

*Tacita Scientia: Reading Aquinas with Michael Polanyi*

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Science is nothing if not a work of faith. Such was the claim of Michael Polanyi. While he was not the first of his century to say this kind of thing (William James had broken the same ground), Polanyi's portrait of science was highly original. As he saw it, the whole scientific endeavor bore a similarity to religion; it was a vast confessional system.<sup>1</sup> Might his thinking suggest the restoration of a medieval enterprise, something like the picture drawn up by Aquinas? Yes, I will argue, it does. But I suspect Polanyi would dismiss the idea. To him, St. Thomas was significant to science only on the wrong side, as partisan to the geocentric universe.<sup>2</sup> I grant him his point. I am also prepared to dislodge it from his convictions by showing its superficial value among them.<sup>3</sup> This essay will present an alternative outline, letting Polanyi's intuitions guide a deeper reading of Aquinas on the conditions necessary to scientific inquiry. I will further suggest that in post-positivist philosophy, especially in Polanyi but also in Kuhn, one finds a hesitant or partial return to the pre-Copernican attitude formalized by St. Thomas.

For many, Aquinas represents the medieval mind at its best, capable of uniting a diverse store of ideas in one massive system. This strength also makes him elusive, because

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<sup>1</sup> "Take two scientists discussing a problem of science on an equal footing. Each will rely on standards which he believes to be obligatory both for himself and the other. Every time either of them make an assertion as to what is true and valuable in science, he relies blindly on a whole system of collateral facts and values accepted by science. And he relies on it that his partner relies on the same system. Indeed, the bond of mutual trust thus formed between the two is one link in a vast network of confidence between thousands of scientists of different specialties, through which – and through which alone – a consensus of science is established which may be said to accept certain facts and values as scientifically valid." *Personal Knowledge* (Chicago: University of Chicago Press, 1982), 375. Hereafter cited as *PK*.

<sup>2</sup> *PK*, 146 n1; also Lecture 1, p.3 of the unpublished Duke Lectures.  
<<https://www.missouriwestern.edu/orgs/Polanyi/Duke-intro.htm>>

<sup>3</sup> Without exactly saying so, Polanyi did recognize that he was returning to an older conception of science, something like a metaphysical tradition grounded in first principles. See Michael Polanyi, *The Tacit Dimension* (Chicago: University of Chicago Press, 1966), 70. Hereafter cited as *TD*.

unlike some thinkers, his central positions increase in complexity the more one reads him. To study Aquinas often demands a guide right from the start, someone to inventory and connect ideas in a manageable way. Even the seasoned scholar cannot help but create downscale models of the larger system, synopsisizing it or re-networking its themes. The second of these techniques, a re-networking of themes, is what I will employ. Because of my aim, I cannot encompass whole topics as Aquinas first laid them out. A proper treatment of *Scientia*, for instance, would range well beyond my intended discussion (since as I say, Polanyi heralds only a partial return).<sup>4</sup> Conversely, the modern sciences range well beyond their medieval parents in subject matter, procedure and instrumentation. So I will draw from multiple topics in Aquinas and attempt to sound them out in a new order. This is not a violent thing to do; my anticipation of a coherent system rather enables the task. Aquinas, I need not argue, was an astonishing systematician. The interconnectivity of his arguments, the ground of his logic, the breadth of its content – these are precisely what have enabled the many rearrangements of his work over time. By enlisting Polanyi as kind of draftsman for the task, we will find the materials of Aquinas unexpectedly current, keeping pace with recent trends in the history and philosophy of science. This, in turn, will support some provisional remarks on the promise of Thomism for the sciences.

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<sup>4</sup> One need only begin the *Summa Theologica* (1a.1.1-7, here after cited as *ST*) to see that Aquinas defends sacred doctrine as a science. This lies beyond my essay. However, I do think the sense of science given by Aquinas will not seem so different from Polanyi's by the time we conclude. In a public dialogue with Carl Rogers, Polanyi suggested that the term 'science' had come to monopolize the domain of 'knowledge', when the latter ought to have suggested a much larger and equally perspicacious realm accessible beyond scientific operations. The common word in Latin for both terms is *scientia*, which was conceived as a multiplicity of sources for truth – from scripture to Aristotle – woven together as *Sacra Doctrina*. See "Michael Polanyi and Carl Rogers: A Dialogue," *Polanyi Society*, 1968, 2006, <polanysisociety.org/Polanyi-Rogers%20Dialog-pdf.pdf>, accessed 20 June 2017.

## 1. Thomism and Science

When tracing similarities in unrelated thinkers, one faces an obvious question: why? Why spend the effort, when the nature of their connection is unapparent? If their likeness is accidental, not transmitted, what good does the study do? The short answer is that such a project opens an existential claim on truth. A lack of relation between two thinkers is exactly what could validate the matter on which they agree. Thus, by taking an eccentric route to St. Thomas, I am attempting to open a specific kind of claim on his philosophy. I am not, in principle, ignoring the legacy of his commentators. I am instead convinced of something Alasdair MacIntyre once said: “We inhabit a time in philosophy in which Thomism can only develop adequate responses to the rejections of its central positions in what must seem initially at least to be unThomistic ways.”<sup>5</sup>

But also, I must confess that Aquinas scholars offer little help in the case I am trying to make. Those with an interest in science tend implicitly to affirm a story of empiricist preeminence, which puts them on the wrong foot from the start. Armand Maurer, for instance, opens his translation of Aquinas on the sciences by saying this:

The center of attraction for St. Thomas and his contemporaries was not empiriological or mathematical science, but rather ontological or philosophical knowledge... The consequence of this optimism was the extension of philosophical analysis to areas in which it fails to achieve results.<sup>6</sup>

This sort of concession is commonplace, and it offers only two choices. Either Aquinas should be thrown out whole (as Polanyi seems to have done), or else pardoned for his ignorance of other methods (especially the Baconian variety). Not surprisingly, Maurer takes the second path, eager to praise Aquinas in the light of his other merits. After all, says

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<sup>5</sup> Alasdair MacIntyre, *First Principles, Final Causes and Contemporary Philosophical Issues* (Milwaukee: Marquette University Press, 1990), 2.

<sup>6</sup> Thomas Aquinas, trans. Armand Maurer, *The Division and Methods of the Sciences. Questions V and VI of His Commentary on the De Trinitate of Boethius* (Toronto: Pontifical Institute of Mediaeval Studies, 1986), xii.

Maurer, there are some questions the scientific method cannot answer – questions about God, ultimate things, and the value of science itself.<sup>7</sup> This is a fairly predictable formula, permitting Thomist metaphysics to cohabitate, seemingly tension-free, with modern science.<sup>8</sup> The truth of each is allegedly compatible with the other. Moreover, the questions unanswered by each are best answered by the other, because the distinction between them is reducible to method. Maurer and others of his cast accordingly commend Aquinas to science as a kind of top layer, an icing which leaves the cake's ingredients unchanged.

This view can be traced (though by no means completely) to Jacques Maritain, a Thomist of Polanyi's generation. According to Maritain, Thomism was an accurate metaphysics for the sciences, one which would "do them no violence."<sup>9</sup> He was bold enough to insist that metaphysics should hence be recognized as a proper scientific discipline, free nonetheless to operate by its own methods. Bolder still, he claimed that metaphysics was the rightful king of the sciences, because other disciplines ultimately depended on it for their starting points. He believed he was opposing Kant on this matter, refreshing a position much closer to Aquinas.<sup>10</sup> One can see how this was true in principle; Maritain was attempting to found all truth in the transcendental reality of God. But centuries have passed since the politics of the academy admitted such a hierarchy. It therefore remains unclear how a Maritainian view can functionally bypass the religious/secular divide after Kant. How can a

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<sup>7</sup> *Ibid*, xii-xiii.

<sup>8</sup> To my mind, this appears to be an effect of neo-Scholasticism, the dominant form of Thomism for much of the nineteenth and twentieth century. Étienne Gilson once complained to Henri de Lubac that Catholic institutions had come to represent "a dull sort of rationalism which panders to the kind of deism that most of them, deep down, really prefer to teach." Faith and reason had been fundamentally separated, along with their correlated domains of grace and nature. The response of *Nouvelle* theologians like Gilson and de Lubac was to insist that Aquinas had always intended to read nature in light of grace. This repositioned reason as an observable feature of pagan nature, but it was observable only in the terms granted by faith, already open to God as the final *telos* of all being. See Étienne Gilson, *Letters of Étienne Gilson to Henri de Lubac 1956-1975*, trans. Mary Emily Hamilton (San Francisco: Ignatius, 1988), 23.

<sup>9</sup> Jacques Maritain, trans. M.R. Adamson, *The Degrees of Knowledge* (New York: Charles Scribner's Sons, 1938), 83-84.

<sup>10</sup> Compare for instance *ST* 1a.1.7 or 1a2ae.66.5.

Catholic metaphysics today 1) operate in its own unique discourse, yet 2) defend its scientific status to disciplines outside its discourse, yet 3) govern those disciplines by means of its discourse, yet 4) refrain from doing them violence? How can such a philosophy have any discursive existence? If it cannot correct the sciences, why should the sciences defer to it? Or, if it moves to correct them, on what basis can it do so? What, for instance, could such a philosophy say to a string theorist intent on explaining everything vis-à-vis physics?

The attempt to ‘explain everything’ presents the sort of liability Polanyi wants to cast off, and we will find his argument to be of greater use than Maritain’s. We will not quickly see his resemblance to Aquinas, however. For one thing, Polanyi’s central position is much easier to condense.<sup>11</sup> He himself states it repeatedly, starting from the premise that “*we know more than we can tell.*”<sup>12</sup> Which is to say, *in order for knowledge to be true, it need not be explicable.* Polanyi’s claim reflects a kind of apophatic impulse, but instead of directing our attention to the transcendent, he offers mundane examples of ineffability: knowing a person’s face, knowing how to ride a bicycle, trusting someone who knows better, and so on. Polanyi does not mean that such things will forever defy explanation (he would be the last to dampen the endeavor). He simply means they do not *start* as explanation, thus they need not end there to be true. I would struggle, for instance, explaining just how I know a close friend’s face. A few features are all I could describe, and their composite might match any number of people on earth. Nor can I exhaustively state just how to balance a bicycle in motion; it is a thing learned by doing. These represent phenomena Polanyi calls *tacit knowledge* or *subsidiary awareness*. It is a sort of knowledge which is never propositionally true, because it is fundamentally not propositional. It is rather like peripheral vision, which eludes our focus

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<sup>11</sup> See Helmut Kuhn, “Personal Knowledge and the Crisis of the Philosophical Tradition,” *Intellect and Hope* (Durham, NC: Duke University Press, 1968), 111.

<sup>12</sup> *TD*, 4.

while bringing into focus whatever we intend to explain. Thus, even if I can adequately describe my friend, I have not made all of my tacit knowledge explicit. I must always employ a huge amount of subsidiary know-how. The syntax of language, for instance, works in my mind without requiring that I appreciate the eight parts of speech and why they work.<sup>13</sup>

We thus find ourselves at a vantage to notice an impressive parallel, perhaps even a blueprint for a larger reconstruction of Thomist science. I can demonstrate it in short form by once again quoting MacIntyre, this time after a similar quote from Marjorie Grene:

Knowing always expresses a personal commitment, because it entails the apprehension of a whole in terms of its parts, or of an aim in terms of a means to it. It entails, in Polanyi's language, both *focal* and *subsidiary* awareness.<sup>14</sup>

And MacIntyre:

The central virtue of the active life is the virtue which Aristotle names '*phronesis*' and Aquinas '*prudentia*.'... it enables its possessor to bring sets of particulars under universal concepts in such a way as to characterize those particulars in relevant relationship to the good at which the agent is aiming.<sup>15</sup>

Specialist vocabularies aside, these quotes can be distilled to the same idea: knowledge implies an aim, a personal commitment to understand things in terms of completion or realization. We only know particular truths by tacitly committing ourselves to a sense of the whole. The same is also true the other way around: we can only speak of the whole by tacitly aggregating its particulars. Let us examine this further.

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<sup>13</sup> Here is where Polanyian theory intersects quite strongly with Wittgenstein; such matters, however, deserve greater attention and belong to another project.

<sup>14</sup> Marjorie Grene, "The Logic of Biology," *The Logic of Personal Knowledge: Essays Presented to Michael Polanyi on His Seventieth Birthday* (London: Routledge and Kegan Paul, Ltd, 1961), 192.

<sup>15</sup> MacIntyre, *First Principles*, 41-42.

## 2. Commitment

Consider a physician making a diagnosis.<sup>16</sup> She has taken various things into account: lab values, clinical images, vital signs and so on. These, along with her patient's history and physical exam, are pieces of a puzzle. They are not meaningful in themselves; their meaning is derived from the whole problem they conjointly define. A diagnosis therefore represents a *knowing through*, as the Greek indicates. The doctor recognizes an illness through its constituent parts. We might just as easily think of diagnostic knowledge as a *putting together, a rendering whole*. But notice: to render something whole in the genre of problems (which is what a diagnosis claims to do), the physician has already employed the same skill in the opposite direction – not forward from bits of data but backward from an even greater whole. *This* human is considered unwell against the backdrop of a normal physiology, a unitive species called 'human'. Has the physician ever seen the human species in itself? No, she has been trained to know it attributively through its members.<sup>17</sup>

It is not overreaching to invoke Aristotle at this point. Medicine is an expression of the mind's enigmatic talent for identifying the kinds or natures of particular things. A physician, peripherally referencing the human kind, is able to judge *this* human's 'quality of life', *i.e.* his degree of wellbeing as implied by his species. There is, without doubt, a perceptual ontology at work in medicine, which autocorrects particulars toward an assumed *telos*.<sup>18</sup> To put it another way, the term 'human' already narrates the *is* and the *ought* of its members. (Not that a man is somehow less human when he is unwell. To the contrary, he can be treated as unwell only if he is considered human.) Hence, there is an ethical sweep in the process of

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<sup>16</sup> Medical diagnostic knowledge is a common example in Polanyi's work. See for instance *The Study of Man* (Chicago: University of Chicago Press, 1959; Republished in Mansfield Centre, CT: Martino, 2014), 45. Also *PK*, 101, in which Polanyi points to a medical student learning to read x-rays.

<sup>17</sup> See *PK*, 88-89 on the training of a physician.

<sup>18</sup> Aquinas understood this clearly. "Thus the physician strengthens nature, and employs food and medicine, of which nature makes use for the intended end." *ST* 1a.117.1, *response*.

knowing and identifying; we are at once involved with ends and justifiable means. And on this front, an open discourse on metaphysics would indeed serve the sciences, because no barricade can stand between fact and value. A fact only exists as something worth noting. No truth exists without a tacitly referenced good. Aquinas and Polanyi coincide on this point from the start.

Introducing Aristotle's *Metaphysics*, Aquinas claims that all the sciences are ordained to one thing, namely human perfection (*hominis perfectionem*).<sup>19</sup> This he also calls *beatitudo*, variously translated 'happiness' or 'blessing'. I have just argued that such a goal is apparent in medicine, but are all the sciences driven by a similar commitment, regardless of their objects of study? Could such a commitment extend to theoretical physics, or even to the mathematician with no interest in the application of his research? If the question itself sounds absurd, it is likely because we accept one of two views. Either we affirm without difficulty that science is teleologically formed, or we believe the popular history of the Enlightenment, which says the very opposite. Take the story often told about Copernicus, which Polanyi uses frequently as a case study. Many writers, he says, extract the following lesson from the Copernican revolution: we ought to "see ourselves objectively in the true perspective of time and space."<sup>20</sup> (One can argue that this already discloses a moral goal for knowledge, but let us leave that aside.) We are told to shed our biases and see the facts coldly. We should detach ourselves from prejudicial commitment and accept evidence contrary to our beliefs. Now, if this is the nature of objectivity, in what sense was Copernicus its harbinger? Thomas Kuhn, very possibly under Polanyi's influence, answers the question well.<sup>21</sup> The Copernican

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<sup>19</sup> Aquinas, *Sententia Super Metaphysicam*, prologue.

<sup>20</sup> PK, 3.

<sup>21</sup> Martin X. Smoleski has written a helpful comparison of Kuhn and Polanyi, suggesting that the former owed an unexpectedly deep debt to the latter. See "Polanyi vs. Kuhn: Worldviews Apart," *Tradition and Discovery: The Polanyi Society Periodical* No. 33, Vol. 2, pp. 8-24.

theory was “neither simpler nor more accurate than Ptolemy’s system. Available observational tests...provided no basis for a choice between them.”<sup>22</sup> So what made Copernicus right? Let us ask it another way: what mechanism was involved in the public rectitude of his theory?

Like Kuhn, Polanyi dismisses the idea that Copernicus and his adherents took an impartial stance, finding facts without prejudice. The real lesson here is “the greater intellectual satisfaction he derived from the celestial panorama as seen from the sun instead of the earth.”<sup>23</sup> The same satisfaction was later felt by Kepler and Newton, who were so taken with the Copernican model that they worked to answer problems no other model suggested.<sup>24</sup> Paul Dirac, a Nobel Prize winner for physics, said the same of relativity. Einstein’s idea was accepted, said Dirac, largely because “there is a beautiful mathematical theory underlying it, which gives it a strong emotional appeal.”<sup>25</sup> Let us take the expert’s word for it: theories gain acceptance not simply because they are proven but because they are gratifying.<sup>26</sup> Proof is but one way to gratify the intellect; gratification is the greater power. If this does not immediately sound controversial, it is because most everyone can relate to the experience of intellectual satisfaction. Who has not known the pleasure of an answer found after great labor, perhaps in math or mechanics, or less formally in the various puzzles of life? Yet if we grant that this kind of pleasure is real, we must make an assumption about the intellect which will not sustain the popular view of objectivity. The question is: can the intellect be defined as a satisfiable entity? If so, we had better revise ‘objective’ to mean something other than

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<sup>22</sup> Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 2012), 76. Hereafter cited as *Structure*.

<sup>23</sup> PK, 3.

<sup>24</sup> Polanyi, the unpublished Duke Lectures, Lecture 1, p. 5.

<sup>25</sup> Quoted by Grene in “The Logic of Biology,” 193.

<sup>26</sup> On this score, one can glimpse the divine transcendentals in how Polanyi thinks: “The affirmation of a great scientific theory is in part an expression of delight. The theory has an inarticulate component acclaiming its beauty, and this is essential to the belief that the theory is true.” PK, 133.

impartial. The intellect must be partial to what it finds satisfying. It must prejudicially incline toward the most appealing object of truth, the most fitting answer.

We have thus worked out a notion familiar to Aquinas: that of the intellective appetite, otherwise known as the will. A detailed account of his view is best left for another essay. Our purposes require only that we land at the foot of the idea. But it can be paraphrased by saying that our hunger for knowledge is the same as our intention to be happy.<sup>27</sup> Because Aquinas defines the will as an appetite (as *reason's* appetite, precisely), science is for him the most poignant example of desire with commitment. Practitioners of *Scientia* commit themselves to the as-yet-unseen truth because they are amorous for it. Science is nothing short of a divine quest, a very personal commitment to be satisfied by the most complete truth knowable. Polanyi thus reclaims a very old transcendental impulse when he says: "Science exists only to the extent to which there lives a passion for its beauty, a beauty which is believed to be universal and eternal."<sup>28</sup>

### 3. Embodiment

In highlighting the appetitive nature of knowing, we are marking a contrast between two epistemic accounts. The first is distinguished by ostensible feats of detachment, or claims that good science is 'objective' or 'unbiased'. The second is what Polanyi calls *indwelling*. Kepler and Newton, for example, indwelled the Copernican system. Satisfied by it, they committed themselves to describing reality on its premises. To use another of Polanyi's terms, they *interiorized* the model, making it tacit to their focus.

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<sup>27</sup> *ST* 1a.82.1, 4. To quote David Burrell: "Ends are consented to, not chosen... Only means are chosen, and that with a view to their appropriateness in attaining the end." *Aquinas: God and Action* (Notre Dame: University of Notre Dame Press, 1979), 125.

<sup>28</sup> *PK*, 281.

To rely on a theory for understanding nature is to interiorize it. For we are attending from the theory to things seen in its light, and are aware of the theory, while thus using it, in terms of the spectacle that it serves to explain. This is why mathematical theory can be learned only by practicing its application: its true knowledge lies in our ability to use it.<sup>29</sup>

In one sense, we reside in a theory, and in another sense, it resides in us. It is a mental habitat created by repeated use. Theory is thus a kind of skill, related to *knowing how* as much as *knowing what*. Consider again the physician diagnosing her patient. She knows what is wrong only because she knows how to tell what is wrong. In this vital sense of how truth is practiced, Polanyi has rediscovered what Aristotle called a second nature, adapted by Aquinas in the term *habitus*. Although it is no longer common to think of a theory as a habit, Aquinas and Polanyi believe habits are the essence of scientific knowledge.<sup>30</sup> Science involves telling the truth by habits of deduction or demonstration, practiced from self-evident or believed principles. A *from-to* motion can be found in all rationality, because reason is like a pathway created by repeated use. It moves from theory to explanation, from symptoms to diagnosis, from tacit to explicit.

As we have seen by now, Polanyi signifies tacit knowledge with a few different terms (peripheral, subsidiary, etc.). One term used less frequently is *proximal*, but incidentally, Aquinas relies on the same lexical idea. A principle taken for granted is what Aquinas calls a *proximum principium*.<sup>31</sup> Polanyi remarks that one's shoulder is likewise *proximal* to one's hand. It is a powerful example, because when I reach out to grasp something, I need not focus on my shoulder; nevertheless I must articulate my shoulder to grasp the object. For Polanyi, this is more than a metaphor. It is the plain recourse of knowledge, and he strengthens this point by considering the use of instruments. When I use a hammer, I do not

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<sup>29</sup> *TD*, 17.

<sup>30</sup> *ST*, 1a2ae.57.2

<sup>31</sup> Aquinas, *Super Boethium de Trinitate*, 2.2, reply to 7. Hereafter cited as *SBT*.

focus on the hammer but on the nail I am driving into the wall.<sup>32</sup> The hammer, being proximal to the nail, becomes an extension of my body relative to the distal point of my focus. The same is then equally true for computational and theoretical devices. Though they are not always physical tools, they indicate that we are habituated bodily. But why must we say *bodily*, if we are referring to such an austere and cerebral task as deduction? In human terms, it is simply incoherent to suggest the possibility of a sheerly mental act.<sup>33</sup> Certainly, we might study the mind instead of the body, but the body must serve us in saying anything about the mind, because language itself is an instrument.<sup>34</sup> In becoming fluent, we did not go without faculties like tongues, ears, eyes, or hands. Thus (and despite the famous attempt of Descartes), we cannot base truth on a dismissal of the body or its senses. All claims on truth are discursive and therefore linguistic.

As Aquinas also tells us, intellect corresponds to body as form does to matter.<sup>35</sup> It may be tempting to spot a proto-Cartesian duality here, as if he intends to isolate cognition from the body's transmittances. But he intends just the opposite, using classical language to bring out a unity. The intellect, he says, exists as the first principle inherent to the body. It cannot be disassociated from its second principle by anyone possessed of its form. Aquinas thus inverts Descartes, because he takes the body for granted in discussing the intellect, which renders the body irrevocable in his account of human thought.

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<sup>32</sup> *TD*, 11-12.

<sup>33</sup> Marjorie Grene made this assertion from Polanyi's family of concepts. See Grene, "Tacit Knowing and the Pre-Reflective Cogito," *Intellect and Hope*, 43.

<sup>34</sup> For Polanyi, language also conveys tacit structures of "authority, custom and tradition." Therefore "Empirical induction, strictly applied, can yield no knowledge at all..." I will return to this idea shortly. See Polanyi, *Knowing and Being* (Chicago: University of Chicago Press, 1969), 41.

<sup>35</sup> *ST*, 1a.76.1

If this sounds a bit woolly, Aquinas clarifies things in his comments on *De Anima*. The body, he says, is a multi-sensory instrument unified by a finite ‘common sense’.<sup>36</sup> Finite, because we cannot know all things at once; common, because we can know multiple things at once. His example of unified multiplicity begins with the five senses. I can identify each sense in abstract distinction from the others, but none of them *per se* makes me aware of myself as the one who is bodied. It is the intellectual soul which inherently unifies the senses, mapping into one coherent whole all kinds of dissimilar sense data. Out of that same power come the need and the ability for rational discourse, because the soul is that essence of humanity which drives us to fit our experience together in one coherent whole.

We might therefore consider the soul the most proximal capacity of human knowing, though Polanyi never used the word *soul* to bring *proximal* to the same conclusion. (He must have seen, however, that his idea necessarily indicated proximity to *something*.) What he did notice – and what he spent a great deal of effort describing – is that the intellect only knows itself in relation to other objects; which therefore means that the intellect is invariably communal and embodied. Science is an expression of both finitude and commonality, energized by the collective effort to make a common sense of things. Along these lines, Polanyi can be transplanted into the old cosmos, where Aquinas contrasts humans with angels in an approving quote of Dionysius:

Souls have the power of reasoning in that they approach the truth of things from various angles, and in this respect they are inferior to angels; but inasmuch as they gather a multiplicity into unity they are in a way equal to the angels.<sup>37</sup>

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<sup>36</sup> Of course, this is unrelated to the modern concept of common sense, as popularized by Thomas Payne. I am referring to *Sentencia libri De Anima*, 3.2, *lectio* 2, 584: “...*potentia sensitiva communis*...” See also 3.2, *lectio* 3, 599: “...*sensum communem*...”, etc. Also see John Milbank and Catherine Pickstock, *Truth in Aquinas* (London: Routledge, 2001), 73-74.

<sup>37</sup> Aquinas, *The Division and Methods of the Sciences* Q6, a1, reply to third question.

For Aquinas, angels do not learn, discover, or deduce truth the way humans do. The angelic nature simply contemplates the real, and so angels are not formally rational.<sup>38</sup> We humans, by contrast, can simulate angelic contemplation by employing reason – synthesizing information, drawing conclusions and so on. All such efforts display our tendency toward the whole truth. But these efforts also display that we are oriented by process and change. The nature of our being is to become. This peculiar mode of knowledge, namely maturation, is what makes our species unique to Aquinas. At least in this case, our rational nature is not granted by comparison with irrational animals. Compared instead with angels, the sheer fact of our bodies manifests our rationality. The human’s physical development reflects the intellect’s potential.

For Aquinas therefore, any epistemological commitment to detach from the body, whether by impersonal objectivity or by doubt of the senses, de-forms the human. And since Polanyi makes a similar case, he inadvertently resituates us a little lower than the angels, in the medieval body. Science is a *habitus* of embodied skill and mastery, a communicated practice of disciplining one’s thinking from certain proximal givens. Habits enable new developments in knowledge, meaning that innovation does not emerge from independent thought. It emerges, principally, from fields in which competence is exercised. Simply put, we learn by doing, which is to follow Aristotle’s dictum: “Men become builders by building and lyre players by playing the lyre...”<sup>39</sup>

#### 4. Faith

Builders, musicians and the rest of us gain our knowledge by practice. What we know is inseparable from how we know it. Clearly then, as finite knowers, we cannot each gain expertise in every field. The musician who wants her home remodeled must have faith in her builder. (That

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<sup>38</sup> *ST* 1a.58.1

<sup>39</sup> Aristotle, *Nicomachean Ethics*, trans. David Ross (Oxford: Oxford University Press, 1998), 29.

is, she must believe not only in his ability to do good work but in his intention to do her good. He would not be a good builder without either aspect; as we have seen, knowledge exists only on grounds of commitment.<sup>40</sup>) Or let us again consider the physician diagnosing her patient. Without her skill, the patient would not know what is wrong, let alone what to do about it. His knowledge comes strictly by faith in her word. For Polanyi and Aquinas alike, faith is never abandoned for the sake of truth. Faith may be highly attuned and even critical, but there is no true knowledge without proximal belief. Here is where Polanyi comes closest to sensing his own medieval bearings, quoting Augustine's famous words: *nisi credideritis, non intelligitis*.<sup>41</sup> For centuries, the phrase was a propositional entrance to Christian orthodoxy, but it now serves Polanyi's doctrine of knowledge in general. Had he known to look, he would have found the statement comparably widened in the *de Veritate*, where Aquinas defends it by citing Aristotle and a Muslim commentator.<sup>42</sup> Aquinas is indeed known for listing faith as a particularly Christian virtue, but he also thinks of it as operative prior to salvation, commonplace among humans. Grace changes our *object* of belief, but we are always already believers by nature.<sup>43</sup> Hence, discussing the phrase 'I believe' in his catechism on the Apostle's Creed, Aquinas says:

If one were willing to believe only those things which one knows with certitude, one could not live in this world. How could one live unless one believed others? How could one know that this man is one's own father? Therefore, it is necessary that one believe others in matters which one cannot know perfectly for oneself.<sup>44</sup>

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<sup>40</sup> This is a few levels deeper into Aristotle than Polanyi ever went. But I suspect that the values of trustworthiness and honesty, which are deeply resonant in Polanyi's social psychology of truth, render him Aristotelian by default.

<sup>41</sup> *PK*, 266.

<sup>42</sup> Aquinas, *Questiones Disputatae de Veritate*, 14.1 *responsio*

<sup>43</sup> This is not a standard Thomist conception, but it nestles quite nicely with the position of Eleonore Stump and (though more vaguely) Rudi Te Velde, who see Aquinas employing reason in the service of Christian faith. That is, reason and faith are never separated as completely distinct domains. Belief is already operative, already granting truths which rational discourse assists one in believing. See Stump, *Aquinas* (London: Routledge, 2003), 374; and Te Velde, *Aquinas on God: The Divine Science of the Summa Theologiae* (Farnham, Surrey: Ashgate, 2006), 26.

<sup>44</sup> Aquinas, *The Catechetical Instructions of St. Thomas Aquinas* (Opuscula 65, 66, 68), trans. Joseph B. Collins (Baltimore: The Catholic Primer, 1939, 2004), 17.

The last sentence holds the crux of his idea, but the first deserves our attention. When Aquinas contrasts matters of certainty with matters of faith, he is not outlining two distinct zones of knowledge. To quote Polanyi, "Our basic beliefs are indubitable only in the sense that we believe them to be so."<sup>45</sup> Belief is the larger fabric of certainty; we believe the things we are certain are true. Aquinas says as much in passing to his main point, which is that belief extends beyond matters of certainty. It always spills over the edges, because we uncritically believe many things we could doubt, such as our own paternity. How then, he asks, could someone possibly doubt all doubtable things? We might add another question to his: how can one express doubt without expressing belief? I may indeed doubt that this man is my father, but I can only do so by believing otherwise. Doubt does not offer the assurance of faithless certainty (again, despite the famous attempt of Descartes); it is fixed to an alternative belief.<sup>46</sup> This, generally speaking, is how scientists negotiate matters of fact.

Modern science is an outgrowth of age-old western skepticism. There can be no denying it has furnished us with powerful techniques of proof, but has it fundamentally changed our situation? What validates evidence, if not a social interplay based on belief? I can now verify my paternity with a DNA test, yet I cannot avoid the necessity of faith when an expert reads me the results. Like children, we must believe people whose knowledge goes beyond our own. Faith is our recourse when a thing exceeds our know-how. This line of reasoning permits Aquinas at last to claim that we can only understand God by faith, since God's knowledge exceeds all human capacity.<sup>47</sup> But the argument works by way of analogy, pointing to the *habitus* of mastery. Certain forms of knowledge exist in excess of what any one person knows. Scientists are therefore able

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<sup>45</sup> PK, 267.

<sup>46</sup> See Polanyi, "Scientific Beliefs," *Ethics*, Vol. 61, No. 1 (October 1950), 27-37. Also see the effects of Polanyi's thought on Charles Taylor, *Sources of the Self* (Cambridge, MA: Harvard University Press, 1989), 74-75.

<sup>47</sup> Aquinas, *The Catechetical Instructions...*, 17.

to gain understanding by erudite proofs or deductions (*demonstrationes*); laypeople and novices must believe in order to understand.

A distinction between scientists and laity is deceptive, however. At risk of repeating the point needlessly, no scientist has finally rested his mind on faithless certainty. Nor does it follow that there exists a simple two-tiered politics of knowers and believers. No separation exists between certainty and faith, as we have seen. Polanyi rightly discerns that belief operates collaterally, among scientists.<sup>48</sup> An astronomer must believe the findings of other astronomers, whether because they are in different locations or because they have better instruments. More to the point, an astronomer must believe in models he cannot prove, facts developed outside his discipline. Compared to a nuclear chemist, he is a layman. Yet he believes in nuclear fusion, interiorizing it to explain the energy and lifecycle of stars. Thus, Aquinas also makes a valid observation:

Sometimes the proximate starting point of a science is belief, as is clear in the subalternated sciences. The proximate source of their conclusions is belief in truths presupposed as established by a higher science. Their primary source, however, is the knowledge of the higher scientist, who, through his understanding, is certain about these matters of belief.<sup>49</sup>

Here again is the *proximum principium*, synonymously used by Polanyi. Some sciences, in order to exist, must base their line of inquiry on the findings of other sciences. Aquinas therefore envisions a hierarchy of disciplines, because certain sciences are more directly concerned with first causes, and the conclusions of these sciences form the assumptions of others. However, we ought to notice that for Aquinas, authority does not subsist solely on the basis of scientific province. It is grounded in the knowledge of persons (*scienti*). Hierarchy in the sciences does not really indicate the absolutism of any one field. In a neighboring passage, when Aquinas says that

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<sup>48</sup> *TD*, 63-64.

<sup>49</sup> *SBT*, 2.2, reply to 7.

a physician is obliged to trust a physicist, we are not expected to believe the physicist could practice medicine.<sup>50</sup> The physicist is finite, trained particularly as such. If he were to become ill, he could do nothing but submit himself to the master of a lower science. Authority therefore derives not merely from higher disciplines but from responsible masters, each of their own province. Seen this way, the social psychology of truth is dynamic, even self-governing in a paradoxical way, because each expert must yield in good faith to the authority of others.

## 5. Authority

We have found another overlap with one of Polanyi's central conclusions:

Science will appear then as a vast system of beliefs, deeply rooted in our history and cultivated today by a specially organized part of our society. We shall see that science is...shared out for cultivation among many thousands of specialized scientists throughout the world, and shared receptively, at second hand, by many millions.<sup>51</sup>

Philosophers of the Enlightenment tended to redraft this basic tenet, claiming that rational autonomy was proper to all individuals.<sup>52</sup> Such an ideal stands in conflict with rationality as defined by Aquinas; indeed, it seems to conflict with the differential we have just observed between scientists and laypeople (or scientists and scientists).<sup>53</sup> Are believers autonomous? To say so proves difficult, unless we narrow autonomy to mean something foreign to philosophers of the 17<sup>th</sup> and 18<sup>th</sup> centuries. The spirit of the Enlightenment was, at heart, an authorial shift. No longer was truth derived from people; it was derived from facts. Science was less the personal mastery of a skill than the objective mastery of nature, more like mining a quarry than carving a sculpture. Rationality had thus become a matter of attaching the mind to whatever brute facts science could

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<sup>50</sup> *Ibid*, reply to 5.

<sup>51</sup> *PK*, 171.

<sup>52</sup> I take Kant as paradigmatic here. See *Groundwork on the Metaphysics of Morals*, trans. H.J. Paton (New York: HarperPerennial, 2009), 98-101.

<sup>53</sup> See Patricia Pintado, "Aquinas on Natural Law and the Question of a Kantian Misreading," *Ave Maria Law Review* Vol. 10, No. 2 (Spring 2012), 365-377.

unveil. And we have not fully departed this picture, despite its grave complications. Not quite a century ago, Bertrand Russell wrote a well-regarded book on education, the effects of which are still felt in classrooms today. He says this:

I should not urge my own views upon the pupils. What I should do is to put before them the ideal of a scientific attitude to practical questions. I should expect them to produce arguments that are arguments, and facts that are facts... I should make it my object to teach thinking, not orthodoxy, or even heterodoxy.<sup>54</sup>

Of course, it is now plain that Russell is espousing a kind of orthodoxy here. The teacher is to remain hands-off, respecting autonomy, stepping in only when a student's reason veers off track. Russell has not invented this. He inherits it from Rousseau's *Emile*, written some 160 years prior.<sup>55</sup> (And Rousseau's sentiment was already long crystalized in the Royal Society's motto, *Nullius in verba*.<sup>56</sup>) The refusal of dogma is nothing if not a tradition, and it is a tradition with two faces. One side prizes autonomy; the other demands its pupils be rational. Autonomy thus looks and feels very much like submission to dogma, and as such, it is a difficult principle to envision in pure form.

Michel Foucault is probably the best known thinker to recognize its impurity at a massive scale. Science, as he thought of it, is a name given to all kinds of techniques designed to control and regulate human life.<sup>57</sup> Facts are accredited by the very systems which produce them, thereby extending the power of those systems. This "regime," as Foucault called it, "is not merely ideological or superstructural; it was a condition of the formation and development of capitalism."<sup>58</sup> One thinks, for instance, of drug companies conducting trials under the approval of the Food and

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<sup>54</sup> Bertrand Russell, *Education and the Good Life* (New York: Liveright, 1923), 284.

<sup>55</sup> "Let him not learn science but discover it. If you ever substitute in his mind authority for reason, he will no longer reason. He will be nothing more than the plaything of others' opinion." Jean-Jacques Rousseau, *Emile, or On Education*, trans. Allan Bloom (USA: Basic Books, 1979), 168.

<sup>56</sup> Literally, "In no words," meaning *take no one's word for it*.

<sup>57</sup> His lecture on the advent of statistics is illustrative. See Michel Foucault, *Security, Territory, Population: Lectures at the Collège de France, 1977-78*, trans. Graham Burchell (London: Palgrave Macmillan, 2007), 91-104.

<sup>58</sup> Michel Foucault, *Power/Knowledge* (New York: Pantheon, 1980), 133.

Drug Administration. Both parties represent the same analytical vocabulary, the same commodity of knowledge, and in short, the same form of power. Although a balance of interests seems to exist, the two parties perpetuate the same regulative principles over the body, the same theories of human organization, the same institutional sketch of the will, and so on. Under the veil of autonomy, the modern body is a subject of control. This view dates back at least to Engels, but it emerged most poignantly among continental philosophers in the 1970s.<sup>59</sup> With the unmistakable tone of Nietzschean suspicion, many reckoned that science, in developing truth, was really creating institutional power.<sup>60</sup> Popular reductions of this idea continue to proliferate in narratives about climate change, or in the market of alternative medical therapies. We have all likewise learned to read the phrase ‘studies have shown’ as a tool of sales and ideology. Lyotard called this attitude postmodern, but this does not mean our skepticism is *anti*-modern. It is shaped by the progress of the very same spirit. The anti-authority groundswell of the Enlightenment has moved us, much as it moved Marx, to suspect that ‘truth’ (at least from some outlets) is propaganda.

Some philosophers of the same period held out hope for science, although they did so in a greatly modulated fashion. Paul Feyerabend, for instance, attempted to prescribe something Foucault never quite offered: anarchy. No longer should ‘the experts’ hold political sway; science ought to be pluralized, its vocabulary decentered, and its absolute methodologies abolished.<sup>61</sup> I cannot give Feyerabend’s argument the space it deserves, but I mention his conclusion to show how, even here, his philosophical script is devoted to the same spirit. Scientific freedom is still conceived in terms of autonomy. Feyerabend has simply carried the tradition forward, following the same impulse to depict liberty as being purely *contra* authority. And because he reproduces the same constitutive process, he remains in the grip of the power he wants to disband. The

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<sup>59</sup> See Friedrich Engels, “Role of Production in the Development of the Sciences,” *Reader in Marxist Philosophy*, ed. Howard Selsam and Harry Martel (New York: International Publishers, 1987), 169-170.

<sup>60</sup> For instance, Jean-Francois Lyotard, *The Postmodern Condition* (Minneapolis: University of Minnesota Press, 1984), 27-28.

<sup>61</sup> Paul Feyerabend, *Science in a Free Society* (London: NLB, 1978), 127.

prescript of *no set methodology* simply sets up a new hegemonic power, or at least a new ethos of authority bent on disallowing a certain organization of knowledge. As Polanyi said, anarchy is not anarchy. “All modern revolutionaries since the Jacobins demonstrate likewise that dissent does not seek to abolish public authority, but to claim it for itself.”<sup>62</sup>

Let me conclude with some tentative resolutions. Like Feyerabend, Thomas Kuhn rejected the idea that science must have an explicit method. However he followed Polanyi, stating that scientists learn “by doing science rather than by acquiring rules for doing it.”<sup>63</sup> The statement seemed novel at the time, but Kuhn was simply defending the convention of Aristotle. The novice scientist is initiated into a tacit knowledge by the hands-on example of an expert, whose highly personal skill is likewise “embedded in shared exemplars.”<sup>64</sup> Science is a tradition of apprenticeship and mastery no less than carpentry or plumbing. A scientist therefore makes discoveries, or detects anomalies and problems, by first adopting the way of a master. Science is only hobbled by rejecting these conditions. With this in mind, Polanyi’s philosophy is not conclusive so much as inceptive:

We have seen that tacit knowledge dwells in our awareness of particulars while bearing on an entity which the particulars jointly constitute. In order to share this indwelling, the pupil must presume that a teaching which appears meaningless to start with has in fact a meaning which can be discovered by hitting on the same kind of indwelling as the teacher is practicing.<sup>65</sup>

Yet from the Enlightenment forward, science has symbolized a reversed relation of person and truth.<sup>66</sup> Whereas the medieval scholastics derived authority from the great *auctores*, science has been published for centuries as if it derives authority from matters of fact. In the spirit of Foucault, I daresay this reversal has justified many cases of exploitative research. Landmark

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<sup>62</sup> PK, 209.

<sup>63</sup> Kuhn, *Structure*, 191.

<sup>64</sup> *Ibid.*

<sup>65</sup> TD, 61.

<sup>66</sup> See Michel Foucault, *L'Ordre du discours* (Paris: Gallimard, 1971).

examples include the Tuskegee syphilis study and its more violent iteration in Costa Rica. By anchoring truth to detachable facts (as epitomized by statistics), modern researchers can far more easily ignore the essential vulnerability, naivety and dependency of human beings. The precept of autonomy, instead of liberating the will of the subject, has often legitimized the social detachment of the 'rational', the powerful, the capable. This is a core misgiving of late modern philosophy, and to my mind, it has not been sufficiently resolved.

Here is where a reading of Aquinas with Polanyi may prove most fruitful – or at least sufficiently disruptive, clearing ground for a germinal idea. The idea is just this: by removing science from its ministerial tradition, we have lost its proper syllabus. Once, truth was tacitly a practice of caretaking, known in a community and guided by a tradition of faith. This is why Aquinas could classify self-evident principles as *per se quoad nos* – self-evident *to us*; which is to say that such principles existed only insofar as they were held in common.<sup>67</sup> Truth did not simply stand alone. It was an exercise, a communally habituated pattern of thought. Even self-evident truths were categorically akin to a physician's diagnostic data. That is, they were intelligible only in a greater, if not fully grasped, beatific knowledge.

## 6. Conclusion

As is the case with any piece of writing, this essay has left many things out. I have not explored serious disagreements that may yet exist between Aquinas and Polanyi. Nor have I harvested what I think would be a rich account of scientific virtue from their synergy. I have merely offered a first step in either direction, tracing the following argument:

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<sup>67</sup> M.V. Dougherty, "Thomas Aquinas on the Manifold Sense of Self-Evidence," *The Review of Metaphysics* Vol. 59, No. 3 (Mar 2006), 625-626. Also see Alasdair MacIntyre's similar reading of Aristotle, *After Virtue* (Notre Dame: University of Notre Dame Press), 146-148.

Science is always an act of commitment to the whole truth, but humans are partial in two senses of the word. First, we know in part, as the Apostle said. Second, we are partial to what we find satisfying, drawn to know truth by a transcendental hunger for it. Bias is therefore not to be done away with, because it is the condition of our intellect's appetite for true reality. Neither should we attempt to disengage the intellect from the senses, because embodied habits grant us the ability to think and reason together. And, in addition to habit or know-how, good science is contingent on knowing *who*. True knowledge depends on faith in the tradition and authority of those who know better. Along these lines, Polanyi urges a full-orbed resettlement of science, and remarkably, the medieval conditions of Aquinas are hospitable to the occupation.

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