"The Silent Knowers: Implications of a Polanyian Account of Knowing and Being for the Computer-Information Model."

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Part I: Introduction.

Conversations about artificial intelligence often stay purely within scientific contexts without explicitly referring to philosophical ideals or notions. We often question the structure and future of artificial intelligence *merely* on scientific or mathematical grounds at the exclusion of philosophical inquiry. If something looks like it requires philosophical thought, we often predict that it just needs to fit more properly within scientific categories to make it un-philosophical and truly justifiable.[1] Even the philosophical ideals we typically ascribe to artificial intelligence—utilitarian value loading programs, evolutionary and genetic theory, knowledge as an aggregate of data—are often explained and defended scientifically, rather than within a philosophical tradition. This approach misses the point of how artificial intelligence came to be, how it currently operates, and how we will advance it in the future.

This philosophical dismissal leads to issues regarding the structure of artificial intelligence and our ability to predict its future state. We assume that, given more complex and efficient models, we will someday soon see consciousness arise within the systems we have created. If it was the case that biological evolution brought about consciousness from lower

[1] This extrinsicist account of modern science echoes the main problem addressed by Michael Hanby in his book, *No God, No Science?*, whose insights I will integrate more explicitly in the following sections.

orders of being, why can't it happen again with these complex machines?[2] Similarly, some grant robots the status of personhood based on performative indistinguishability. We think machines can have minds like we do since we see knowledge purely as information and the mind merely as the processes of the brain. After all, if we could accurately map a human brain into a computer, why wouldn't it be able to work like a mind? What would be left to "factor in"?

These questions, conversations, and predictions are inherently philosophical, even though we ask them behind the guise of scientific language. The nature of personhood—mind, consciousness, agency, knowledge—is not a question only within the scope of science. The scientific tradition helps clarify the particulars of our inquiries; but the categories we use as such, and our wholistic understanding of the subject at hand, are matters of philosophy first and finally, even if they pass through scientific methodology.

The question of whether artificially intelligent machines can produce minds of their own is an investigation into the structure of computers generally, rather than into what artificial intelligence newly brings into the discussion. If epistemological and ontological limitations exist inherently within computers, then artificially intelligent computers cannot transcend such limitations by breaking through those barriers because, as we will see, they are bound within them. In this sense, if classical computers[3] cannot produce a mind, then the addition of artificial intelligence will not solve that problem.

This paper does not attempt to provide a comprehensive account to answer each of these questions. Nonetheless, I will argue that Michael Polanyi's epistemology of tacit knowledge and

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[2] Nick Bostrom, *Superintelligence,* Oxford University Press, 2014, 28.
This is one of the foundational premises in Bostrom's unfolding argument throughout the book.

[3] By "classical computers," or "the current computer-information model," I am referring to all mechanical systems of calculation that use the standard binary order of operation. The term is general enough to cover all computer systems apart from quantum computers, which fall outside the scope of the paper.

his ontology of stratified comprehensive entities are indispensable for meaningful considerations about the structure and future of artificial intelligence as described here in Part I. His philosophy clarifies significant questions relevant to the field of artificial intelligence. In a positive sense, it offers a comprehensive account of human knowing as it relates to consciousness and being; and in a negative sense, it brings to light the fundamental lack within the current computer-information model in achieving the criteria of personhood, consciousness, and true human knowing. I will explore some of his major essays on the topic and apply them to facets of artificially intelligent machines. I will also apply the work of Michael Hanby as it clarifies and expands upon my overall argument. In one sense, then, I will attempt to weigh a Polanyian ethics of belief against the structure of how computers store and process information. Part II applies tacit knowing conceptually to artificially intelligent computers. Part III integrates Polanyi's stratified entities with the computer model to argue that computers cannot contain knowledge and minds cannot arise from such a system. Part IV will offer concluding remarks on the implications of Polanyi's work considering contemporary conversations about artificial intelligence.

Part II: Tacit Knowing.

Michael Polanyi says that all knowing is an integration between two kinds of awareness: focal and subsidiary.[4] Because no knowledge is wholly focal,[5] we attend *from* tacit, subsidiary

[4] Polanyi, Michael. *Knowing and Being*. Chicago: University of Chicago Press, 1969, 212.
[5] Polanyi, *Knowing and Being,* ix.

clues as we attend *to* a comprehensive entity. Focal patterns are comprehensive entities such as systems of thought, forms, or any such structures upon which we focus. Any act of knowing attempts to comprehend a focal pattern which is the object of our focus; similarly, we learn by attending to these focal patterns from tacit clues. Subsidiaries are the clues upon which we rely in our knowing. We must not mistake these subsidiaries with our subconscious, even though there are subliminal clues that we can never identify or verbalize in a bodily sense,[6] just as there are clues upon which we can turn our gaze, thus making them focal for a time.[7] In our human efforts, "Subsidiary awareness and focal awareness are mutually exclusive,"[8] meaning that we can only focus on one thing, and our awareness of that thing disallows us from attending *from* it at the same time we attend *to* it.

Whenever we articulate something, we abstract from a whole by identifying a piece apart from the rest. We can understand mathematics as abstracted internal relations, and so calculations only have meaning and worth insofar as they relate to aspects of reality. Once we achieve a focal pattern and the clues make sense in context, they shift from focal to subsidiary, and we see the whole and can dynamically shape the focal pattern as we continue to indwell and rely on the subsidiary elements in our knowing. "*This reliance is a personal commitment which is involved in all acts of intelligence by which we integrate some things subsidiarily to the centre of our focal attention*."[9] All knowing works this way, according to Polanyi, and we cannot understand explicit statements apart from our tacit awareness of what makes them meaningful. All formalized systems are undergirded by a tacit dimension that allows the knower to make

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[6] Polanyi, *Knowing and Being, 139.*
[7] Polanyi calls this process "logical disintegration." Polanyi, *Knowing and Being*, 218.
[8] Polanyi, Michael. *Personal Knowledge: Towards a Post-critical Philosophy*. Chicago: University of Chicago Press, 1974, 56.
[9] Polanyi, *Personal Knowledge*, 61.

sense of such systems, since the know indwells the clues necessary to apprehend the pattern's referents.

Artificial intelligence cannot entirely escape the limitations of the classical computer-information model and achieve true tacit knowledge according to this understanding of knowledge. Even given the complex object structures we can program, we cannot transcend the primitive data types that act as the lowest levels of data storage,[10] even though we may combine data types to create more complex or even emergent structures. All primitive data types are abstractions whose wholes are understood by the person and not by the computer. Humans have defined the primitive data types by virtue of their prior understanding of comprehensive entities, but the origins of those data types—namely, the structure of comprehensive entities—are never apprehended by the computer. For instance, suppose we wanted to model a deck of cards in a computer program. To begin, we might create one data structure for each individual card and one for the deck as a whole. We might create any number of variables to help represent the objects within the data structures, but at best we can only represent certain abstracted particulars of the physical deck of cards that we are modeling. The abstracted particulars, based on the apprehension of the deck itself, only truly make sense in the mind of the programmer according to a true knowledge of the object. The computer, on the other hand, can only process internal relations based on the computer model's systemic logic, and the computer cannot discriminate between a system that coheres to reality and a system that is merely internally consistent. The deck of cards may as well have been a card of decks, a card of decks, or a stack of pancakes depending on how accurate the data structures model the object in question. The focal pattern is entirely obscured, and the particulars lose the meaning upon which they rely, since they only

[10] Bostrom, *Superintelligence*, 227.

have meaning as a collection of internal relations understood through mathematical and logical axioms that serve as the basis of the computer model. In more explicitly metaphysical terms, a computer can reductively represent aspects of a thing's essential or accidental features, but it has no categories or systems to account for the thing's actual existence as a comprehensive entity with a unique integrity unshared by any other object in the world. The entity that exists as a sum larger than its parts cannot be apprehended by a computer, since the very basis of its representational formats cannot access things *qua* things existing in the world. The human body does not use standard representational formats when apprehending the deck of cards. The clues themselves, while they can be modeled in the formalized system of a computer, cannot transcend mere modeling to true indwelling at a level worthy of existential meaningfulness.

This brief example begins to unpack core differences between the computer-information model and bodily human knowing. I will take a more detailed approach to better understand these differences. According to Polanyi, tacit knowing has four aspects: the functional, the semantic, the phenomenal, and the ontological.[11] I will consider each separately and argue how artificially intelligent machines overall fail to meet the criteria necessary for true knowing that has epistemological merit and ontological depth.

Subsidiaries have a function insofar as they relate to a comprehensive whole.[12] This is the functional aspect of tacit knowing. Because our immediate apprehension of something is of that thing's form,[13] we can articulate aspects meaningfully precisely because they relate to the previously apprehended whole upon which the particulars rely. This is what Polanyi meant in

[11] Polanyi, *Knowing and Being*, 212.
[12] Polanyi, *Knowing and Being,* 212.
[13] "Form" here can also mean *Gestalt*, comprehensive entity, or any such definition insofar as it relates to a whole greater than the sum of its parts that cannot be accounted for merely by attending to its particular elements.

saying that even explicit knowledge is rooted in tacit awareness[14]: we can only make sense of focal, articulable statements as they relate to our tacit awareness and indwelt experience of what they signify.

Artificially intelligent machines fail to account for the functional aspect because they are stuck at the level of abstraction. A computer's sensory inputs cannot apprehend a thing's form—they can only quantify individual data via instrumental means. Similarly, humanly inputted data is simply that—data. Because no amount of data can aggregate to form a comprehensive whole, as we will see later with Polanyi's theory of a stratified universe, a computer cannot make the leap from particulars to an irreducible, coherent focal pattern that bears upon reality (i.e. has ontological reference). Even the transformation from unstructured data to meaningful information requires logical structures that the computer relies on, but it does not understand the system's relation to the object's real properties except insofar as the programmer formulates that relation. In this way, a computer cannot account for focal patterns because it processes relations between aggregates of data based on explicitly formalizable structures of logic, mathematics, and any combination of the two explicitly defined by the programmer. And such relations are not found within the data, but rather within the humanly defined data structures that govern the operations of the computer. There is nothing inherent in the current computer model that can weigh the validity of a programmer's own system against the real world, since any system the computer may use to validate its own logic would only be provided by initial programming and cannot arise out of data sets within such systems.

[14] Polanyi, *Knowing and Being,* 144.

Even in the case of a neural network, where computers hold dynamic structures that form according to ideal pattern matching and therefore transcend initial programming, the limitations of those structures are set before the beginning of the processing by the programmers who have defined both the neural network's capabilities and the data sets upon which the computer relies in order to better match the ideal patterns and avoid errors. Although neural networks are most often "black box AIs" with its specific weights and neurological pathways not understood holistically by the programmer, the computer still needs to sort focally through the data, and it is unclear whether it truly reaches a point where the data becomes indwelt subsidiarily and function according to an overarching focal pattern.

The definition of a "focal pattern" as more than an aggregate of data does not entirely fit within a completely formalized system, and even artificially intelligent machines can never truly be unformalized without falling into chaos or meaninglessness. Artificially intelligent machines have already reached levels where any human observer cannot comprehend its complexity; but a human's lack of holistic understanding of such structures does not mean that the system is unformalized from the perspective of the computer. Such a case ought to be a call to wonder and humility on the programmer's part, in response to the complexity of human affairs and formalized systems, rather than to re-question whether artificial intelligence has created unformalized tacit knowing. If a computer does indeed exhibit performative indistinguishability, for example, in playing chess against another human, it is crucial to look at what a computer ontologically can achieve within such limits perhaps more heavily than at what artificial intelligence has added to the conversation. At the heart of even artificially intelligence computers, a formalized system sorts through abstracted bits of data that do not semantically bear on a true object, and the means by which the system sorts and processes is still wholly

defined by the logical structures imposed by the programmer and not necessarily created within the event of back propagation or more representative data sets. The main event of a computer's processing, by and large, has remained the same, even though artificial intelligence allows for a faster, more dynamic, and more efficient process—even in being self-correcting and more accurate than a human agent. The limits imposed by the bit, in other words, are seemingly stronger than a neural network has been able to transcend thus far.

A computer can never understand the true relation of the particulars to the whole because, as Michael Hanby writes, "Attending to the particular parts as such requires us to 'disattend' from the form or gestalt of the whole, but *understanding* those parts in relation to the whole requires a tacit 'indwelling' of the whole."[15] This inability to indwell the whole precludes computers from grasping the functional aspect of the particulars. Hanby continues in this way: "Reality and the entities comprising it can never be simply built up by adding analytically separated parts, even in thought."[16] It is not enough to think of knowledge simply as focal information, because the information does not have meaning apart from the forms to which they refer. Those forms cannot be an aggregate of the parts because the parts can never account for the thing in its simple unity. The functional aspect of tacit knowing, then, is crucial to make sense not simply of the focal pattern, but of the subsidiaries as well. If a computer cannot move past the level of abstracted parts, then it cannot achieve knowing by making sense of the true ontological context in which the particulars ground their meaning.

We can more clearly see this difference by considering a picture stored on a computer. When I look at a digital image of the Grand Canyon, I first struggle through clues as to what the

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[15] Hanby, Michael. *No God, No Science? Theology, Cosmology, Biology.* West Sussex, UK: Wiley Blackwell, 2017, 395, emphasis mine.
[16] Hanby, *No God, No Science?*, 396.

parts of the image relate to, and it is not long before I can see the canyon itself. Because I have achieved a pattern in recognizing the Canyon, the clues have become subsidiary, and now I can focus on specific parts or attend to the picture as a whole; however, the parts themselves make sense only because they bear upon the image of the Grand Canyon due to their function as subsidiaries. The computer, however, first and finally stores an array of RGB codes, written as a collection of 1s and 0s.[17] The bits serve no intrinsically functional purpose in the sense of bearing upon a representation of the Grand Canyon from the perspective of the computer, because the array of RGB codes could just as meaningfully signify a green wall or nothing that represents an aspect of reality. Even though the computer begins with focally attending to subsidiaries, it can never look through them at an irreducible focal pattern because it lacks the capabilities to see the significance of clues in their functional roles.

We see the loss of meaning as a failure to grasp the semantic aspect of tacit knowing, which is how the subsidiaries form to create a joint meaning.[18] A couple years ago, I built a rudimentary program that took statistics of lengths of words, sentences, and paragraphs, and it created its own words and paragraph structures and "wrote books" every second or so. It would then output the "book" into a folder on my computer. The longer I ran the program, the fuller the folder would get. From a human perspective, the books were inscrutable, both because there was no coherent language it developed and because the words themselves signified nothing of value. However, the point of the program is to make the point that, to the computer, the value of the "books" is purely in how well the particulars relate internally through the system I created, not in

[17] This description, of course, is highly simplified and does not explicitly account for layers of compression between the displayed image and the stored collection of bits, nor does it leave room for alternative methods of storing images that may be present in different architectures. Irrespective of the description's precision, the point stands that any storage procedures within the classical computer-information model fails to account for the functional aspect of tacit knowing.

[18] Polanyi, *Knowing and Being*, 212.

how they relate to any truth in the world. Whenever we read a fantasy novel which takes place in another universe, we can understand it and value the qualities and moral lessons that speak to our current context through the patterns that have semantic bearing and that transcend individual environments. Even with natural language processing which relies on contextual clues to clarify specific meanings within words, the semantic bearing is still lost because such a system only creates more precise information from the data, rather than understanding the true joint meaning of a sentence with ontological bearing.

A computer cannot reach beyond the level of abstraction to achieve meaning; even if it did, how can the meaning be stored except through the primitive data types?[19] How can a computer apprehend, or begin to piece apart, concepts like goodness, truth, or beauty?[20] How could a computer begin to search for such things if it relies on explicit information as the basis for everything? As humans interacting with other humans, we only need to speak the word "book" to achieve meaning if the concept is commonly shared. This is not because the word encapsulates the ontological reality of the book—it merely serves as a pointer, and its shared meaning is understood and indwelt by the reader by virtue of his or her body. The unique role the body serves in knowing underscores the lack of ability computer hardware has at truly accessing the world in a meaningful way. The semantic value of the word, then, is not in the word itself, although it is a pointer and indication of a greater context.

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[19] Bostrom, *Superintelligence*, 227.

[20] While philosophers have difficulty finding common ground defining many of these rich and thick concepts, it is an uncontroversial point that these concepts, in a realist worldview, have weight and meaning and point to something true, even if such definitions are vague at times and difficult to articulate. Furthermore, a computer's lack of understanding of these concepts should not raise doubt toward them; rather, such an instance should emphasize the epistemological differences between man and machine as well as the irreducibility and richness of notions like beauty.

We understand that the quality of the book, once we recognize it as such, has a certain meaning that cannot be reduced to the particulars we attend from in our understanding of it. This is the phenomenal aspect of tacit knowing. To say the Lord of the Rings is simply a collection of words bound together in a book and nothing more is to empty it of its purpose and meaning. That would be to deny the book a quality to it that cannot be reduced to the words on the page or even its structural literary elements.

Such qualities cannot be grasped by computers because we can only either store quantitative measures—which cannot "add up" to qualities—or we can represent qualities through strings of characters. This representation, however, cannot allow for any signification beyond the level of internal relations through natural language processing, machine learning, or any other artificially intelligent model. A computer cannot store the phenomenal *quality* of a book, although it can store certain quantitative measures relevant to its material properties or internal structural composition that allow the readers to perceive its qualities. It can store every word in the book and even begin to piece together words within contexts, although it has no understanding of the Lord of the Rings in any meaningful or comprehensive way. Even in the case of natural language processing, it merely uses prior internal structures to weigh and evaluate new texts, or even predict new sentences. The most advanced artificially intelligent machines today can create uncanny human-like sentences, although further inspection reveals a complete lack in a semantic bearing of the words themselves. The most advanced word-prediction artificial intelligence does not have a greater semantic or phenomenal grasp on the world than the program I created has, even though the coherence and helpfulness of the internal relations of the former exponentially outweigh the latter.

Finally, the ontological aspect refers to the reality of the focal pattern on our accessing something real, something true, in our knowing.[21] I said earlier that computing systems need only be internally consistent for a machine to process. That illustrates how computers need not represent reality at all; rather, it is only useful that they do in certain cases. It cannot discriminate between fact and fiction; even if we program the tools necessary for it to weigh things against reality, it blindly does so through the systems or data sets we provide, and it has no ability to weigh those structures or data sets because there are no superseding structures against which it can weigh anything. An improper, misleading, or false data set can have unmistakable ramifications for the artificial intelligence's ability to make helpful predictions. However, the point is that, whether its predictions are helpful or not, there is no difference ontologically for the computer. It simply takes input from a human through sensory inputs and data sets, processes the data through a humanly defined structure, and then outputs the representation of the meaning we understand ourselves. The ontological aspect is of mere indifference to a machine. This limitation is true of the simplest program as well as the most advance artificial intelligence, due to the boundary conditions set upon by the limits of machines, as we will consider in the next section.

This brief look at tacit knowing, and a computer's failure to achieve knowing according to this epistemology, illustrates a crucial difference between humans and machines. Given this epistemological deficit, I will consider Polanyi's theory of stratified entities to further unpack the structure of a computer and whether consciousness can arise from the computer-information model.

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[21] Polanyi, *Knowing and Being*, 141.

Part III: A Stratified Universe.

Part II explains how Polanyi's account of tacit knowing differs from the current computer-information model. The integration between subsidiaries and focal patterns shows how humans know in contrast to how computers operate. Polanyi expands the scope of his tacit awareness to the ontological structure of all comprehensive entities, saying that "the logical structure of tacit knowing thus covers in every detail the ontological structure of a combined pair of levels."[22] These levels between the focal and the subsidiary bear the same relation to what he calls higher and lower principles. Every comprehensive entity can be understood in terms of a higher principle, with the particulars of the entity being the lower principles. The lower principles set the boundary conditions upon which the higher principles operate. Through this lens, a deck of cards, for example, does not logically necessitate the existence of any card games *per se* by virtue of the cards existing; in the same way, the actual playing of a card game does not reduce to the rules that govern it. Simply creating a physical deck of cards does not generate any games, and we cannot comprehend of a card game apart from an understanding of the cards, as the medium upon which the game is played.

He writes, "no description of a comprehensive entity in the light of its lower principles can ever reveal the operations of its higher principles. *The higher principles which characterize a comprehensive entity cannot be defined in terms of the laws that apply to its parts in*

[22] Polanyi, *Knowing and Being*, 218.

themselves."[23] This claim hearkens back to the irreducibility of the phenomenological pattern that arises out of the joint meaning of particulars. Most foundationally, the existence of a mind cannot arise out of the current computer-information model, given Polanyi's stratified theory of comprehensive entities, even with an emergent system powered by artificially intelligent models. If the argument in Part II holds true, that computers fail to establish the relation between focal and subsidiary awareness—and, therefore, cannot *be* aware of any such focal pattern—then there can be no ontological relation between a computer and a thinking mind apart from the direct operation of the former by a human.

Artificial intelligence relies on the laws governing the computer, since a computer sets the boundary conditions upon which artificial intelligence operates. In a way, the computer-information model bottlenecks, or sets the boundary conditions for, artificial intelligence, especially at the level of how information is stored and processed and how it can extrapolate based on the processed information. In discussing the mind and the body, one of Polanyi's conclusions is this: "As the operations of the mind rely on the services of lower bodily principles, the mind can be disturbed by adverse changes in the body, or be offered new opportunities by favourable changes to its bodily basis."[24] Applying this logic to the current conversation shows that structural or epistemological limitations on the computer model itself would also adversely affect its higher principles, e.g. artificial intelligence.

We can think of consciousness as a higher principle to artificial intelligence because Polanyi argues that the mind is the comprehensive entity, the higher principle, governed by the body, the lower principle.[25] The question of whether consciousness will arise from a computer is

[23] Polanyi, *Knowing and Being*, 217.
[24] Polanyi, *Knowing and Being*, 221.
[25] Polanyi, *Knowing and Being*, 219.

the same question as whether our rational minds arose out of lower levels of cognition, from an evolutionary standpoint. Saying that our minds evolved from a state much like the rest of the animal kingdom to a state of consciousness is the main premise behind the claim that consciousness will also rise out of artificially intelligent machines. Polanyi argues against the possibility of material causal relations creating higher principles like consciousness, since higher principles exist beyond the scope of physics and chemistry while also being governed by their boundary conditions: hence, they are irreducible to their lower principles.[26]

Artificially intelligent machines have an ontological from-to structure, even though they fail to account for an epistemological dynamic between focal and subsidiary. The lower levels of artificial intelligence are the internal systems that govern and set the boundary conditions for the actual programs that run. Any kind of approach to artificial intelligence, then, acts as a higher principle, where the classical computer model and the laws of physics and electricity serve as the lower principles. The question of whether computers truly learn within this perspective does not apply because knowledge is purely focal information to a computer at the outset; therefore, the possibility to access meaning lies outside of the ability and scope of the computer's internal framework. That is why humans can use computers to process information and glean valuable insights, and partly why minds cannot arise out of computers: machines lack the ability to indwell knowledge because they do not have a body capable either of indwelling or of true perception.

Furthermore, the higher principles of a computer—artificial intelligence, or simply the programmed systems that run as a result of the computer—do not have the capabilities to grasp

[26] Polanyi, *Knowing and Being*, 216-217.

forms and therefore any meaning at all inherent within the structure. Computers cannot work from abstracted parts to wholes because parts only make sense within the context of form. Hanby discusses this same lack in early modern scientific thought because of its failure to account for the ontological priority of form. "To abstract—literally to take or pull from—is to distinguish or isolate in thought what actually belongs together in reality: form and matter, parts and wholes, a thing and the context which is the presupposition of its flourishing."[27] In other words, form is necessary even for abstraction at all. If a computer cannot attempt to grasp or acknowledge form, it cannot understand abstracted parts. Computers cannot know or even begin to know. The meaning lies entirely in and through the programmers and end users.

Consciousness cannot come from the machine itself. "The laws of physics and chemistry do not ascribe consciousness to any process controlled by them; the presence of consciousness proves, therefore, that other principles than those of inanimate matter participate in the conscious operations of living things."[28] According to Polanyi, consciousness could not have arisen merely as a result of material laws, the lower principles. He does not specify here what principles work to create consciousness. Because of this, the question of artificial consciousness remains open regarding the future of mankind's ability to create thinking machines; however, even though the future of such machines logically remains uncertain, the current computer-information model precludes such a possibility on the grounds provided.

Part IV: Concluding Remarks.

[27] Hanby, *No God, No Science?* 31.
[28] Polanyi, *Knowing and Being*, 218.

Michael Polanyi's philosophy, further expanded by Michael Hanby's critiques of modern scientism, allows for a comprehensive understanding of a computer's current inability to achieve knowing and bring forth consciousness. Because knowledge is not wholly focal, and since computers can only store and process explicit data through a completely formalized structure, computers are not able to know meaningfully. Because the relation between the subsidiary and the focal is the same as the relation between the body and the mind,[29] we can also conclude that a computer as it stands cannot count as a body and therefore cannot hold, much less produce, a thinking mind. It can, however, be used as a tool for a thinking mind, but it is stuck at the level of abstraction and at simply processing internal relations between explicit information.

Artificial intelligence is subject to the epistemological and ontological boundary conditions governed by the classical computer-information model upon which its processes are based. The field of computer science would greatly benefit from Polanyi's work, not simply negatively in understanding the limitations of the computer model in achieving knowing, but also positively in understanding the true scope and power of computers' ability to process information. If we conceded that minds cannot arise out of the current model, we may evaluate what we think the nature of knowledge is and may reallocate our work to efforts that would further computers according to their true capabilities, instead of wrongly imposing false characteristics to computers that apply uniquely to humans. Humans could be humans, and computers could be computers, and we could keep the irreducible nature of our personhood and minds without humanizing machines or mechanizing, or de-humanizing, ourselves.

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[29] Polanyi, *Knowing and Being*, 213.

In the end, we fail to account for the existential quality of human life when we say robots can know like we do or achieve consciousness, and we turn personhood into an abstraction that can be mass produced, instead of a beautifully indwelt mystery of infinite depth. We indwell what we know,[30] whereas classical computers process what we feed it. From a Polanyian account, computers look less like a mind and more like an external brain in a tripartite system.[31] This allows the room to see that the problem of artificial consciousness may not be answered by finding more advanced algorithms with implementing artificial intelligence, but rather by addressing limitations within the structure of the computer itself and reframing computer architecture to reflect more comprehensively how humans truly access the world.

To a computer, nothing is inherently intelligible because it cannot grasp forms and therefore achieve comprehension. Hanby argues that rejecting substantial forms empties things of the very qualities that make them what they are,[32] reducing them to unintelligibility and incoherence. It is impossible to deny form without also eliminating intelligibility and history, which both act as the groundwork necessary even to attempt to make such a denial.[33] The meaning, however, does not rest in the computer, but is understood by those who use the computers. The meaning, then, is saved: not by the computer, but rather by the ones who understand the significance of what the processed information means. This is also partly why there is much confusion over whether computers understand things; if computers can process information, and make data meaningful, then does it not at some point need to comprehend in

[30] Polanyi, *Knowing and Being*, 220.
[31] Polanyi makes this argument in his essay, "The Hypothesis of Cybernetics."
[32] Hanby, *No God, No Science?* 119.
[33] Hanby, *No God, No Science?* 349.

order to make that shift between uninterpreted data to useful information? That is not the case with a Polanyian account of knowledge and being, and so both aspects are preserved.