It is the only logical operation which introduces any new idea...Abduction merely suggests that something *may be*" (1903).<sup>7</sup> Abduction for Peirce it is one of three logical operations (the others being deduction and induction), each of which plays a vital role in human knowing. Again, speculation is at the heart of abduction.
- 4) "The abductive suggestion comes to us like a flash. It is an act of *insight*, although of extremely fallible insight. It is true that the different elements of the hypothesis were in our minds before; but it is the idea of putting together what we had never dreamed of

putting together which flashes the new suggestion before our contemplation” (1903).<sup>8</sup> How very interesting for students of Polanyi is Peirce’s assertion that what existed before illumination contributes significantly to the emerging hypothesis. In addition, the juxtaposition “fallible insight” is striking. “Flash” of course summons a vision of illumination.

- 5) “What is good abduction? What should an explanatory hypothesis be to be worthy to rank as a hypothesis? Of course, it must explain the facts. But what other conditions ought it to fulfill to be good? The question of the goodness of anything is whether that thing fulfills its end. What, then, is the end of explanatory hypothesis? Its end is, through subjection to the test of experiment, to lead to the avoidance of all surprise and to the establishment of a habit of positive expectation that shall not be disappointed” (1903).<sup>9</sup> With its stress on practical consequences and reference to predictable, effective living, it is difficult to imagine a statement more classically pragmatic in nature. Any thought of Aristotelian teleology that is sparked by Peirce’s reference to “end” is squelched by our realization that whatever end he has in mind is subordinate to the ongoing and open-ended process of human living in the world. We have here an observation regarding not only the purpose of abduction but also its origins.

If there is reference to the flash of illumination in Peirce’s abduction as well as in both Polanyi’s account of scientific discovery and Aristotelian induction, it is also the case that Polanyi joins Peirce in his emphasis on testing and verification. He says, for example, that the discovery delivered by illumination is more precisely understood as “*tentative discovery*” (PK, 121; emphasis added) because the attempt to act on what was seen may show the insight to be mistaken.<sup>10</sup> As he states in his account of problem-solving, “Since the practical realization of the principle discovered by insight often presents difficulties which may even prove insurmountable, the manipulations by which the animal puts his insight to the test of practical realization may be regarded as the stage of Verification” (121). A few pages later, Polanyi adds, “Actually...such a flash of triumph usually offers no final solution, but only the envisagement of a solution which has yet to be tested” (130). Finally, in a sentence that is scarcely

distinguishable from Peirce's description of discovery, Polanyi remarks, "It is of the essence of scientific method to select for verification hypotheses having a *high* chance of being true" (30).

The central question thus emerges. Given Polanyi's agreement with Peirce regarding the need to test and verify the product of illumination, is there any room in his account of discovery and problem-solving for the epistemological autonomy of insight that constitutes the heart of Aristotelian induction? Is Polanyi thoroughly modern, a pragmatist through and through? Or, alternatively, might Polanyi offer an account of discovery that escapes the mutually exclusive classifications offered by Groarke? Could Polanyi have a foot in both camps? Just what is going on in Polanyi's "illumination"?

In *Personal Knowledge* illumination is portrayed as the traversing of a logical gap.<sup>11</sup> *The Tacit Dimension*, the work of a later Polanyi, downplays the notion of crossing a gap and instead emphasizes the role of integration in knowing.<sup>12</sup> Even here, however, Polanyi emphasizes that we are witnessing a logical operation ("a logic of tacit thought").<sup>13</sup> The idea that tacit knowing involves a logical operation is formally acknowledged by the title of a 1964 essay ("The Logic of Tacit Inference") in which Polanyi reports that he is "developing a theory of non-explicit thought" that is properly referred to as "an *informal logic* of science and of knowledge in general."<sup>14</sup> At the heart of this logic is the exercise of our "powers of perceiving coherence" (139). This is an act of integration resulting from an inference, an inference from subsidiarily known clues to a focally known object or result.

But the act of inference and the powers making it possible belong to an aware and active being that recognizes clues and engages in acts of integration in light of prior experience and earlier acts of understanding. Some see where others do not. This difference is in part attributable to character (i.e., attributes such as diligence, accessibility, commitment, perseverance, etc.). An aspect of character that is especially prominent in Polanyi's account of discovery is belief in the nature and possibilities of tacit knowing itself. As he says in *The Study of Man*, "my purpose...is only to show that as a result of accrediting within the framework of personal knowledge a belief in true mental achievements, we gain a view of man which confirms and strengthens this belief."<sup>15</sup> The person most adept at seeing is one who grasps and is committed to the process of seeing. In addition, and as an aspect of such commitment,

Polanyi emphasizes the importance of “incubation” (*PK*, 121-122) in which, following laborious study, one lets go and permits the tacit process of integration to run its course (ideally issuing in illumination). But the factor that appears most important in the execution of tacit inference leading to integration and insight is possession of skills that can be learned from others (hence the importance of apprenticeship) and are augmented and refined through continued inquiry.<sup>16</sup>

As suggested above, inference occurs within the context of a larger process. For Polanyi this process is marked by stages. In *Personal Knowledge*, for example, we are told that problem-solving, or discovery, consists of four stages: Preparation, Incubation, Illumination, and Verification (*PK*, 121). This description of tacit integration as the product of stages is usefully elaborated in “The Logic of Tacit Inference”:

Discovery comes in stages, and at the beginning the scientist has but a vague and subtle intimation of its prospects. Yet these anticipations, which alert his solitary mind, are the precious gifts of his originality. They contain a deepened sense of the nature of things and an awareness of the facts that might serve as clues to a suspected coherence in nature. Such expectations are decisive for the inquiry, yet their content is elusive, and the process by which they are reached often cannot be specified. It is a typical feat of discovery without awareness. (“LTI,” 143).

There is much to remark on in these references to stages. To begin with, of course, we note that verification for Polanyi is a formal part of discovery. And, while the phrase is certainly dramatic, it is unsurprising, given our acquaintance with Polanyi’s emphasis on the tacit, to read that discovery occurs “without awareness.”<sup>17</sup> Less explicit, but no less significant, is the picture of the discoverer as an individual (interestingly, it is a “*solitary*” individual<sup>18</sup>), within a problematic situation, seeking relief from a form of discomfort. This individual is the beneficiary of “clues” offered by his surroundings. Things in the world are one source of these clues. But so, too, are things in the mind. Integration is stimulated and made more likely by education and relevant prior experience. Within the same chapter of *Personal Knowledge* that contains the above description of problem-solving and its constituent stages, Polanyi describes in detail “the educated mind” (*PK*, 102-104). A distinguishing feature of such a mind is its

capacity for and proclivity toward discovery. As Polanyi says toward the close of his account of problem-solving, “The interpretative framework of the educated mind is ever ready to meet somewhat novel experiences, and to deal with them in a somewhat novel manner” (*PK*, 124; cf. 317). What one brings to the struggle to resolve perplexity has much to do with its outcome. Our background (which is to say, our conceptual and experiential resources) is deeply implicated not only in *how* we think but also in *what* we discover.

Does Polanyi’s portrayal of problem-solving as occurring in a troubled mind contending with a problematic situation reduce the process to an instance of tension-relief? This interpretation is suggested when Polanyi states that “nothing is a problem or discovery in itself; it can be a problem only if it puzzles and worries somebody, and a discovery only if it relieves somebody from the burden of a problem” (*PK*, 122). Is mere equilibrium, a sort of quiescence, the normal and sought-after condition? If so, illumination loses much of its allure. We are spared such disappointment, however, since within insight we grasp “a principle” (121) and gain access to “a reality to which we have access by no other channels” (359). Illumination, the product of successful problem solving, offers a distinctly positive outcome, ontological in nature: communion with a significant reality, hitherto concealed, that is in the nature of things.

Finally, for Polanyi, it is not simply a mind that experiences perplexity and achieves discovery. Necessarily among the clues that are integrated by the problem-solving individual are those arising from the body. Indeed, it is only through the paths offered by the body that we come to know the world. This realization leads Polanyi to acknowledge “the bodily roots of all knowledge and thought” (“LTI,” 147). His explanation of this statement is striking: “Every time we make sense of the world, we rely on our tacit knowledge of impacts made by the world on our body and the complex responses of our body to these impacts. Such is the exceptional position of our body in the universe” (147-148).

With our understanding of Polanyi’s illumination thereby deepened, let us again visit Peircean abduction and Aristotelian induction. In doing so the first thing we notice is how much of what Polanyi reveals is recognized by Peirce. These points of intersection might be called “the Polanyian features” of his account of abduction. Among the most important of these are “a natural instinct for truth” and the role in hypothesis-formation (abduction) of

“preconceived ideas.”<sup>19</sup> For Peirce, as for Polanyi, organisms find themselves in problematic situations which they strive to resolve. In the case of human beings, both the recognition of the difficulty and development of a response to it involve the intellect. That is, we see the problem and then devise a possible solution. These are acts of insight. Peirce considers such insight to be a manifestation of “Instinct.”<sup>20</sup> He employs this unexpected term due to his acknowledgment that we have no explicit clear understanding of how the “divining”<sup>21</sup> that constitutes abduction operates. We see here, then, a prefiguring of Polanyi’s conception of the tacit dimension.

Peirce highlights the role played in abduction by “guessing” and “feeling.”<sup>22</sup> But while the act is conjectural, it is scarcely arbitrary. In abduction we *select* a hypothesis<sup>23</sup> and, while doing so, we follow “rules.”<sup>24</sup> Noteworthy among the rules mentioned by Peirce is appreciation of the “probabilities” associated with a hypothesis.<sup>25</sup> In reading of the role assigned by Peirce to assessment of probability, we are reminded of Polanyi’s description of the white pebbles at the Welsh train station (*PK*, 33-34). Peirce and Polanyi are equally appreciative of the part played by probability, and by professional judgment generally, in science. Of special note is that Peirce’s guessing and feeling (what we might call intuition), as well as the formulation of a hypothesis in light of rules, are informed by the background we bring to the moment. This includes the “preconceived ideas” mentioned by Peirce, including a set of tacit criteria, fundamentally aesthetic in nature, in light of which we decide whether an idea (a hypothesis) is acceptable, fruitful, etc.<sup>26</sup> The process results in “abductive expectability” (as opposed to “deductive necessity” and “inductive probability”).<sup>27</sup>

The parallel with Polanyi extends yet further. Peirce states, “Now the surrender we make in retrodution [his later term for abduction] is a surrender to the insistence of an idea. The hypothesis, as the Frenchman says, *c’est plus fort que moi*. It is irresistible; it is imperative. We must throw open our gates and admit it, at least for the time being.”<sup>28</sup> In this description Peirce is elaborating upon and helping to explain the striking motivational power of illumination that is so dramatically noted by Polanyi. What each of them recognizes is that this power stems from a tacit understanding that the emerging idea subscribes to, and is even endorsed and mandated by, preexisting standards of plausibility and promise. (There is something special

about *this* idea.) As both men stress, were such a process not operating, and operating effectively, we would be required to examine innumerable possibilities, thereby rendering discovery chaotic, and, indeed, making the advance of knowledge within disciplines impossible.<sup>29</sup>

In Peirce's abduction there are two moments, each with its own perspective, which, taken together, will serve as a bridge to our further examination of Aristotelian induction and the question of Polanyi's relationship to it. The first of these is that belonging to the instant of illumination that figures so prominently in Peirce's account. To employ his lexicon, this is the moment of the "flash" that constitutes the "explanatory hypothesis" and yields a "new idea." The second prominent moment in abduction occurs when the new idea is successfully tested. This is a moment of seeing following verification. We might, then, refer to these two moments as "insight<sub>1</sub>" and "insight<sub>2</sub>". For Peirce, insight<sub>1</sub>, while essential, is by itself incomplete. It shows the way, but it can provide reliable guidance only when combined with insight<sub>2</sub>. Even then the hypothesis, now confirmed, remains in principle fallible and hence subject to falsification by experience. But this fact should provoke neither anxiety nor disappointment. It is for Peirce fanciful to imagine that a perfectly necessary alternative exists. It is the mark of wisdom and maturity not only to build an inventory of strongly probable (and thereby fruitful) hypotheses but also to become adept both at identification of additional candidates, and at their integration, following verification, with the preexisting store.

There are parallel moments of insight<sub>1</sub> and insight<sub>2</sub> in Polanyi's analysis of discovery. We saw already that illumination and verification are both among the formal steps of discovery. Polanyi's view of the two moments, or perspectives, is neatly captured in *Personal Knowledge*: "At that moment [of illumination] we have the vision of a solution which *looks* right and which we are therefore confident [during verification] to *prove* right" (*PK*, 131). *The Tacit Dimension*, with its emphasis on the act of integration, employs somewhat different language: "to see a problem is to see something that is hidden. It is to have an intimation of the coherence of hitherto not comprehended particulars" (*TD*, 21). Polanyi later adds, "we can have a tacit knowledge [or "foreknowledge"] of yet undiscovered things" (23). The first moment, marked by insight<sub>1</sub>, therefore consists of a distinctive form of comprehension. It is an "intimation" of

something real. But, significantly, Polanyi declares, “To trust that a thing we know is real is...to feel that it has the independence and power for manifesting itself in yet unthought of ways in the future” (32). Verification, or the insight<sub>2</sub> of the second moment, is an instance of such manifestation. It is worth noting, moreover, that these manifestations, and thereby verification, carry on indefinitely into the future

It thus appears that our attempt to locate Polanyi’s “illumination” in relation to Aristotelian induction leads into consideration of temporality as well as to the meaning of the real, matters that, for Polanyi, are intimately connected. Let us approach these subjects from the direction of Polanyi’s conception of his own enterprise, or of that of any pioneering discoverer. In *Personal Knowledge* he states,

I have described...the passionate preoccupation with a problem which alone can elicit discovery, and the protracted struggles against doubts of its significance and validity by which its announcement is often followed. Such a struggle, in which the ardour of discovery is transformed into a craving to convince, is clearly a process of verification in which the act of making sure of one’s own claims is coupled with the effort of getting them accepted by others. (*PK*, 171)

Note in this admirably forthright statement the acknowledgement of the public dimension of knowing the truth. During the first moment of discovery (illumination qua insight<sub>1</sub>), we not only believe we have seen something significant, we are at the same time possessed by a passion to demonstrate to ourselves that what we see is in fact real. Yielding to this passion consists of taking the steps that will eliminate our doubts. But, Polanyi stresses, a necessary part of eliminating my own doubts is showing to the satisfaction of those I respect that my discovery is real. That is, a critical part of eliminating my own doubts is eliminating theirs. The passage of time—the time required to show myself (and thereby others) that insight<sub>1</sub> is genuine—is *intrinsic to discovery*. Arriving at insight<sub>2</sub> is a necessary condition for the legitimization of insight<sub>1</sub>.

This very process of verification over time is central to Polanyi’s understanding of the real. This was already suggested in our reference to page 32 of *The Tacit Dimension* where manifestations in the future confirm the reality of what we conceived in the past. Polanyi

emphatically drives home the point by saying that something is “*most real*, owing to the wider range of its yet unknown future manifestations” (*TD*, 61).<sup>30</sup> Reality is future-oriented and so also must be our assessment of illumination.

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We arrive at last at the point where it is possible to draw some conclusions. The primary of these, given the question with which we began, is that Polanyi’s “illumination” is not, and cannot be, autonomous in the sense definitive of Groarke’s Aristotelian induction. For Polanyi, illumination, or what we have come to know as “insight<sub>1</sub>,” while of vital importance, is by its very nature incomplete. We have seen, however, that illumination consists of an inference, which is a discrete act. An inference may be executed more or less well, and with more or less acumen. Verification, the second moment for Polanyi and itself an inference, is not, as indicated by Groarke, superfluous. Rather, it is the completion (albeit, a provisional one) of the initial illumination. At the heart of Polanyi’s account of discovery is a profound respect for the initial insight. Indeed, he stands in awe before it, and much of what Polanyi does, both as a master practitioner and a philosopher of science, is directed toward stimulating in those that follow him the capacity for fruitful illumination. Such illumination is not autonomous “à la Groarke,” but it certainly possesses a significance and independence that entitles it to our greatest respect—perhaps more respect even than is extended to it by the deeply appreciative Peirce.

Groarke’s assignment of exclusive authority to the moment of illumination depends on a radically favorable appraisal of the present moment that is impossible for Polanyi. It is impossible because it is inconceivable. We have in this connection already spoken of the role of time in Polanyi’s process of discovery. More broadly, what we see in Polanyi and Peirce, and what is only incoherently present in Groarke, is recognition of the open-ended and intrinsically public nature of the experience of illumination.<sup>31</sup> But incoherence on the part of Groarke is scarcely the central matter. More to the point, and more constructive, is Polanyi’s observation that the recognition attributed by Groarke to illumination never belongs exclusively to any particular individual and point in time. Rather, it belongs to a community over time—to the assembly of those who are committed to knowing about the matter under study.

This conclusion can be rendered in somewhat different terms as well. We saw at the outset that, for Groarke, “Confirmation plays an important role but it is logically *a posteriori*. It is not, initially, what makes us understand anything” (AAI, 324). But what constitutes understanding? The response we find in Polanyi is that while understanding is indeed *personal*, it is not fundamentally *private*. The object of discovery and pursuit of its understanding are the concern of a community, and they receive their meaning from that concern.

Looking back at Groarke’s account of Aristotelian induction, what is perhaps most striking is its minimal preoccupation with the act of justification that for Polanyi is the central challenge in discovery. Students of Polanyi are well aware of the degree to which he stresses the importance of faith and commitment. What our excursion into his conception of illumination reveals is that the primary function of faith and commitment is to sustain in the discoverer the vitality of his insight for the period of time required for it to be confirmed through the assent of relevant fellow explorers.

It is to be noted, however, that Polanyi’s rejection of the autonomy of illumination is not equivalent to any demotion of what has been discovered in insight<sub>1</sub>. In his description of illumination, Polanyi employs many of the very terms (a “principle” has been grasped, for example, and “reality” itself is revealed) used by Groarke. In their conception of what is at stake in discovery and understanding, Polanyi and Groarke converge. But in their grasp of these processes, viz., in regard to how and when they take place, they are worlds apart. This difference penetrates to the heart of Polanyi’s enterprise. He holds in the highest esteem both illumination and verification—which is to say that his central focus forever remains on the *activity* of discovery and the *community* of explorers for which such discovery is a life’s calling.

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<sup>1</sup> Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (Chicago: The University of Chicago Press, 1962 [first published in 1958]), 123. Hereafter, references to this book will occur in the text and be

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designated by “PK”. In a revealing passage, Polanyi later in the book refers to the “discoverer’s first excitement at the moment of illumination” (172).

<sup>2</sup> Louis Groarke, *An Aristotelian Account of Induction: Creating Something from Nothing* (Montreal: McGill-Queen’s University Press, 2009). Hereafter, references to this book will occur in the text and be designated by “AAI”.

<sup>3</sup> Peirce’s logical theory evolved over his career. Abduction at an earlier time was referred to as “hypothesis” and, towards the end of his life, was typically called “retroduction.” In our citations to his work, we will focus on his writings and lectures from 1901 onward, which can properly be regarded as representing his mature position.

<sup>4</sup> Charles Sanders Peirce, “On the Logic of Drawing History from Ancient Documents,” in *The Essential Peirce*, vol. 2, edited by the Peirce Edition Project (Bloomington: Indiana University Press, 1998), 106-107.

<sup>5</sup> Peirce, “The Three Normative Sciences,” in *ibid.*, 205.

<sup>6</sup> Peirce, “Pragmatism as the Logic of Abduction,” in *ibid.*, 234.

<sup>7</sup> Peirce, “The Nature of Meaning,” in *ibid.*, 216.

<sup>8</sup> Peirce, “Pragmatism as the Logic of Abduction,” in *ibid.*, 227.

<sup>9</sup> *ibid.*, 235.

<sup>10</sup> Cf. *The Tacit Dimension* (Gloucester, Mass: Peter Smith, 1983 [but based on lectures delivered in 1961 and 1962]), 25: “The anticipation of discovery, like discovery itself, may turn out to be a delusion.” Hereafter, references to this book will occur in the text and be designated by “TD”.

<sup>11</sup> “‘Illumination’ is then the leap by which the logical gap is crossed” (123). Cf. 130 and 367.

<sup>12</sup> See, for example, *TD*, 6.

<sup>13</sup> As we move more deeply into the study of Polanyi’s logic, we are put on alert by William H. Poteat in his *Polanyian Meditations: In Search of a Post-Critical Logic* (Durham: Duke University Press, 1985) in which he speaks of “the ostensible philosophical dangers of Polanyi’s dissident uses of the word ‘logic’” and “a curious skewing of the uses of the word ‘logic’ by Polanyi” (35).

<sup>14</sup> “The Logic of Tacit Inference” in *Knowing and Being: Essays by Michael Polanyi*, edited by Marjorie Grene (Chicago: The University of Chicago Press, 1969), 155. The emphasis is Polanyi’s. On 139 he refers to “the logic of discovery.” Hereafter, references to this article will occur in the text and be designated by “LTI”. Polanyi is careful to point out that the inference with which he is concerned consists of integration rather than deduction. See “Sense-Giving and Sense-Reading” in *Knowing and Being: Essays by Michael Polanyi*, edited by Marjorie Grene (Chicago: The University of Chicago Press, 1969), 194. Peirce surely would concur.

<sup>15</sup> *The Study of Man* (Chicago: The University of Chicago Press, 1959), 66. Hereafter, references to this book will occur in the text and be designated by “SM”.

<sup>16</sup> Cf. *Personal Knowledge*, 106: “For the capacity for making discoveries is not a kind of gambler’s luck. It depends on natural ability, fostered by training and guided by intellectual effort.”

<sup>17</sup> Technically, of course, there is awareness here. But it is subsidiary in nature, and refers to elements whose integration makes illumination possible.

<sup>18</sup> The solitariness of the discoverer’s mind, we will see, constitutes a problem. It is a challenge to be overcome.

<sup>19</sup> “On the Logic of Drawing History from Ancient Documents,” 108.

<sup>20</sup> “The Nature of Meaning,” 217. See, too, 443 and 444.

<sup>21</sup> See, for example, “The Nature of Meaning,” 224.

<sup>22</sup> For example, see “On the Logic of Drawing History from Ancient Documents,” 106 and 107.

<sup>23</sup> See “Laws of Nature” in *The Essential Peirce*, vol. 2, 73. Peirce also speaks of “choosing” a hypothesis. See “On the Logic of Drawing History from Ancient Documents,” 106.

<sup>24</sup> See *ibid.*, 113. These rules are in large measure eminently practical (107). Cf. Chapter II of Polanyi, *Science, Faith and Society* (Chicago: The University of Chicago Press, 1964 [first published in 1946]), titled “‘Authority and Conscience,’” especially 47ff.

<sup>25</sup> “On the Logic of Drawing History from Ancient Documents,” 114.

<sup>26</sup> Peirce refers to the “step of adopting a hypothesis as being suggested by the facts” (“On the Logic of Drawing History from Ancient Documents,” 95). But of course, facts themselves cannot “suggest” anything. The suggestion, which is to say, the emergence of the hypothesis and the subsequent impulse to accept and act in accordance with it, is the result of a *judgment* regarding those facts. What Peirce acknowledges just as much does Polanyi is the vital role of this judgment and the conditions making it possible and incumbent. Peirce goes on to

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formally identify the adoption of a hypothesis as abduction and then, importantly, adds, “*I reckon it as a form of inference, however problematical the hypothesis may be held*” (ibid.; emphasis added). The role of interpretation in perception (and hence abduction) is discussed in detail in “Pragmatism as the Logic of Abduction,” 228-229.

<sup>27</sup> Ibid., 233.

<sup>28</sup> “The First Rule of Logic” in *The Essential Peirce*, vol. 2, 47.

<sup>29</sup> “Life is too short to allow us to go on testing millions of false *H*'s [hypotheses] in order to hit on a true one. It is of the essence of the scientific method to select for verification hypotheses having a *high* chance of being true” (*PK*, 30). Note that, like Peirce, Polanyi speaks of the scientist *selecting* a hypothesis.

<sup>30</sup> Cf. *Personal Knowledge*, 116-117. Peirce is explicit on this point: “The opinion which is fated to be ultimately agreed to by all who investigate is what we mean by truth, and the object represented in this opinion is the real” (from “How to Make Our Ideas Clear” in *The Essential Peirce*, vol. 1, ed. Nathan Houser and Christian Kloesel [Bloomington: Indiana University Press, 1992], 124-41, at 139).

<sup>31</sup> Groarke's incoherence consists in the fact that as adamant as he is in asserting the exclusive authority of illumination, he is nearly as forceful in affirming the significance of subsequent verification: “Further confirmation, after the fact, may be a useful, even necessary tool; in complex cases, it confirms that we really know” (*AAI*, 367).