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This issue opens with Kyle Takaki’s discussion of Alicia Juarerro’s work in complexity theory as it might relate to Polanyi. Takaki introduces us to her thought by identifying some important points at which her work converges with Polanyi’s and other points on which they can learn from each other. Not only is the article interesting in its own right, but it serves as a good introduction to the featured speaker for the Saturday evening session of the 2013 annual meeting in Baltimore (see p. 4 for a copy of the program). Dr. Juarerro is Professor Emerita of Philosophy at Prince George Community College in Largo, MD. She received her bachelor’s, master’s, and doctoral degrees all from the University of Miami in Florida. She is an award-winning teacher and author who served on the Advisory Board of the National Endowment for the Humanities from 1992-2000. For more information, see www.aliciajuarro.com/about.

Tihamér Margitay’s 2010 essay, “From Epistemology to Ontology: Polanyi’s Arguments for the Layered Ontology,” continues to evoke response and so we also have in this issue a continuation of an earlier TAD forum. Charles Lowney begins the interchange in this issue by conceding Margitay’s point that a simple one-to-one correspondence between knowing and being is untenable. However, he goes on to argue for more nuanced ways of reading Polanyi that he thinks can overcome Margitay’s concerns. Margitay replies to Lowney by noting places where his critics are making incorrect assumptions about his views. He also expresses concern about a tendency to go to the concept of emergence as a relatively easy answer to sticky problems.

Next, we have two review articles. The first is Andrew Grosso’s review of a cluster of books on the theme of personhood: Malcolm Jeeves’ Rethinking Human Nature, J. Wentzel van Huyssteen and Erik Wiebe’s In Search of Self, and Christian Smith’s Moral, Believing Animals, along with his What is a Person? Grosso puts these authors in conversation with each other and Polanyi in suggestive ways. The second is Jon Fennell’s review of Thomas Nagel’s Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly False. Nagel, like Polanyi, challenges scientific orthodoxy and in this review, Fennell show how both authors might profitably learn from one another.

At least two threads run through the disparate articles in this issue. The first has to do with the complexity of reality. Whether we are talking about evolution, boundary conditions, or vector spaces, complexity comes up in a variety of ways. A second thread is that of conversation, as each of our authors points to places where a contemporary thinker and Polanyi (as well as Polanyians) can engage in fruitful conversations so that each party can learn from the other.

In other important business, we have an update on the Poteat Conference in “News and Notes.” In addition, it is time to pay dues and raise funds for other important projects, so please attend carefully to the information about paying dues that is found in the insert to this issue, as well as News and Notes. Readers know tacitly the good work that the Society does on modest dues, so please make your support of this work explicit. “News and Notes” also contains information about the latest publications of seven Society members. The Editorial Board has worked hard to revise the submission process and create a style guide, something that is par for the course for all other journals. This information is now on p. 55 of this issue and is also available at www.polanyisociety.org. Please read carefully the formatting instructions and note the deadlines as you submit work. We look forward to receiving your contributions to this journal. Finally, check out pp. 53-54 for ads for books from Mercer University Press that may be of interest—and do take note of the discount TAD readers are being offered.

Paul Lewis

P.S. Thanks to Phil Mullins for stepping back in to help finalize this issue as I recovery from minor surgery.
Poteat Conference Seeks Donations

A conference on the legacy of William H. Poteat will be held at Yale Divinity School on June 6, 7, and 8 of 2014. The conference aims to be a space for articulating and acknowledging his work in ways that will make it accessible to others who have yet to learn of and benefit from it. Poteat (1919-2000) was a distinguished graduate of Yale’s School of Divinity (MDiv ’44) and Duke University (PhD ’51), where he taught philosophy and religion for most of his career. At Duke, Poteat became a leading, early exponent of the thought of Michael Polanyi, who delivered Yale’s Terry Lectures in 1962. This conference will be of special value to those interested in exploring the nature of personhood and the important implications of the tacit dimension of knowing.

Planners believe that this conference is especially important at this time. First, an archive of Poteat’s letters, papers, unpublished manuscripts, and student lecture notes has just been established at the Library of Yale Divinity School, where he received his B.D. The conference will formally recognize this important step while affording a glimpse into the potential of the archive for future research. Second, since many of Poteat’s students have retired or soon will, this event may be the last and best opportunity to communicate and embody the heart of Poteat’s legacy as a teacher of undergraduate, graduate and divinity students, i.e., his personal and conversational relationships with others. Moreover, the conference could be an important “tipping point” in determining whether similar conferences will take place in the future so that the intellectual legacies of Polanyi and those who followed after him can be advanced.

In order to cover the deposit, planners must raise $2,500 as soon as is practical. Such gifts will be tax exempt because The Polanyi Society, as a 501 (c) 3 organization, has graciously offered to be the conference’s contracting sponsor, with the expectation that fundraising and fees are sufficient to cover all costs. Contributors will receive a tax-exempt letter and be acknowledged in Tradition and Discovery, at the Annual Meeting of the Polanyi Society, and of course at the conference itself. Any extra monies left over once registrations are fully received will be used to meet unanticipated miscellaneous costs of the conference and offset expenses for students and other persons in hardship circumstances.

Donations can be made by (1) sending a check to Dale Cannon, 287 N Warren St., Monmouth, OR 97361 or (2) when paying Polanyi Society dues, by designating a contribution to the Poteat Conference on both the dues form and your check. If you use PayPal, you may designate the contribution by clicking on the plus sign (+) next to “Add any special instructions here” and type: “Donation to Poteat Conference.” See also information on “How to Pay” in the last item in News and Notes.

Information on proposals and registration will come later, but planners anticipate that the fee to cover registration, on-campus residence, and all meals will come to about $360.00, with a substantial reduction for enrolled students.

For more information, contact Dale Cannon at cannodw@wou.edu or 503-838-3489.

Recent Publications


Paul Lewis, Kelly E. Reffitt, and Mark L. Jones have co-edited Toward Human Flourishing: Character, Practical Wisdom, and Professional Formation (Mercer University Press, 2013). Lewis contributed two pieces to the book and Polanyi is discussed explicitly in another chapter by Jack Sammons.
The June 2012 Loyola Conference sponsored by the Polanyi Society included a panel on “Polanyi and Politics/Political Philosophy.” These presentations have evolved into a “Symposium on the Political Thought of Michael Polanyi,” which was recently published in *Perspectives on Political Science* 42:3 (July–September 2013). The essays included are:

**Phil Mullins**, “Michael Polanyi’s Thought and Political Philosophy: An Introduction” (152-153) and “Michael Polanyi’s Early Liberal Vision: Society as a Network of Dynamic Orders Reliant on Public Liberty” (162-171);

**Jon Fennell**, “On Authority and Political Destination: Michael Polanyi and the Threshold of Postmodernism” (154-161);

**Walter B. Mead**, “Michael Polanyi’s Social/Political Order: Design for a Society of Explorers” (172-177);


**It’s Fund-Raising Time**

The Society offers four important opportunities to support the Society’s work:

1. **Dues Payment.** Dues remain $35 ($25 for libraries and $15 students), a bargain in the academic journal world. These funds support the cost of annual meetings and the production of *TAD*. The Oct. and Feb. issues of *TAD* include a membership flyer and an addressed envelope to make it more convenient to pay dues and make contributions. (Do note that because US postage regulations require that every copy of *TAD* must weigh exactly the same, you will, nevertheless, receive these membership materials in your February copy of *TAD* even if you pay your annual dues in October.)

2. **Travel Assistance Fund.** Limited travel support is available for students and other young scholars planning to attend the Polanyi Society Annual Meeting in Baltimore in November 2013. Society members are urged to inform worthy can-
didates about this assistance. Those who wish to request funds (or nominate someone) should contact the fund administrator, Walter Mead (wbmead@ilstu.edu). Contributions to the travel fund are, of course, always welcome. Those who wish to contribute should e-mail Walter Mead and send their contributions to Charles Lowney, as indicated below.

3. **Endowment Fund.** This fund was created in 2010 by the Board as a long-term solution to funding Society projects such as the Loyola conferences. Again this year, there will be a **year-end challenge match** to build endowment resources which presently total approximately $12,000. We already have donors willing to match the first $1000 of gifts to the endowment by December 31, 2013.

4. **The Poteat Conference.** See the first item in “News and Notes.”

All donations beyond $35 (dues) are eligible for an IRS letter certifying a charitable deduction. Related information about travel funds is available on the Polanyi Society web site (www.polanyisociety.org).

**How to pay?** Please use the enclosed payment form and check the appropriate designation(s) for funds above and beyond dues. Also, be sure to note on the check how the funds are to be used.

Because the Society can no longer process credit cards, there are two ways to pay:

1. Those living in the United States should send a check to Charles Lowney, Dept. of Philosophy, Baker Hall 124, Washington and Lee University, Lexington, VA 24450. Again, if you are paying dues AND contributing to a particular fund(s), be sure to make the designations clear on the form and on the check.

2013 Polanyi Society Annual Meeting Program

This year there will be three sessions with presentations and discussion at the annual meeting of the Polanyi Society. Our sessions, held in conjunction with the annual meeting of the American Academy of Religion, will be in Baltimore on November 22 and 23. The papers will be posted on www.polanyisociety.org by early November.

SESSION I: FRIDAY, NOVEMBER 22, 4:00-6:00 PM, Hilton-Baltimore Latrobe

“Polanyi and Van Til: Two Analyses of the Nature and Function of Presuppositions”
Joshua Benjamins, Hillsdale College

Respondents: Esther Meek, Geneva College
Matt Sandwisch, Baylor University

“Towards a Heuristic Theology: Reimagining the Relationship between Theology and Science with Michael Polanyi and David Brown”
David Stewart, Luther Seminary

Respondents: Jon Fennell, Hillsdale College
Andrew Grosso, Trinity Episcopal Church, Atchison, KS

SESSION II: SATURDAY, NOVEMBER 23, 9-11:30 AM, Hilton-Baltimore, Tightman

“Bachelard, Polanyi, and the Construction of Objective Belief in Science: Two Realistic Perspectives”
Teresa Castelao-Lawless, Grand Valley State University

Respondents: David Nikkel, University of North Carolina at Pembroke
David Rutledge, Furman University

10:00-10:15 Break

“Polanyi, Professionalism, and the Ethical”
Allen R. Dyer; George Washington University Medical Faculty Associates

Respondent: Richard Gelwick, Bangor Theological Seminary

11:15-11:30 Business Meeting

SESSION III: SATURDAY, NOVEMBER 23, 8-10:00 PM, Hilton-Baltimore, Tubman

Alicia Juarrerro, Prince George’s Community College.

Dr. Juarrerro will examine the connections between Polanyi’s thought and her own thought grounded in complexity theory (see her Dynamics in Action). She will examine such notions as the interrelation between parts and wholes, boundary conditions and contextual constraints, and a hierarchical understanding of reality, all contributing to an expanded understanding of causality.

Respondents: David Agler, Pennsylvania State University
Donald Crosby, Colorado State University
Kyle Takaki, Independent scholar
Juarrero, Polanyi, and Complexity

Kyle Takaki

Key Words: boundary conditions, constitution (constitutive ontics), heterarchical hierarchy, pursuit of wisdom, second-order constraints

ABSTRACT

Alicia Juarrero’s insights have much to offer Polanyians, and vice versa. Her works suggest the potential for cross-fertilization between her ideas on dynamical systems and Polanyi’s epistemic approach to ontology. I hope to create a “hybrid space” for future inquiry, based on what I think are Juarrero’s most important ideas for Polanyians interested in ontological hierarchy and complexity.

Affinities Between Juarrero and Polanyi

Alicia Juarrero is Professor Emerita of Philosophy at Prince George’s Community College, and has authored and edited a number of articles and books dealing with complex systems. I believe her insights have much to offer Polanyians, and vice versa. I shall approach her works in a rather general way, with the aim of starting a dialogue based on what I think are Juarrero’s most important ideas for Polanyians interested in ontological hierarchy and complexity. Like Polanyi, Juarrero’s interests are broad and she develops a framework that applies to diverse realms of inquiry (see Juarrero 1991, 1999, 2008, 2009). At the core of Polanyi’s philosophy is the notion of tacit knowing, which generates tacit knowing’s realm, a realm that spans a significant region of human experience. For Juarrero, the analogous core of her work is the notion of self-organized dynamics, which similarly serves as a basis for a wide range of things like action and intention.

My latent allusion here to a mathematical metaphor will be used to indicate the areas of broad overlap between these two research programs, as well as where there might be space for rapprochement. The metaphor also highlights some of the mathematical notions Juarrero appeals to in her works (which I will explore further below). The mathematical notion of a vector space can be informally understood as a space in which a variety of vectors “push” and “pull” in varying combinations. For example, a sailing ship’s trajectory is viewable as a combination of force vectors like wind and friction, which together describe and also account for many of the ship’s movements. A vector space is the projected range of possible vector combinations, where the ship’s trajectory actualizes a tiny region within that overall possibility-space. Moreover, a vector space can be compressed into a series of core generators (vector units which form what is called a “basis”) that capture the essence of the diverse range of vector behaviors (what is called the “span” of the unit vectors).

As the above generator metaphor applies to Polanyi and Juarrero, for Polanyi tacit knowing serves as a “basis” that captures the essence of what tacit knowing projects—a continuum of diverse human experiences. These experiences presuppose the tacit integration of various particulars into what Polanyi calls “comprehensive entities.” Such entities, in brief, exhibit self-organized dynamics that characterize living beings and make possible, for example, survival, achievements, and acting as an agent—all skillful modes of being. For Polanyi, knowing (and in general all skillful modes of being) is active and all forms of knowing are either instances of tacit knowing or are rooted in tacit knowing. Similarly, for Juarrero intention is an action, and all forms of intentional action are either instances of dynamical systems or are underwritten by dynamical-system considerations. In this sense, dynamical systems generate ontologies, ranging from the physical (e.g., the Belousov-Zhabotinsky reaction) to the intentional.
One noticeable difference between Polanyi and Juarrero arises from this metaphor: ontology emerges from epistemology for Polanyi, where emphasis is placed on our projected (hierarchical) epistemic-ontologies; by contrast, Juarrero is more concerned with ontic claims, and at times downplays epistemic concerns. I suspect her view of epistemology is analytically informed, serving as a foil for her ontic claims about complex dynamical systems (e.g., Juarrero 2000, 32). In similar fashion, her rightful dissatisfactions with the quagmires of analytic action theory and its various shortcomings serve as a foil for her introduction of ontic claims about intention as a dynamical system (see Juarrero 1999, Part I). I think Polanyi would be generally sympathetic to Juarrero’s views, but would most likely urge a reconceiving of epistemology and its relation to ontology. This would perhaps bring Polanyi’s “positive” account of epistemology-via-tacit-knowing (“positive” in the sense of cashing out how tacit knowing works and is applied) closer to Juarrero’s at times “negative” assessment of mere epistemic claims (“negative” in the sense that it serves as a contrast to what she wants to highlight, namely the ontic status of dynamical systems). Additionally, if Polanyi were to delve into contemporary action theory, I suspect he would be inclined to start his inquiry elsewhere (or, more radically, he might not recognize action theory’s problems as problems at all, akin to Wittgenstein’s dissolving of philosophical problems once it is recognized that these problems are entrapped by their own presuppositions).

Another difference brought to the fore by the generator metaphor concerns the strong use of mathematical concepts in Juarrero’s works. I think her use of dynamical-systems ideas is largely metaphorical, where her novel and groundbreaking work at the time (most especially Dynamics in Action) presented a series of root-metaphors for a new framework accommodating intention, action, and beyond (for her more current works that extend her framework to ethics, aesthetics, religion, etc., see Juarrero 2008, 2009). However, at moments she writes as if the mathematical structures of dynamical systems theory are actually in the world. As a result, she might be accused of committing a Deweyan fallacy of mistaking one’s categories of thought for the things themselves (some reviewers of her Dynamics in Action have alluded to roughly similar objections; see, for example, Pols 2000 and Tuomela 2003). In any event, this can be finessed by remembering that her ambitious and novel framework is just that—a philosophical framing of a new research program deserving serious attention by philosophers, whose root-metaphors provide new ways of philosophical understanding. I conjecture that if Polanyi’s comprehensive entities map significantly to Juarrero’s dynamical systems, this objection can be further finessed by keeping in mind the always present role of living systems with tacit powers of integration. That is, the estimation that such mathematical structures are in the world is itself a skillful estimation, as are the developments of dynamical systems theory and its conceptual root-metaphors.

What are these root-metaphors? There are a number of them, but I think the one that is most important is the notion of causality as constraint. Juarrero first draws a distinction between behavior and action (a “species” of behavior). She writes: “I postulate that behavior constitutes action when self-organized dynamics, as characterized by consciousness and meaning, originate, regulate, and constrain processes such that the resulting behavior ‘satisfies the meaningful content’ embodied in the complex dynamics from which it issued” (2000, 28). The resonance with Polanyi’s features of tacit knowing is remarkable. Translating roughly into Polanyian language, the above would read: the meaningful subsidiaries bearing on focal objects of awareness jointly originate, regulate, and constrain the resulting trajectory of what tacit knowing projects—a continuum of comprehensive entities (that in turn constitute and enable a significant portion of experience). What both tacit knowing and Juarrero’s notion of action highlight is the “autopoetic” nature of meaningful modes of engagement with the world—the self-generating and self-regulating nature of knowing and skillful modes of intentional action; or perhaps better yet, to quote from Juarrero’s borrowing of “Chuck Dyke’s (1988) great phrase,” intentional action and tacit knowing are “structured structuring structures” (2000, 31). This is a wonderful phrase indeed, and one that captures the essence what dynamical complexity is about.
Juarrero’s notion of causality as constraint is homologous to Polanyi’s notion of a type of boundary condition that enables comprehensive entities; what she is drawing attention to by the idea of constraints aren’t merely boundary conditions that delimit one region of experience from another, but rather qualitatively different sorts of “levels” that enable-and-enact the very levels themselves. Boundary conditions/constraints of this generative sort are interpretable as structured structuring structures that afford and bring into being Polanyi’s heterarchical (dynamic and not static) ontological hierarchy, which is composed of comprehensive entities (see Mullins 2013a).

Let me further discuss some of the specifics of Juarrero’s intriguing and important notion of causality as constraint. She first spends quite a bit of time in *Dynamics in Action* outlining several notions of causality operative in the Western tradition of action theory. Two sources come to the fore when tracing our modern sense of what “causality” means, namely Aristotle and Newton. In brief, efficient mechanistic causality is what is normally understood when “cause” is invoked, and is often implicitly at work in various modern metaphysical contexts. What Juarrero specifically attributes to Aristotle that carries through to modern times is the latent assumption that causes cannot cause themselves—they cannot be autopoetic. Think, for example, of Hume’s analysis of cause: events E1 and E2 appear to be connected causally. But whether cause is genuine or a product of custom, the point remains that sequential, linear causality is presumed in the background. There is no consideration of self-causation.

Juarrero observes that Kant was one of the first philosophers to consider something like self-causation in his *Critique of Judgment* (which he relegated to the realm of regulative judgment, not having the resources at the time to make a more ontic assessment; see Juarrero 1985, 1999). She traces the first genuine ontic version of self-causation to Prigogine (and Stengers) and his work on dissipative systems. So firstly, by “causality as constraint” Juarrero has in mind self-causation as a relatively new conception of cause brought forth by the somewhat messy and new science of complex systems (a conception that does not neatly fit into either Newtonian or Aristotelian conceptions of cause). And as for the “constraint” aspect, Juarrero reflects on this new science and provides what I think are novel and apt philosophical characterizations of the variegated work coming from inquiries into complexity. As far as I can tell, she is one of the first to articulate these ideas that, while having a longer philosophical history, are really phenomena starting in the late twentieth century (see for example her co-edited work highlighting the historical roots of emergence, Juarrero and Rubino 2008).

The “constraint” aspect of causality-as-constraint will take a bit of work to unfold, and I shall try to be as clear as I can while aiming to maintain sufficient representational accuracy. Juarrero draws a distinction similar to Polanyi’s distinction between his two types of boundary conditions (I alluded to the second enabling sort above). As with Polanyi, her constraints are contextual, where she accordingly makes a distinction between “first-order contextual constraints,” similar to Polanyi’s notion of boundary conditions that delimit realms of experience in rather ordinary fashion, as a test tube delimits an artificial site in which a chemical reaction can be studied, and “second-order contextual constraints,” similar to Polanyi’s notion of boundary conditions that enable-and-enact levels of inquiry (see Takaki 2011; Mullins 2013a and 2013b). First-order contextual constraints are “context-sensitive constraints operating at the same level of organization” (1999, 141), as a test tube and the reaction taking place within occur at the same level of interest. Second-order contextual constraints are more important, so I will concentrate on unfolding what Juarrero has to say about them. She writes:

> [In the Belousov-Zhabotinsky reaction] once molecule Z catalyzes A and the autocatalytic loop closes, a phase change takes place: the autocatalytic network’s organization itself suddenly emerges as a contextual constraint on its components. I call these second-order contextual constraints. Top-down, second-order contextual constraints serve as
the boundary conditions in which the components are located—and to which they are now systematically, not just externally related. All virtual governors are examples of such top-down, second-order contextual constraints (1999, 141).

Juarrero cites a number of very good examples of second-order constraints (the B-Z reaction is an exemplar in the literature on complexity and also receives treatment in Prigogine’s work). To avoid technicalities as much as possible, I will try to map the above notions to Polanyi’s chess example, as it illustrates his second type of boundary condition.

Firstly, Polanyi claims that the rules of chess are boundary conditions whose boundaries enable interest not by what the rules themselves strictly indicate, but by the strategies they afford when actually playing chess. Polanyi is gesturing towards the dynamic aspects of chess—the strategies and counter-strategies, the gambits, the evolving space of changing possibilities as a game unfolds, and so forth. Interesting games of chess explore not mere possibility-spaces, but regimes of order that can be novel, creative, and brilliant achievements. Thus the rules are not merely first-order constraints, even though they can be viewed this way in the sense that the “state space” of chess—the space of total possible moves and games—occurs at one level (when chess is viewed in this very coarse-grained manner). Rather the complexity of chess concerns the other type of boundary condition regarding the enabling-and-enacting of intricate games of interest. How does this map to second-order constraints? Second-order constraints build on the first-order state space of possible chess games, where they are second-order in the sense of exploring dynamic, concrete, and interesting configurations—adaptive peaks of interest, as it were—within that background state space.

Secondly, the “top-down” aspect of playing chess concerns the moves made and strategies deployed that actually change the possibilities and probabilities of a game’s trajectory. We shift from a state space representation to families of “phase space” representations—the dynamical unfolding of specific trajectories in state space—where there are a series of conditional probabilities signifying a structural shifting of possible attractors. These moves and strategies, as a game progresses, are not simply “externally related” to what future moves can be made, akin to Juarrero’s remarks about the B-Z reaction. Recall that with the B-Z chemical reaction, emergent boundaries “systematically” constrain the components in a new relational way (I should also note that some of the best examples of systematic constraint are exhibited in biology: function is form and form function, a principle showing itself at numerous scales of resolution, from microbiology to paleontology). So likewise a brilliant chess move shifts the trajectories of available moves, further constraining the state space, introducing new relations between the components (not merely the chess pieces, but the possible moves in “move-space,” as it were—a further constraining of possible phase space trajectories). What are these new systematic relations? They would correspond to “new” attractors (or a newly disclosed constrained range of phase space trajectories)—the opening up of new ways to get to checkmate that occur in an emergent move-space simultaneously disclosing brilliance.

At this point, it might be objected that I am doing violence to Juarrero by appropriating her into a Polanyian framework. Whence then is the difference and why bother with any dialogue (for if true, this would appear to be an unhappy case of absorption or perhaps conversion)? While I’ve mapped Juarrero’s first-order and second-order constraints to Polanyi’s two types of boundary conditions, this has been an exercise in starting a dialogue based on similarity, not identity. I think Polanyi is a proto-complex systems thinker who didn’t have access to the modern phenomena of complexity; by contrast, Juarrero firmly starts with Prigogine and builds on recent work on complex systems in developing a philosophy of dynamics. In short, this is not an exercise in appropriation, but one of hopeful bridge building, noting along the way overlapping regions of interest, and how both views I think can mutually inform and enrich one another.
Problems and Future Areas of Inquiry

For the remainder of the paper, I’d like to discuss in greater detail possible avenues of mutual enrichment (at times raising potential problems), areas of future inquiry, and some speculative metaphysics. Let me start by further discussing the chess example. As noted above, new systematic relations map to new ways of getting to checkmate occurring in an emergent move-space. More generally, Juarrero writes that a “new ‘type’ of entity, one that is functionally differentiated appears [emerges]. In turn, the newly organized hierarchy [a new emergent move-space] constrains top-down its components’ behavior [the new possible moves in this emergent move-space] by restructuring and relating them in ways they were not related before” (1999, 129). This last point is crucial and deserves further consideration.

As Juarrero notes, constraints “are relational properties. But they are not simply relationships among components within a system…[constraints] are relational properties components acquire in virtue of being embedded in a higher level system” (1998, 234). This sounds very much like Polanyi’s writings on boundary conditions that embody higher-level principles. As alluded to earlier, a difference of emphasis, not of kind, between Juarrero and Polanyi is that Juarrero’s access to modern ideas on thermodynamics, information theory, chaos theory, and so forth enable more precise philosophical characterizations of complexity. I submit that Polanyi’s “looser” characterizations of these principles—which can be critiqued precisely on these grounds—is also potentially a strength if viewed at an appropriate level of resolution (see Takaki 2013). And conversely for Juarrero, the virtue of greater precision might simultaneously be critiqued as “too narrow” given the heterogeneous range of complexity-related phenomena. What I am hoping to create is a space for mutual enrichment (“vigor”) via a hybridization of Polanyi and Juarrero.

Allow me to expand on the potentially “too narrow” objection. I think most importantly Juarrero argues that “constraints not only reduce the alternatives—they also create alternatives. Constraints, that is, can also create properties which a component exhibits in virtue of its embeddedness in a system, properties it would not otherwise have” (1998, 234). To clarify what she is gesturing towards, note that Juarrero distinguishes two sorts of constraints nearly identical to her earlier distinction between first-order and second-order constraints. She uses conditional probability to frame and illuminate how new properties emerge via constraints. Informally, given some B, conditional probability says that some A becomes more or less likely in the presence of the probability space that B induces. As this is applied to emergent phenomena, the intuition that conditional probability accommodates and makes more precise is the idea that given an appropriate set of conditions, the emergence of property P becomes more likely, which perhaps can be illustrated by the autocatalytic emergence of amino acids given the Miller-Urey set-up of appropriate initial conditions.

This use of conditional probability provides a good coarse-grained outlining of complexity, but is not by itself the whole of Juarrero’s novel account. For it could be objected that conditional probability by itself doesn’t really get at the structural properties of emergence, as conditional probability can be and is applied to a wide range of cases, many of which are not viewed as cases of emergence. What matters more is what she does with conditional probability by relating it to the second sort of constraint (second-order constraints), where a real sense of creativity arises. These second-order constraints actually create heterarchical hierarchies according to Juarrero, making these phenomena ontically real and not merely “epistemological” (in a non-Polanyian sense) tools of our understanding. Constraints of the second-order sort are, in addition to conditional probabilities that constrain some event A relative to B, “alterations in the probability distribution of a system’s state space” (1998, 240). That is, if conditional probability operates at one level in a particular probability space, second-order constraints not only induce-by-constraining probability niches within the overall state space—they also create and alter the very niches themselves, creating new relationships (more mathematically, they are conceivable as the introduction of new operators/functionals remapping the “given territory”).
Juarrero continues: “As enabling constraints operating bottom up, contextual constraints free up a set of states which the higher level system of relationships they create can now access” (1998, 240). Metaphorically, if first-order constraints are viewed as a first-generation software package, the software “frees up” or enables a new range of things that can be done with the software (for the chess example, this would correspond to a strategy opening up a new horizon of possible moves). Second-order constraints build off of these first-order constraints: “Systems of relationships themselves can in turn become related… thus evolving into systems of ever higher level relationships with creative new properties of their own. Once the higher level system is in place, it acts as a top-down selective constraint on the (now) lower level components from which it organized, altering the number of ways they can be arranged” (1998, 240-1).

Metaphorically, new sorts of meaningful tricks with the software can be performed, creating their own “forms of life,” as it were, that also systematically constrain what the original software package does, relative to these new practices (for the chess example, given a certain “first-order” strategy deployed, this would correspond to the altered trajectories of moves and counter-moves in move-space).

Does my use of these metaphors muddy and detract from the more mathematically precise cases of emergence that Juarrero discusses? While there might be truth to this charge, matters are more complicated as objections to Juarrero can be made on two fronts (aspects of which were mentioned earlier). On the one hand, her use of conceptual root-metaphors appears too loose and doesn’t do justice to the mathematically precise cases of dynamical complexity. After all, there is no explicit appeal to classes of differential equations, which form the mathematical core of dynamical systems as exhibited in mathematical physics (see Tuomela 2003). And on the other hand, it appears she reifies these largely mathematical concepts (state space, probability distribution, etc.) that may not have clearly defined ontic standing (how, for example, are we to physically interpret the ideal precision that such concepts present?). In addressing these objections, I think we can begin to hybridize Polanyi and Juarrero, avoiding more generally the Scylla of not being precise enough and the Charybdis of being “too narrow.”

I shall sketch some responses, intentionally keeping them brief to indicate future areas of inquiry. Juarrero’s major work, Dynamics in Action, has been (gently) critiqued in various ways, but in my estimation none of the critiques prove damaging to her overall project. Quite the opposite, I believe that she can strengthen her position by bringing a Polanyian perspective to bear. For example, she could respond to criticism that her account is not precise enough (in not appealing to explicit uses of differential equations) by arguing that her conceptual framework would be hindered by such precision (in earlier works she does make more precise use of Prigogine’s work on autocatalytic cycles, which simultaneously, and I think unfairly, opens herself up to the charge that such cases do not generalize to any reasonable degree in the sciences). Polanyi’s grounding of ontology in epistemology (non-analytically conceived) holds that what scientists tacitly estimate always and already presupposes intuitive ideas guiding their skillful inquiries. What Juarrero is doing in my estimation is cashing out these intuitions, shifting attention from the foci tacitly projected by scientists like Prigogine to the “philosophical subsidiaries” making possible such projections. In Heideggerian fashion, she is doing a kind of fundamental ontology on these presuppositions, drawing out the contours and nuances of what Prigogine and others ontically project. Thus the objection that her account lacks mathematical precision misses the point and value of her philosophical project. Herein lies one area of further investigation: how might a Polanyian view of epistemics (especially his notion of comprehensive entities) fit with and perhaps enrich Juarrero’s ontic (and ontological?) concerns?

Given Juarrero’s greater emphasis on ontology, might her reifications of mathematical concepts need softening, which I think would bring her closer to Polanyi? Also might Polanyians benefit from a bit of reification and the benefits that arise from these projections? I think both can be answered in the affirmative. For example, in Dynamics in Action (and her 1998 article) Juarrero argues that second-order contextual constraints enable (or some variant thereof) emergent boundaries with genuine ontic standing.
She seems to shift slightly in her 2009 article “Downward Causation and Religion,” where she claims in more bold (reified?) fashion that second-order contextual constraints “serve as—indeed are—the boundary conditions in which the components are located and to which they are now systematically and not just externally related” (119). The thin line between one’s epistemic categories of understanding and what they project seems to be erased; they now are constitutive of what is really happening in Nature. This is both a problem and a significant advance. In her earlier work, she notes that Kant’s understanding of self-cause was novel at the time, and given the absence of what the contemporary tools of complex-systems thinking afford, he could only assign his speculative thoughts to the regulative role of judgment. In other words, Kant didn’t know if autopoesis is anything more than an artifact of the limits of our understanding, thus he acknowledged the need for new ideas applied to life-like (telic) phenomena falling within the realm of judgment—judging, but not constituting, what we think holds for telic phenomena. Juarrero, from the benefit of hindsight, boldly moves beyond Kant (and other historical precursors traced in her 2008 co-edited work) by moving to the realm of constitution in claiming that our categories of understanding—specifically second-order contextual constraints—actually “are” the boundaries themselves (see also Juarrero 2010). She may be right, and if so, this would present a strong case addressing some of Tihamér Margitay’s concerns (Margitay 2010, 2013).

Such a bold move could be seen as a projection of tacit knowing by Polanyians since constitution conveys a sense of universal intent. Moreover such a projection for both Juarrero and Polanyi would not be “merely epistemic.” In this regard, what Juarrero can offer Polanyians is an updated picture of realism via complexity, boundary conditions, and so forth whose (fallible) constitutive status is part and parcel of pursuing universal intent. And on the other side, what Polanyi can offer Juarrero is an easily overlooked reminder that reality, whose features are revealed by the consequential fruits of inquiry, are still irrevocably grounded by the operations of tacit knowing (and the comprehensive entities of which they form a part)—ontics are “fundamentally” grounded in the negotiations and renegotiations of what tacit knowing projects for communities of inquirers pursuing reality (thus alleviating the problematic aspects of reification, highlighting instead the consequential elements of her bold move).

Let me illustrate through an example how Polanyi and Juarrero can further enrich and complement one another. As Juarrero and Rubino correctly observe, Poincaré is key in the history of complexity because of his discovery of chaotic dynamics, which marks a philosophical shift from a view of nature based on mechanics alone (classical or otherwise) to a thermodynamic perspective. “We have not, Poincaré concludes, managed to resolve the enormous difficulties involved in reconciling mechanics with thermodynamics, and it is unlikely that we ever will” (2008, 8). There are epistemic and ontic issues these difficulties raise that remain open ended, even with significant subsequent advances (think, for example, of the still quite messy state of interpreting statistical mechanics). Perhaps more troubling, there have been certain resolutions since Poincaré’s discovery of chaos that rather oddly have unclear bearing on these difficulties. In particular, I’m alluding to Poincaré’s investigations of the n-body problem, where he gleaned tangles that he thought might never be undone (chaos seemed to imply non-integrability; Poincaré’s introduction of the notion of qualitative phase spaces signifies both the intractability of many dynamical problems and a way to get around such intractability).

A result not widely advertised is that the n-body problem has been solved (Wang, 1991), perhaps in part because its solution yields practically no new light on the problem (Diacu, 1996). That is, even with a theoretical resolution of the n-body problem, the solution offered doesn’t shed any light on the structure and nature of dynamical n-body systems unfolding. In essence, we know that the problem is solvable—that a solution exists—yet we have no practical idea of what the solution really looks like or how to manage the tangles that chaos introduces. There is a large body of work surrounding the n-body problem, where various illuminating but approximative techniques help to tame the problem and also
shed significant light on the structural dynamics of the problem. In other words, even if “ontically” we were to claim that the n-body problem is unsolvable (as Poincaré was inclined to think), epistemically we would be left in the same situation of struggling to understand the dynamics of n-body systems. We might be inclined to think from the successes of this burgeoning body of work that there really is chaos in nature, and that the problem maps to genuine ontic regimes of order and disorder (“solvable and nonintegrable regions,” as it were). In analogous fashion, we might like Juarrero argue that the successes of applying mathematical techniques to understanding complexity justifies projecting ontic standing to levels, (hierarchical) hierarchies, and the like.

This may be right, but as with the n-body problem, we conceivably could encounter a similar puzzling situation: suppose complexity turns out to “reduce” theoretically to some parallel general solution. Would this then mean that levels, hierarchies, and so forth aren’t really real? Would it mean that our approximative techniques and models used to study the messiness of complex systems are “merely” epistemic tools of our limited understanding? I suggest that Juarrero can avoid the potential pitfalls of strong ontological claims (think, for example, of debates in the philosophy of science over realism and antirealism, which strike me as similarly dissatisfying as Juarrero’s assessment of analytic action theory) on the one hand and the weak status of “mere” epistemic claims on the other by taking a cue from Polanyi. How does tacit knowing relate to the deployment of mathematical techniques of understanding? What do they project, and how do we get from “epistemology” to “ontology,” both of which are significantly reconceived by Polanyi? What are some of the more fine-grained features of this reconception, especially concerning how tacit knowing might relate to intention as a dynamical system? Does intention map to the from-to aspect of tacit knowing, or more generally is intention itself a comprehensive entity? What is the relation between intention as a dynamical system and dynamical systems “out there”—are they the same, informational, do they exhibit scaling relations, are they all comprehensive entities, etc.? Perhaps most importantly, what new philosophical picture emerges from these considerations? For certainly it would not be listed among the usual suspects (supervenience, various types of antireduction, analytic conceptions of emergence, and so forth), whose careful but coarse-grained logical considerations tend to exhibit the shackles of modes of thinking from which Polanyi, and I think Juarrero as well, is trying to break.

Speculative Metaphysics

This brings me to the last topic concerning a speculative metaphysics that blends Polanyi and Juarrero. I don’t know if there is strong support for these considerations in either thinker’s writings, but I suspect that such speculations may present fertile soil from which to construct a hybrid “metaphysics” (in the sense, beyond ontic considerations, of presenting an overarching philosophical vision). On the Polanyian side, I think it is fair to say that a key feature of his overall philosophy is something like the regulative ideal of the pursuit of truth, which can be gleaned from his fiduciary framework guiding how we get from epistemology to ontology. And as for Juarrero, in her writings I think one can discern—in addition to her shift from Kant’s regulative judgment to a constitutive principle concerning emergence and autopoetic systems—what might be characterized as the pursuit of heterarchical, stable hierarchies, what she sometimes calls “safe-fail” systems (Juarrero 1991).

Polanyi’s pursuit of truth ought not flatly to be conceptualized as inquiry’s “asymptotic” convergence to a single unified and monolithic “Truth.” Rather more subtly, it is a fallibilistic project rooted in tacit knowing, where a continuum of diverse modes of knowing (fiduciarily) hones in on stable realities by way of achievements. Thus what tacit knowing projects is a heterarchical, dynamic hierarchy of ongoing achievements that are imbued with universal intent. Polanyi’s pursuit of truth is a regulative project emphasizing the never-ending process of articulating universal intent, the unending consequential fruits of inquiries, and the ever-expanding continuum of achievements that are centered by comprehensive
entities. By contrast, it might seem that Juarrero offers a framework moving beyond regulation to constitution. However, this would be too quick an assessment, for many of her critiques are directed at philosophical views that Polanyi likewise contests. For example, concerning Platonic “Truth” and object-subject divisions, she writes:

Recent developments in the philosophy of science, and considerations drawn from features characterizing complex dynamical systems such as dissipative structures, in particular their openness and coupling, as well as their capacity to process information, all suggest that the ideals of absolute [Platonic] Objectivity and Truth—and perfect Societies—are unattainable because the model of Reason from which they issue ignores the realm of the particular, the contextual, and the temporal. Once these are incorporated into a broader notion of reason, one can begin to understand reason dynamically and so an alternative to the objective-subjective dichotomy opens up. One comes to appreciate that the concept of truth makes sense only within the cultural milieu which gives it meaning, that culture, history, and tradition serve as the contextual framework in terms of which events and phenomena are interpreted as meaningful (1991, 1776-7).

In general, Juarrero moves beyond Kant’s notion of regulative judgment, and also contests much of the Western philosophical tradition whose object-subject dualities and disembodied views of Reason and Objectivity do violence to the phenomena of complexity. In a sense she is doing two things simultaneously: she is moving beyond Kant and yet is not falling prey to the “antinomies of reason” by her constitutive move, as she also rejects Platonic accounts of “Objectivity and Truth.”

Thus firstly, we have opened a space for accommodating Juarrero’s constitutive principles within a Polanyian regulative fiduciary framework. For as with the n-body problem, many of whose lessons can be generalized, even if there were some analogous sort of ultimate Platonic “reality-solution,” it would give us no genuine sense of how actual dynamics work. Thus Polanyi’s regulative fiduciary framework would offer guidance in exploring and understanding dynamics in action, where Juarrero’s constitutive principles would be the enriched analogue of Polanyi’s achievements. Secondly, there is a “symmetrical” way in which Polanyi can also be accommodated within Juarrero’s framework. What Juarrero offers Polanyians is a metaphysical softening of the pursuit of truth, emphasizing contextual particularities and thus the crucial role of exercising practical wisdom when cultivating what tacit knowing projects—a gentle reminder to Polanyians of tacit knowing’s humanistic contours. She writes:

Complex dynamical systems [in particular, intention as a dynamic system] suggest...[we] have the ability both to impart through example and to acquire as an exercise in personal responsibility the sensitivity to contextual nuances (spatial, historical, and cultural) in others and ourselves that will enable us to better understand the dynamics and behavior of both [gesturing towards a “participatory realism,” as it were]. With that ability comes the obligation [a fiduciary commitment] to nurture the practical wisdom with which we can make reasoned, reflective judgments about ourselves and the messy, complex world in which we live—and to act from that wisdom (1999, 260; emphasis mine).

It is not enough to pursue truth, that regulative non-Platonic ideal, heterarchically and dynamically conceived. For mere connoisseurship in pursuing truth does not do justice to the crucial personalistic aspect of Polanyi’s thought. What inextricably comes with genuine commitments of the sort Polanyi recommends is an invested sense of personal responsibility to inquiry and to one’s self, as it were, which is a calling to pursue wisdom—an ideal for non-sages (i.e., most of us) pursuing, but not yet having,
wisdom. As Juarrero might remind Polanyians, tacit knowing is not simply skillful “subsidiary” practical wisdom (broadly conceived, in accordance with tacit knowing’s continuum) directed upon various foci of one’s engagements; it is perhaps most crucially itself a commitment made to act on that pursuit of wisdom, which reinscribes these various foci as they bear back upon one’s subsidiaries.

If these speculative remarks are right, it would make greater sense of Polanyi’s contesting of various traditional views of science (often reductionistic and/or based on Cartesian assumptions). For a modern tendency, taking its cue from the successes of the “harder” sciences, is to isolate problems, to ossify that isolation to an extent, and then inductively to generalize whatever successes arise. This image of reason—perhaps more aptly characterized as scientistic rather than scientific—I think has done significant damage to the humanistic ideal of pursuing wisdom. It certainly infects a fair amount of modern academic philosophy; for example, one sometimes hears teachers of philosophical ethics claiming that they may be interested in the study of ethics, but that doesn’t imply that they are thereby ethical. This is surely an important distinction, but for who, and in support of what implicit framework? Polanyians ought to be wary of such “important” distinctions, as the latent dualities they contain threaten to undermine the radical wisdom of what Polanyi’s post-critical philosophy offers. We cannot study systems of whatever sort in pure isolation, nor can we forget that our various reductive tools of examination—as important and as powerful as they are—require reintegration within wider systems as well as in relation to our personalistic commitments. The pursuit of truth as a commitment is interrelated to a variety of values, perhaps the preeminent of which is the pursuit of wisdom. Without the commitment to pursuing wisdom first, other ideals threaten to undermine Polanyi’s framework, as well to further fragment an already fragmented world. Echoes of this are found in Juarrero:

Now that there is no denying that top-down causality, in the sense [of causality as constraint], is ontologically real, there is even less reason to deny the causal efficacy of such ideals [concerning values, ethics, and morals], which after all can now be understood to embody the “integration achieved by a supervenient level of relatedness,” in [C. Lloyd] Morgan’s words (2009, 121).

Regulative ideals like the pursuit of wisdom and the pursuit of truth are ideals that enact the worldviews they project (in open-ended and fallibilistic fashion). The realism they create and are created by is a new sort of epistemic-ontology that I hypothesize can be fruitfully developed within a Juarrero-Polanyian framework. This realism is not merely a realism “out there”; it is part and parcel of putting wisdom into action. In this sense, it aims to rehabilitate an ancient view of philosophy, namely philosophy as a “way of life” (see Hadot 1995). Perhaps a hybridization of Polanyi and Juarrero can explore the contours of this rehabilitation in hope of healing some of the innumerable fractures of modern life.

**Endnotes**

1Thanks to Phil Mullins, Paul Lewis, and Andrew Grosso for their helpful feedback on earlier drafts of this paper.

2I am indebted to Phil Mullins for this important insight.

3In Polanyi’s later writings he refines his account of boundary conditions through his notion of the principles of marginal control, which operate in top-down fashion and “govern the boundary conditions of an inanimate system” (*TD* 40). He appears to subsume both sorts of boundary conditions under his notion of dual control, and his higher-level principles are expressed via marginal control. It would be an interesting project to undertake a detailed investigation concerning the extent to which Juarrero’s first-order constraints map to dual control, and second-order constraints map to marginal control. Thanks to Andrew Grosso for suggesting this insight. My suspicion is that the “devil is in the details,” from which
the differing aspects of the mapping will be further revealed by the differing implications Polanyi and Juarrero draw regarding their views of evolution, issues relating to biosemiotics, how heterarchical their hierarchies are, and so forth.

References


“From Epistemology to Ontology to Epistemontology”

Charles Lowney

Key Words: emergence, reductionism, tacit knowing, epistemology, hierarchical ontology, dual control, machines, Michael Polanyi, Tihamér Margitay, Gottlob Frege

ABSTRACT

According to Tihamér Margitay, Michael Polanyi held a strong “correspondence thesis” between the structure of tacit knowing and the structure of ontological emergence. In agreement with Margitay, this article finds a one-to-one correspondence implausible, given our tacit ability to integrate various clues into the apprehension of the same object and given the multiple realization of object types via different components. It is acknowledged, however, that such a correspondence is encouraged by an analytic, scientific approach to understanding objects (as Bedeutungen), when held distinct from linguistic modes of identifying objects (via Sinne). It is then shown how the epistemological and ontological interweave at a deeper level in Polanyi’s participatory or enactive realism. This notion of epistemontology counters a second set of Margitay’s criticisms. It re-affirms a pluralist ontology by demonstrating how machine types, as comprehensive entities, resist a reduction to material parts and lower level physical laws, without violating such laws.

In “From Epistemology to Ontology: Polanyi’s Arguments for the Layered Ontology,” Tihamér Margitay offers insightful criticisms of two of Polanyi’s key ideas. First, Polanyi held that there is a parallel structure between tacit knowing and identifiable beings, such that the tacit clues that come together in our knowledge of a comprehensive entity are structurally similar to the way that the parts of an entity come together into a whole. Second, in dual control systems, such as machines or living beings, the higher ontological level and the principles of its operation are irreducible to the lower level and its laws. Here Polanyi provided the example of how a machine’s engineering principles are irreducible to the laws of chemistry and physics. These two ideas bolster Polanyi’s conviction that the universe is layered hierarchically: just as focal meanings are irreducible to their tacit clues, so emergent comprehensive entities are irreducible to their lower level parts.

Margitay criticizes the first idea by showing how there is no direct correspondence between how we know and what we know. This, for Margitay, undermines any epistemically-based support for the idea of an ontological hierarchy, at least with regard to things such as planets, cobblestones, and wristwatches that are not “knowledge-like” entities (M1, 131). Margitay then criticizes the second idea, which would provide an independent basis for a layered ontology. By looking at solar systems and watches, Margitay blurs the hard line Polanyi established between (on one side) inanimate nature and (on the other) dual control systems. This greases a slippery slope to reducibility, for at least machines and most organisms. Margitay then nudges us down that slope by defending the idea that machines can be identified through their physical properties.

In his criticisms, Margitay is conscious of his agreement with Polanyi that (1) there is indeed a hierarchical structure in knowing, and (2) there is indeed a strong correspondence between knowing and being in knowledge-like entities, such as minds and persons. Margitay also (3) appears to hold on to a conviction in the freedom and irreducibility of persons, as real entities; persons are not reducible to their constituent parts, although one wonders how Margitay maintains this, since, short of an outright dualism, it seems contrary to his conviction that “physics is complete” (M1, 133-4).
To indict Polanyi on these counts may seem an indictment of all that is valuable in Polanyi’s understanding of nature. But, as I see it, Margitay’s thoughtful criticisms point out some limitations in Polanyi’s thinking and call us to understand, in a Polanian way, the relation between tacit knowing, emergent being, and the hierarchical—or perhaps plural—structure of each. It also challenges us to set Polanyi’s ideas in the context of current discussions about the nature of explanation and the ultimate nature of nature.

In response to Margitay, I will agree with his first point. Margitay is right to de-couple knowing and being, but only when it comes to the naïve idea that there is simple one-to-one correspondence of knowing to being at the macro level, which Polanyi might have held at least at some points in the development of his thought. Here I will point out that analytic assumptions regarding the identification of an object in science—for better or worse, and probably for better—continued to shape Polanyi’s thinking. However, I will also point out a deeper connection between knowing and being that Margitay misses—or fails to emphasize properly. That deeper connection I call Polanyi’s “epistemontology.” Here I hope to bring proper emphasis to the unity between knowing and being that Polanyi endeavored to promote, in spite of his inability to shake completely loose from the dualistic divide between knowing and being that encourages a simple correspondence picture.

I will then show how Margitay falls short in his criticism of emergence in dual control systems, (1) in part because of the model for understanding scientific reduction that he seems to presuppose; and (2) in part because of what he misses when he decouples knowing from being. More specifically, he misses the way in which meaning is integrated into the fabric of reality, and this becomes apparent when he criticizes a semantic defense of hierarchy. But in spite of our disagreements here, I want to emphasize that Margitay raises interesting questions that require further investigation.

**The (Too) Strong Correspondence Thesis**

Margitay criticizes what he calls the “correspondence thesis” in Polanyi. This is the idea that there is a correspondence between the from-to structure of tacit knowing and the part-whole structure of complex entities. Margitay first considers a strong version of the thesis: the idea that reality is layered ontologically because our knowing of it is layered. Margitay quotes Polanyi to show how Polanyi himself may have espoused this strong version: “the structure of tacit knowing determines the structure of comprehensive entities” (TD, 55). In other words, says Margitay, Polanyi believed “the world has a hierarchical ontological structure because our knowledge about this world is hierarchical. The ontological structure of a particular entity follows from the way we know it” (M1, 131).

Taken as a one-to-one correspondence, especially with a causal direction going from knower to thing (without consideration of how the thing itself, and clues from background contexts, inform our knowing of it) and from parts to wholes (without a consideration of environmental pressures or the functioning of the whole), the thesis is clearly false, and Margitay does a splendid job showing us how.

Margitay points out that we use tacit knowing to comprehend things that are not emergent, for instance, a planet (M1, 132). Those things are fully reducible to their parts, according to Polanyi, but a comprehensive meaning is not reducible to its clues, and so a one-to-one correspondence that supports a layered ontology could not hold here. But even when we take an example of a purportedly irreducible entity, the correspondence does not hold. Margitay uses his watch as an example of something that we might easily identify without knowing anything about its parts and their relations. This example shows that our perceptual system integrates clues into a phenomenal entity in a way that may be different from the way the parts are integrated into a whole, and both may be different from the way we learn to identify an object in different contexts.
There is an assortment of different cognitive and semantic clues we might indwell in order to apprehend a comprehensive entity. As Margitay says, “We use some clues to recognize this object as a watch and usually rely on other clues for other kinds of knowing, e.g., for understanding this watch, for using it, for developing it etc.” (M1, 132). This runs counter to the correspondence thesis, but Polanyi’s understanding of tacit knowing does indeed allow for such identifications in a variety of contexts. The linguistic and pragmatic contexts, Polanyi might say, provide tacit background clues that contribute to our identification and understanding of the watch. In Frege’s language, different Sinne (senses) can point us to the same Bedeutung (referent).

The “because” version of a strong correspondence may thus somewhat distort Polanyi’s ideas, since of course he believed that we were discovering entities and not simply making them, and of course he would recognize contextual clues as bearing upon our knowledge of a thing. But Polanyi, to an extent, might have been distorting his own ideas because of his tendency to give pride of place to a scientific understanding of the object, and because of a neglect of the distinction between senses (and contexts in which we identify objects) and references (the objects themselves).

As a step toward understanding Polanyi’s epistemontology, we can note that Polanyi blurs the line between linguistic meaning and the thing we are talking about, but never at the expense of the reality of the individuated thing. Polanyi is convinced that we are, or should be, talking about the same thing in the variety of instances in which we use the word “watch” and that this thing on Margitay’s wrist can be understood and investigated. The scientific context preserves its unity as an entity for investigation where other contexts may disavow it. This point takes us beyond any warrant the later Wittgenstein gives us to focus only on sense, and draws us back to Frege’s notion of a Bedeutung (aptly enough from a Polanyian perspective, “Bedeutung” means both the meaning and the referent itself). Words have both a Sinn and a Bedeutung. Sinne can get us to the same thing in a variety of ways, e.g., we may have a different sense of the word “Venus.” For you it may be the morning star, for me it is the evening star, but they both direct us to the planet. The senses can be different means of identifying the same referent, which is the entity or meaning of the word. If separate contexts and different cognitive clues are pointing towards the same sort of entity, there are features of the entity that would need to be in place in order for this particular item to qualify as that sort of thing. The entity is picked out by contextual clues (e.g., a Sinn) but is considered independently from them as its own entity (e.g., the Bedeutung) subject to scientific study. It is from the privileged position of the scientific understanding of the thing that the analogy between tacit integration of the clues into a comprehensive unity and the functioning of the parts into an emergent entity is strongest.

So although there are many ways to locate an object and to understand its pragmatic role, Polanyi may be justified in privileging the way in which we know it via the integration of parts to wholes as this seems the best way to understand an object qua object and the surest way to know our identification is correct (e.g., that it is a watch and not a cleverly disguised bracelet). When we dwell in those clues that let us know that this indeed is a real watch and not an imitation, we are likely dwelling in the tacit clues that correspond to the functional parts of the watch. In this tacit integration we are more likely to move from the parts as Bedeutungen to the whole as a Bedeutung rather than from various senses (Sinne) that point us to a focal whole.

The strong version of correspondence is clearly wrong. In fact, even before Margitay shows us his watch, his depiction of the unspecifiability of tacit clues in Polanyi’s theory (M1, 128) foreshadows why the knowing-to-being relation cannot be this sort of one-to-one correspondence: Margitay tells us that according to Polanyi, “[Clues] are logically unspecifiable... Different clues under different integrations may lead to the same whole” (M1, 128). If there is multiple realizability of the whole via a different organization of clues—and, indeed, if the real entity can reveal itself in unforeseeable ways in the future (TD, 32)—it
seems we are already well on our way to a de-coupling knowing from being—even for knowledge-like entities; we cannot determine (in either an epistemic or ontic sense of “determine”) an entity via dwelling in its parts as clues. There is a connection, an interconnection, even an interweaving, between knowing and being, but it is not one-to-one at the level of medium-sized dry goods (to turn a phrase of Quine’s) which we typically encounter. The over-determination or multiple-realization of comprehensive entities shows us that our knowing doesn’t always connect up with being as well as Polanyi’s science might like.

The (Too) Weak Correspondence Thesis

After successfully dismantling the strong correspondence thesis, Margitay presents the weaker thesis that the correspondence is “only” a heuristic device. From this view, Polanyi is not claiming that the strong relationship between knowing and being holds, but instead is merely claiming that a strong analogy holds. Margitay suggests the correspondence thesis “says no more than that the similarity between the structure of knowing and the structure of reality consists in that the lower level partially, but not fully determines the higher level in both cases and the higher level laws determine it. That’s it” (M1, 134).

The analogy of epistemology with ontology, according to Margitay, is thus fine as a heuristic, but then the idea of a truly layered ontology needs independent support. So Margitay turns to his second line of criticism, which acts to undermine the difference between any physical system and a machine. But I think he moves on too quickly and thus misses the importance of the interconnection between knowing and being that I call Polanyi’s epistemontology.

Knowing doesn’t “determine” being in the way Margitay sets up the problem, but neither is the process of knowing a separate convenient analogy for examining the process of how things come into being. Although I recoiled at the way Margitay used “determines” to imply a because—i.e., to imply that one structure (knowing) was determining a separate structure (being)—there is a deeper sense in which “determines” might be the right word to use. The way we know inextricably conditions our very experience of the thing, perhaps even to the extent that the thing we are talking about is a creation of our interaction with it, as well as a discovery of its reality. Knowing and being, one might say, mutually determine each other.

On to Epistemontology

Here I can only sketch how I understand the deeper interweaving of knowing and being in Polanyi’s thought. Some clues to epistemontology are found above in exploring Frege’s distinction between Sinn and Bedeutung. Another fundamental place to see the deep connection between knowing and being, which I will briefly touch upon, is seated at the level of how concepts or universals are formed. For Polanyi, concepts are created through the from-to tacit integration of indeterminate clues (the from) into a joint comprehension (the to). Joint comprehensions can themselves become clues to further tacit integrations, and the main job of a concept is to work as a tacit clue to understanding focal objects. Polanyi says concepts or universals, denoted by general terms, have a “curiously unsubstantial character” (KB, 168). This is because concepts are joint comprehensions that are in turn seen through in order for us to see the formerly indeterminate clues as determinate particular things. The concept (originally a to) becomes a through and the particular focal object the concept lets us see is the final to, so we have a from-through-to structure. For example, before the tacit integration of clues into the concept cow, we might see indeterminate black and white blurs on a field; after the formation of the concept, we look through it and the black and white objects are now seen as cows. We see through concepts to the objects we experience. There is no entity without identification, as Margitay notes citing Quine, but there
is no identification without tacit integration. Concepts or universals function tacitly in the background to allow us to identify and understand an object. Words have background senses (Sinne) that allows us to identify and experience the reality of their referent. Not only are intuitions without concepts blind, there is no intelligible structure to the sense intuition—even in experience—without the senses or concepts.

In response to Kyle Takaki, Margitay acknowledges this deeper sense in which our knowing “determines” our reality, and he recognizes the Kantian roots. Takaki discusses how our models in science condition our understanding of the entities we posit: “there is no direct access to Nature except by way of our models (theories, data, etc.)” and, he says, “tacit knowing primarily ‘determines’ the structure of these models” (M2, 36 & 51). For Takaki and me, noting that science uses models to understand the objects and their relations is married to the notion that similar tacit structures condition the objects we perceive, name, and understand. The Sinne that show us the Bedeutung, or concepts that show us objects, or the universals that allow us to identify particulars, may seem purely cerebral, but they also involve bodily skills and are the fruition of engagement with the world. Theoretical structures, networks of beliefs and conceptions, condition, if not determine, the very objects that those scientific theories posit, but not in a one-way trajectory from knowing to being. Knowing and being condition one another in a self-correcting feedback loop, much like the feedback loop we experience whenever we undertake to develop a skill through repeated performance, analysis, and recalibration.

Margitay agrees with Phil Mullins that “you cannot split ontology from epistemology’’ (M2, 45), but while Margitay affirms this interweaving, he shies away from what he calls Takaki’s “radically realist” approach to Polanyi’s ontological levels. Margitay quotes Personal Knowledge to defuse the radical suggestion: “strictly speaking, it is not the emerged higher form of being, but our knowledge of it, that is unspecifiable in terms of its lower particular levels” (PK, 393; M2, 53). But, as Mullins points out, in PK Polanyi only applied the term “comprehensive entity” to living things and later broadened his use of the term. This is significant because in a comprehensive entity the joint comprehension of meaning (our knowing) is inextricable from its unity and identity (as a being); these are the knowledge-like entities for Polanyi that Margitay restricts to persons. Mullins argues that Polanyi’s thought developed to more closely tie the conceptual and the existential, so we might expect that when he came to discuss dual control and machines after PK, which Margitay cites, Polanyi was indeed affirming the more radically realist ontology. This expansion of the notion of a comprehensive entity is important for the understanding what a machine is and why it cannot be reduced to its component parts.

**Indwelling that by which**

Polanyi is especially good at showing the interweaving of knowing and being in indwelling. He does it with acts of perception, cognition, with the exercise of skills and more. Our bodies as well as ideas extend out into the world; we can dwell in tools in order to understand and experience the shape of a room, or dwell in a theory in order to appreciate the movement of the stars. Here I want to emphasize two points that highlight the importance of the interconnections of knowing and being that Polanyi brings to the foreground and show how Polanyi is fighting an uphill battle against metaphysical assumptions we have been steeped in for several hundred years. One point goes back to at least to medieval debates that show how we dwell in our concepts to experience reality; another is a current “hot topic” in philosophy that shows how we dwell in objects to experience reality. Together they show how a sharp distinction between concepts and objects—one on the side of mind, the other on the side of reality—cannot be maintained.

C.S. Peirce, like Polanyi, claimed that universals are real. In the medieval debate between the nominalists and the realists, Peirce sided with the realists. Mullins points out that Peirce saw the heart of the debate was built around how we should understand the relationship between our knowing and
The nominalists, like the moderns, presuppose a strong divide between our mental faculties and what is out there to know; the realists, in contrast, identified reality with the judgments we are warranted to make, and ultimately with the judgments we would all agree on in the long run. This, as Mullins shows, has clear connections with Polanyi’s participatory realism, the unity of knowing and being in tacit integration, and Polanyi’s notion of personal judgment and universal intent in the context of a scientific community.

The first point I emphasize is how, like the medieval realists, Polanyi takes us out of our heads to show how our ideas, concepts and conceptions bring us to reality. Another medieval notion rides together with Mullins’ observations. Thomas Aquinas asked whether or not ideas (i.e., intelligible species) are that which we know or that by which we know. He argued that they are that by which we know, implicitly siding with the medieval realists. Thinkers of the modern era, like the nominalists, primarily saw ideas as that which we know. This nominalist/modern approach deepens the rift between knowing and being and sets the stage for representationalist and objectivist approaches to meaning in language, in which a word stands for an idea in my head and that idea represents the thing “out there.” Polanyi overturns this view by implicitly agreeing with Peirce and Aquinas: ideas and universals are the through—that by which—we experience and understand the world (though we may indeed attempt to shift our focus to the tacit by which and turn it into a focal that which) and those universals are conditioned by a more indeterminate experience of reality.

The second point I emphasize is the notion of an “extended mind” that has become popular in the work of Andy Clark. The idea here is that the mind is part of the physical environment outside the skull. This notion echoes and develops Polanyi’s understanding of how tools and behaviors are dwelt in when one has focal awareness of things in the world.

Ideas are our window into reality and we reach through them, but we also reach through things (muscles, probes, television cameras) to understand and experience reality. When we know something—even when we identify something—our knowing and its being are “always already” (as Heidegger or Merleau-Ponty might say) inextricably intertwined at some level, though not necessarily at the level of one-to-one correspondence between the clues we use to identify the thing and the parts that comprise it. Some correspondence at the level of sentences and facts is required for the concept of truth, but the idea of a strong one-to-one correspondence between knowing and being already presupposes a deep rift that needs to be crossed at the object level.

Polanyi’s epistemontology carries forward the spirit of the early pragmatists who see primary experience as both true to the world that effects us and yet fused together with our conceptions. A tacit integration comes first, and this is fundamentally different than a reversible logical inference. John Dewey adopts William James’ expression: “Experience is ‘double-barreled’ in that it recognizes in its primary integration no division between act and material, subject and object, but contains them both in unanalyzed totality. ‘Thing’ and ‘thought,’ as James says in the same connection, are single-barreled; they refer to products discriminated by reflection out of primary experience.” Similarly, Dewey attacked the presumed distinction between facts and values: “if experience actually presents esthetic and moral traits, then these traits may also be supposed to reach down into nature, and to testify to something that belongs to nature as truly as does the mechanical structure attributed to it in physical science.”

We see Polanyi also making strides in overcoming strong dichotomies between thought and world. But Margitay is right: showing the inextricable fusion of knowing and being, subject and object, value and fact, does not at this point produce an argument for a layered ontology. Margitay, responding to Takaki, does do a good job of showing how this more fine-grained, yet general, interweaving of epistemology
and ontology does not help Polanyi support a hierarchy at the coarse-grained level (M2, 51). Margitay can claim that the epistemontology at work behind the focal thing applies just as easily to cobblestones and planets as it does to living things and minds. So how might this notion support Polanyi’s layered ontology? Polanyi needs both epistemontology and dual control.

From a Polanyian perspective, although the experience and conception of a planet, or any object, is the product of irreducible tacit integration, the conception of a planet is fully explained by the conception of planet parts and physical laws (here is where a reversibility of clues points us to the same ontological level). But according to Polanyi’s notion of dual control, when it comes to living things and machines, the conception of the whole (its Bedeutung) is not reducible to the conception of the parts (Bedeutungen), when those part are conceived simply as objects subject to the laws of physics (here is where irreversibility points to an ontological difference). Add that the focal conception of the machine, organ, or living being reflects our access to an epistemontological reality—and so the meaning (Bedeutung) is not merely (as Kant proposed) a subjective projection or a regulative idea—and we see the idea of dual control as evidence for ontological emergence.

Polanyi needs to show that in some systems, physics is insufficient: we must appeal to higher or different laws in order to show how the Bedeutung of the parts comprise the Bedeutung of the comprehensive entity. In *The Tacit Dimension*, Polanyi brings this intertwining of tacit knowing and being forward in his example of knowing a frog. And the frog will show us why Polanyi’s understanding of dual control holds true.

**Emergence and Dual Control**

By bringing out the epistemontology of Polanyi I hoped to show that Margitay moves too quickly to the idea that ontological emergence has to stand on its own with no help from tacit knowing. Now I want to look at Margitay’s criticisms of Polanyi’s notion of dual control as a ground for a hierarchy of emergent levels. Here I will emphasize that dual control is not the “purely ontological argument” for emergence it appears to be (M1, 134). Purposes, or meanings, are built into the notion of a dual control system so that Polanyi’s ontological layers are infused with meanings that cannot possibly be explained purely in terms of physical and chemical laws.

For Polanyi, emergent entities start with *life* and *machines*. The illustration of dual control shows how the laws of physics and higher order freedoms might be compatible. A machine’s operational principles, says Polanyi, are not reducible to the laws of physics. Living things also maintain an order that allows them to manipulate the boundary conditions of lower levels for their continued functioning. According to Polanyi, the lower order cannot determine the higher order because from the perspective of the lower order one cannot even tell whether the higher level machine or organism is broken or working.

Margitay provides a wonderful example to show a possible weakness here in Polanyi’s thinking. He provides an example of design-like functioning in systems that are, according to Polanyi himself, fully explicable by their parts and the laws of physics. Take the solar system. Margitay says that we here have something machine-like that “has a particular shape, material and arrangement; and, as Polanyi said earlier, no higher principles are needed to determine them” (M1, 135). The physical laws and the initial values of the material constituents are enough “to determine in its entirety the physical structure of the solar system.” But Polanyi, according to Margitay, does not explain “why the physical level can completely determine the physical structure of the solar system but cannot the physical structure of, say, my watch” (M1, 135).

If there is a slippery slope between (on one hand) the solar system and (on the other) a machine or
living system, one might slide either way. One person’s *modus tolens* could be another’s *modus ponens*. Margitay says that if machines are emergent then the solar system must count as emergent, too. It does not, and so machines are not emergent (in the sense of operating by higher principles). But if pressed by Margitay’s argument, Polanyi might take the route of seeing solar systems as comprehensive entities and admit to higher-level organizing principles in some inanimate systems. Hints of this inclination are found towards the end of *Personal Knowledge* where Polanyi speaks of a “generalized field” at work in organizing and developing natural systems (PK, 398). One might take Margitay’s logic seriously and one might come to agree, for instance, with Gregory Bateson, who sees mind as extending into some inanimate systems, as well as organic systems and brains. One might even come to agree with Peirce, who held no strict divide here, but spoke of physical systems and material objects as mind “hidebound with habits.”

Margitay says Polanyi gives no indication of the difference between the solar system and a machine, but as Gulick points out (M2, 14), for Polanyi emergent things are “telic.” A key to seeing that a thing is telic, and therefore emergent, is that there are parameters for what constitute proper development and functioning. For Polanyi, like Gregory Bateson, how semantic *information*, i.e., differences that make a difference, works to order constituent parts is an important clue: life has DNA and a genetic code; machines have purposes ordered by their operational principles. Bateson sees mind extending into nature because he sees “intelligent” knowledge-like behavior there: patterns are maintained by processing information. So Bateson sees standards of correctness in ecological systems, just as Polanyi sees them in machines. He reaches more broadly into nature, seeing there a wider sort of semantic robustness that Polanyi sees only in living organisms and artifacts.

Margitay thus raises an interesting question by emphasizing “knowledge-like” entities as a *sine qua non* of emergence. How deep below, or how far around, the level of human purpose into inanimate nature does emergence go? Peirce goes deeper than Polanyi, Bateson goes wider than Polanyi. Polanyi himself holds the baseline at the biological and artifactual. Margitay suggests emergence begins only at higher stages of mental development, not even at the level of cognition, but at the level of mind and person (M1, 139). Is his ontology too stingy?

But whether or not Margitay’s slippery slope slides emergence further down into nature or propels it further up, I think that Polanyi is right to hold that the lower level laws and initial material conditions would not be enough to determine that the physical structure on Margitay’s wrist is *a watch*. The purposes that make a thing a type of machine are not recognized at the lower level, so some configuration of constituents describable by physics might be there on Margitay’s wrist but it wouldn’t be a watch.

Margitay seems to see a machine as a projection of human meaning rather than an entity integrally comprised of meaning. Polanyi, however, says that nothing is a machine “unless it serves a useful purpose, and living organs and functions are organs and functions only to the extent to which they sustain life. A theory of knowledge based on tacit knowing does not require that we purify science of references to mind or to the finalistic structure of living beings” (*KB*, 157).

But is Margitay right to suggest that the higher ontological level and its laws are fully reducible to the lower levels and their laws when it comes to systems such as machines and biological organisms? The problem here—and all the better for Polanyi’s argument—is that the notion of mechanistic explanation forces together the mechanical and the organic. Could Margitay stick with the reducibility of machines only, his claim might have more rhetorical force, but he implicitly must slide from machines to biological systems, and so Margitay moves to a ground where there is less science and more supposition on his side.

Here is where the understanding of what counts as a reductive account makes a difference. As
philosophers like William Wimsatt who are serious about the study of biology point out, mechanistic accounts of organisms should not encourage any confidence in an ontological reduction. These sorts of explanations do not eliminate the higher level; they rely on its existence, even as they attempt to work out conditions on which it is dependent. Mechanistic explanations provide interlevel and not ontological reductions, and an “[i]nterlevel reductive explanation, successful or not, is never eliminative. Eliminative (interlevel) reduction is a mythic invention reflecting older aims of ontological economy since abandoned.”

The ontological economy “abandoned” here is described by Marjorie Grene as an attempt on the part of logical empiricists to unify science by reducing all phenomena to physics and its laws. The attempt to reduce one theory to another can be a step towards accomplishing this goal. Ultimately, the hope was to reduce all theories—chemical, biological, psychological, etc.—to physics. The supposition was that when a theory was reduced, the ontology was also reduced. There are instances in which intralevel theoretic identities have been established and ontologies, as well as theories, have been reduced. But this “successional reduction,” in which one theory is succeeded by another, is far less common than has been supposed, especially in the realm of biology. To reduce one theory to another, we need to find correspondences that show an identification of one entity with others. But Wimsatt says, “as we proceed we are given not correspondences, but pieces of mechanisms” and the correspondences we can construct turn out to be “richly context-dependent.” In other words, instead of a successional theory and ontological reduction what we find are explanatory mechanisms, or operational principles.

Polanyi uses the notion that the lower level does not contain the concepts of the higher level as a means of showing that the higher level cannot be reduced. Margitay understands this and does something interesting by attempting to show that a reducing theory need not fully capture the concepts of the reduced theory (M1, 137). Margitay believes this weaker conception of reduction is enough to undermine an ontological emergence; it need not be as strong as the reduction of phenomenological to statistical thermodynamics purports to be. To make a bid for ontological reduction, Margitay here shifts to the notion of identification rather than identity. He claims that “a proper identification of something as something by virtue of its parameters” is enough, and “only this is required for ontology” (M2, 54).

Two things to note here are, first, that the concepts and meanings of the higher level are left unreduced and, second, that Margitay takes the picking out of the machine by physical and chemical properties to be an adequate identification of the machine. Margitay is in effect saying that we can identify the machine without recognizing it as the sort of machine it is terms of its meanings. This, of course, is meant in opposition to Polanyi’s claim that the semantic unity and function that constitute the machine itself are invisible at the level of its constituents and their laws (KB, 176).

According to Margitay, industrial standards show us actual instances of our ability to identify machines, which are emergent things for Polanyi, merely in terms of the constituent level of physical and chemical parameters (M1, 138). Margitay might even believe that we can develop industrial standards for identifying and distinguishing working steam engines from broken ones by basing our search parameters on lower level laws and concepts only. To an extent this might be right. But the real question here is whether or not Margitay is illicitly importing the knowledge of the purpose and function of the machine that we gain at the higher level in order to write those parameters into the lower level search. Polanyi points out a similar move when he accuses the behaviorists of illicitly importing the meanings of the behaviors into their studies, which they claimed were purely descriptive: “Behaviourist psychology depends on covertly alluding to mental states which it sets out to eliminate” (KB, 216).

Margitay says, “the lack of concepts is not enough to show the impossibility of identification and to establish ontological difference thereby” (M1, 138). We might agree that he might be very successful in
identifying a machine by these standards, but that does not establish an identity between one level and the other.

By moving to this notion of identification, rather than the establishment of an identity, Margitay is reaffirming an observation he made earlier. As I put it: we can identify an object (*Bedeutung*) via various contexts (or *Sinne*), i.e., we can locate it using different maps with differing degrees of success. But it is still the case that in order to best locate a comprehensive entity on any map we need to have some understanding of what type of thing we are looking for. If we seek to identify a machine, the understanding of what we are looking for, and what lower level features would best identify it, come from the tacit knowledge that allows us to identify it consistently. Polanyi gives us a biological example:

in order that we may formalize the relations that constitute a comprehensive entity, for example, the relations that constitute a frog, this entity, i.e., the frog, must first be identified informally by tacit knowing; and indeed, the meaning of a mathematical theory of the frog lies in its continued bearing on this tacitly known frog (*TD*, 20-21).

Polanyi builds on his frog example when he discusses machines. In the case of machines, operational principles are the better way of formalizing the concepts that tacit knowing secures.

Physics and chemistry … include no knowledge of the operational principles of machines. Hence a complete physical and chemical topography of an object would not tell us whether it is a machine, and if so, how it works, and for what purpose. Physical and chemical investigations of a machine are meaningless, unless undertaken with a bearing on the previously established operational principles of the machine (*TD*, 39; my italics).

The most important question in assessing Margitay’s analysis of dual control systems is whether or not we can get necessary and sufficient conditions from the lower level and its laws alone. Margitay suspects we can, since he is committed to a strong version of the idea that “physics is complete,” but he is conscious of the fact that he does not show that we can. His strategy then becomes an attempt to show that both the functional explanation provided by the engineering principles and the standards provided by chemical and physical parameters are inadequate to the meaning of the machine. One can raise the objection that the “industrial standards” for catching frogs will inevitably miss many frogs. Margitay responds thus: “no explicit description—be it physical or functional—can provide a definition of the class of referents of a linguistic expression in terms of necessary and sufficient conditions. We learned this from Wittgenstein, but Polanyi would hasten to acknowledge it” (*M1*, 138).

We did and he would. But that does not change the fact that the higher level operating principles better catch and display the tacit meaning we recognize in the machine. And the lower level techniques, such as industrial standards, must somehow simulate (or “covertly allude to”) the meanings generated by the higher level concepts. So I disagree with Margitay when he claims that lower level descriptions, uninformed by higher level meanings, could be “just as successful” when it comes to identifying machines (*M1*, 138). I disagree not because industrial standards can never be as successful as functional descriptions, but because they won’t be as successful unless the parameters built into the industrial standards already attempt to simulate the boundaries set by the meanings we receive in advance via a tacit integration to a comprehensive entity. I can become better and better at finding frogs by specifying in more detail frog parts, but it is only in light of *the frog* itself that I come to my physical description of *its* parts.

As Margitay notes, both the functional and the physical parameters can fall short of the goal of finding instantiations of the machine type. As Wittgenstein shows, there is always a way to go wrong. But
the ability to pick out a machine by its lower level material properties does not negate the subservience of the materials to engineering principles that can better specify their proper ordering in the service of a purpose. Tacit meanings dominate both higher/functional and lower/material levels of search, but the higher engineering principles are the true lieutenants; they still stand above and order the foot soldiers so that they may move about in purposive motion.

Gergely Kertész brings a similar objection to Margitay’s criticisms. He claims that the approach via industrial standards misses the unity of the object and the explanation of that unity. In reply, Margitay says that identification is enough and we don’t need “unity and the explanation of unity for an ontology” (M2, 55). I hope I have shown why the sort of identification made possible by industrial standards is inadequate for collapsing ontological distinctions. Such standards rely on search parameters tacitly derived from a higher level of unity. I further hope that my foray into epistemontology shows that a conceptual irreducibility of a thing to its parts should be considered a pro tanto indication of ontological irreducibility. The burden of proof should be on the ontological reductionist in cases where there is no epistemological reduction. Margitay, also in response to Kertész, acknowledges that the irreducibility of a conceptual comprehension can be deployed as an epistemological argument for the emergence of entities. What seems to hold him back from seeing the full force of his own argument here is his commitment to the completeness of physics, which he sees as “inconsistent with the theory of dual control” (M2, 50).

Here Polanyi could cite the specialization of sciences themselves as epistemological evidence for an ontic plurality, if not hierarchy. Polanyi, in effect, does this with dual control by showing how the laws of different fields of investigation build upon each other and are irreducible to laws of physics, though they are not in violation of those laws. The ideal of the unity of science, which promotes a theoretical reduction of all the sciences to physics, and thus requires that the laws of physics be complete in a strong sense, has been seriously called into question as scientific investigation has advanced beyond the armchair assumptions of the positivist. Another reason to expect a disunity is precisely the reliance of different fields of science, motivated by different questions, on idealized models that can be in principle incommensurable. An inability to reduce one field of science to another (e.g., by providing a conceptually adequate explanation of one in terms of the other) should imply that no ontological/metaphysical reduction is possible as well. The conceptual irreducibility of the sciences provides a negative epistemological argument against reduction and for ontological diversity. Steven Horst thus sees a pluralistic ontology legitimately advancing from a “Negative Epistemology-to-Metaphysics Connection” argument. The disunity of the sciences thus calls into question the metaphysical hope that “physics is complete.” The laws of physics are not broken, but neither are they sufficient to explain more complex, or different, emergent phenomena.

**Conclusion**

Polanyi emphasized, at least at times, a strong structural correspondence between knowing and being, perhaps because of the privileged place scientific investigation has in understanding a thing, and perhaps because of lingering analytic assumptions that make an analysis to parts essential for understanding and identifying whole entities. Polanyi, in denying an ontological reduction, does not claim that machines are in explicable; quite the contrary, they are only explicable in terms of the meanings that they have and the operational principles that enact those meanings. And these are not merely meanings given by us, since machines are real in Polanyi’s terms just as organisms are.

The analytic presuppositions that led Polanyi to hope for a strong correspondence between clues and parts may also have pushed Polanyi towards an understanding of ontology as a simple hierarchy, rather than a complex plurality, since parts must be “lower” than wholes, which can form parts of even
“higher” unities. But ontological layering may also be a mistake engendered by too analytic and linear a way of thinking. Marjorie Grene, in “Merleau-Ponty and the Renewal of Ontology,” notes that while Merleau-Ponty’s early work originally displayed an ontology that bore resemblance to Polanyi’s hierarchy, he later moved to a pluralistic ontology, which Grene seems to have preferred to Polanyi’s stratification. She describes Merleau-Ponty’s later ontology as a plurality of “real centers of being” that is less an ascent and more a “multiplicity of forms.”

But the analytic presuppositions of correspondence and hierarchy may be benign and even beneficial taken the right way. The first might go toward understanding a thing better (e.g., the Bedeutung) rather than merely identifying it (via Sinn) and the second might go toward grouping pluralities in a way that shows the general structure of important dependencies.

Margitay brings up interesting and important issues in a thoughtful manner that encourages dialogue, but I can only raise here a few questions: What counts as an explanation in science? Do mechanical explanations count as reductive explanations? In what ways are the laws of physics complete? Is indeterminancy or randomness a real feature of the universe? How deeply does mind or purpose reach into the inanimate? Are there structural realities that emerge through the interactions of things? Is there a reality to scientific laws and theory? To what degree do we participate in the constitution of reality, and how can that be best expressed?

I could go on, but I see by my watch (which looks an awful lot like a smart phone and contains much of my memory) that the time I have to engage Margitay’s ideas is, for now, finished.

Endnotes

1 Tihamér Margitay, “From Epistemology to Ontology: Polanyi’s Arguments for the Layered Ontology” in Tihamér Margitay, ed., Knowing and Being: Perspectives on the Philosophy of Michael Polanyi (Newcastle upon Tyne: Cambridge Scholars Publishing, 2010), 128-140. References to this work are prefixed with “M1.” An exposition of Margitay’s paper can be found in Margitay, “Polanyi’s Ontology from Inside: A Response to my Critics,” TAD, 39:2 (2012-13): 42-58. References to this TAD are prefixed with “M2.”

2 Mihaly Héder also raises this as a problem and Margitay acknowledges the difficulty (M2, 52-53). But, oddly, Margitay still does not quite see how his critics might see him as espousing reductionism (M2, 46). Apczynski says, the notion of dual control was deployed to show the limits of physics, i.e., the limits of a “reductive materialism,” and to allow for domains of freedom, i.e., “human reality and values” (M2, 28). The criticism of dual control at this level and the notion of the completeness of physics that Margitay espouses can efface distinctions that support the notion of emergent ontological levels for knowledge-like entities as well as machines.


4 Walter Gulick, M2, 10-11 and John Apczynski, M2, 27 suggest this strong correspondence is not Polanyi’s, but Marjorie Grene also worried that Polanyi made too strong a correspondence between epistemology and ontology in his TD manuscript. See Phil Mullins, “Scattered Thoughts,” Polanyiana, 19:1-2 (2010): 64. Robert Cohen voices similar worries in “The Tacit, the Social and the Hopeful.” In Interpretations of Life and Mind Essays around the Problem of Reduction, edited by Marjorie Grene (London: Routledge and Kegan Paul, 1971), 38-64.
8Ibid.
11Aquinas shows how the universal is understood as we look back at the concept that we looked through: “…since the intellect reflects upon itself, by such reflection it understands both its own act of intelligence, and the species by which it understands. Thus the intelligible species is that which is understood secondarily; but that which is primarily understood is the object, of which the species is the likeness” (also Article #2).
14Ibid., 5.
15For Kant, the telic structures were merely regulative ideas. See Kant’s *Critique of Judgment* trans. J. H. Bernard (New York: Hafner Press, 1951).
16Here I make a criticism along the lines of David Agler (M2, 22-28) and Gergely Kertész (M2, 16-21).
17It is interesting that for Polanyi scientific laws are also emergent realities; they are real by his definition just as universals are real. While Margitay sees knowledge-like unities in the *personal*, the laws of science and natural kinds would seem to bring it into the *natural* as well.
18Gulick provides the response that solar systems are *not telic*, and belong to inanimate nature for Polanyi, i.e. what Gulick describes as the “dynamo-physical world” (M2, 11). Designed entities and organism are, in contrast, telic. Gulick makes a further distinction in ontological levels between the “biological world” and the “human world.” This tri-part general ordering of emergence fits nicely with a Polanyian scheme, in which inanimate things, living things, and persons have important and real gaps between them. But the genius of including machines together with living organisms can blur any sharp distinction between the meanings we generate in the human world and those found in nature. This does not dispose of Gulick’s hierarchy, but speaks of areas of important overlap. The meanings we come to in the long run, in response to the “hardness” of the world, as C.S. Peirce might say, would be the human meanings with the greatest ontological charge.
19See Bateson, *Mind and Nature* (New York: Bantam Books, 1980). Bateson did, however, limit the use of “mind” to systems that include living things. He develops a definition of mind that makes precise, but diverges somewhat, from what we ordinarily mean by mind (see page 102) but this definition does not seem to preclude the possibility of inanimate minds.
22Ibid., 457..
23Marjorie Grene, “Reducibility: Another Side Issue?” In *Interpretations of Life and Mind*, edited by Marjorie Grene (London: Routledge and Kegan Paul, 1971), 27-28. Gulick, in criticizing Margitay’s conception of the completeness of physics, also points out that this idea is part of a reductionist, objectivist program that Polanyi and others have “successfully questioned” (M2, 14).
25In my “Rethinking the Machine,” I show how eliminative reductionists illicitly commandeer mechanistic interlevel reductions—miscaling them as successional reductions—in the service of promoting an unfounded ontological reduction that purportedly eliminates certain “folk” concepts (18).
There are problems even with this poster child of reduction, as Takaki (M2, 37) points out and Margitay acknowledges (M2, 52). See also Steven Horst, *Beyond Reductionism: Philosophy of Mind and Post-Reductionist Philosophy of Science* (Oxford University Press, New York, 2007), 51.

“We can identify tangible manifestations of mental processes only by first recognizing the mind at work in them…without reference to mind, these particulars observed in themselves, would become meaningless…the actual practice of behaviourist experimental psychology is rescued from this fate by tacitly relying on the mental interpretation of its observations, which are then translated into objectivist language” (*KB*, 169).


According to Grene, for Polanyi to say that “physics is complete” means that physics sets necessary conditions. Polanyi’s contention that reality is indeterminate also implies that reality cannot be sufficiently determined by physics. Ibid.

Margitay strengthens Kertész’s argument and goes on to say, “if we can conceptually comprehend a machine type as part of our ontology, then we can treat it only as an emergent entity in the lack of a complete inter-theoretic reduction of the machine type to its physical-chemical particulars. And since we do not possess such inter-theoretic reduction and still can comprehend machines as part of our ontology, therefore, they are emergent entities” (56).


Ibid., 103.

See Lowney, “Rethinking the Machine,” 187, for a discussion about why this natural conclusion is resisted.


See Horst, Ibid., 101-109, on the “Thesis of Causal Closure” and presumptions of determinism. Moreover, one does not even have to challenge the TCC to get distinct ontological levels. The thesis is also satisfied with a “deterministic ‘downward causation’ that is underdetermined by strictly physical laws” (109).


Ibid., 607 and 609.
Without Reductionism: A Reply to Lowney

Tihamér Margitay

Key Words: dual control, emergence, completeness of physical theories, causal closure of the physical, downward causation, layered ontology, Michael Polanyi, Charles Lowney.

ABSTRACT
My arguments against Polanyi’s notions of a layered ontology and dual control of entities were introduced in Margitay 2010 and defended against criticism in Margitay 2013. However, it has become clear from Lowney’s and earlier comments that my presentations were not sufficiently clear. So I will explicate some points of my argument against dual control. First, I will contrast the metaphysical thesis of The Causal Closure of the Physical with the semi-empirical thesis I hold, The Completeness of Physical Theories. I have argued that Polanyi’s theory of dual control involving downward determination is inconsistent with standard physics because of the completeness of physical theories. I support this claim by what I term the no difference and the completeness counterarguments. Secondly, I shall show these arguments do not involve or entail any sort of reductionism, and they do not question the ontological autonomy, the reality, and the irreducibility of higher level emergent entities and their properties.

I thank Charles Lowney for his intriguing and detailed comments (in this issue which I will cite by page numbers in parentheses). They shed fresh light on many issues. The discussions by Lowney and other commentators in Tradition and Discovery (TAD 39:2) reveal a gross misunderstanding of my position. I discussed and criticized three of Polanyi’s arguments for a layered ontology (Margitay 2010, 2013): the argument from the Correspondence Thesis, from dual control, and from identification. All three have the objective of establishing a multilevel ontological hierarchy on the basis of the characteristics of our knowledge. My attack on dual control, however, elicited the fiercest response and greatest misunderstanding, so in this abbreviated reply to Lowney, I will focus on clarifying some points in this reasoning to dispel the charge of reductionism.

I offered an internal criticism of Polanyi’s stance, not an external one from a reductionist point of view. Yet all my commentators except Kertész (2013) interpreted my position as criticizing Polanyi from a reductionist-objectivist stance (Lowney, 25-26). I was astonished, for I accept neither scientific nor epistemological/ontological reductionism. I attributed this misunderstanding to the objectivist ontological language I adopted from Polanyi’s Correspondence Thesis. Thanks to Lowney’s thoughtful comments and to helpful personal discussions with Walter Gulick, Mihály Héder, and Gergő Kertész I now see this attribution was incomplete. The thesis of the completeness of physics is also responsible for the misunderstanding.

Probably my critics attribute more ontological content, on the basis of the popular metaphysical notion of completeness, to my understanding of the completeness of physics than I intend. To answer Lowney’s comments regarding dual control (and space does not permit commenting on his other points) and to rectify misunderstandings, I will first distinguish two distinct notions of completeness. Second, I will recast my critique of Polanyi’s argument for dual control to show that my notion of completeness does not presuppose the metaphysical completeness principle or any sort of reductionism. Finally, the philosophical roots that generate the internal inconsistency in Polanyi’s argument will be pointed out.
Causal Closure and the Completeness of Physical Theories

The metaphysical thesis that most of my critics assumed I hold is the Thesis of Causal Closure. A simple formulation is the following (see Robb and Heil 2013):

**Causal Closure of the Physical (CC):** Every physical effect has a sufficient physical cause.

It is often called the thesis of the (causal) completeness of the physical. It is to be distinguished from my thesis of the Completeness of Physical Theories (see below).

According to CC, only physical causes can produce physical effects; non-physical causes cannot bring about physical changes in the world. Physics by itself can give a full causal explanation for any physical effect and in this sense is complete. CC presupposes deterministic causal relations; however, it can also be formulated in a way that permits probabilistic causal effects.

While CC need not exclude non-physical causes, they are superfluous. For instance, mental causes would seem to be ad hoc additions to the effective physical causes that are needed to make bodily changes. Many would add that if something does not have causal power and cannot make any difference in the physical world, then it does not have the real existence that physical objects have. So CC is a very strong ontological thesis, and it easily leads to the physicalist thesis that everything is physical or can be reduced to physical objects and parameters.

What I mean by the completeness of physics has much weaker ontological implications.

**Completeness of Physical Theories (CP):** Physical theories are complete in the sense that, for all physical properties of a system in the intended applications of a physical theory (and only in this domain), physical laws and their input parameters account for (i.e., determine and explain) all the subsequent physical parameters of a system. In short, physical theories are complete in the sense that they determine (precisely or in terms of a probability distribution) every physical state and property of a physical system within the domain of their application.

CP is a modest claim about the theories of physics as they are understood and used in the practice of physicists. It is a direct consequence of the logical and epistemological structure of physical theories. Physical theories describe the temporal development of a particular type of physical system from a particular point of view. The particular viewpoint is captured by a certain set of physical parameters. The value of these parameters gives a full description of the physical state of a system (from the selected viewpoint). Given that physical laws are universal statements, they determine all the future parameters of all the systems in the domain of their intended application. CP says that laws should account for all the physical parameters of all the systems the theory is meant to cover. If a physical theory in which laws are universal statements is epistemologically true in the domain of its intended application, then it must be complete in the above sense.

The word “determinism” is a dangerous one in Polanyian circles (and probably in all discussions of emergence). It can easily trigger the vision of Laplace’s Demon and associate my position with undesired philosophical doctrines such as CC. Determination in CP means that, given an initial state, any later state of the physical system logically (mathematically) follows from the laws of physics and their input parameters. Note that determinism as used in this paper does not presuppose that a particular form of causality
must prevail in all ontological domains. In this way, CP differs from CC. It is important to emphasize also that CP and my arguments presuppose the logical determination only within the domain of application of physical theories, and I think most Polanyians affirm the validity of physical laws in determining how the physical state of a thing changes once initial conditions are established.

CP should be seen as a semi-empirical rather than a metaphysical claim. It describes how scientists and engineers carry out their calculations within the domain of proper application.

**Physicalism and Reductionism in CC and CP**

While CP is a relatively modest claim about the properties of physical laws in their domain of intended application, CC is a bold general metaphysical claim. CC presupposes the truth of CP but not vice versa. CP must be augmented with three further claims to support CC:

1. Laws of physics are causal laws expressing causal relations.
2. All input parameters of laws must themselves ultimately be physical parameters.
3. Laws of physics apply universally to all domains.

The first claim is compatible with the practice of physicists insofar as fundamental forces and Newtonian mechanics are concerned. It is less clear that other laws of physics (e.g., the gas laws) should be interpreted as causal laws. In any case, (1) involves a substantial ontological commitment that goes far beyond the logical-epistemological requirements from which CP is derived. Moreover, (1) prioritizes efficient causality and excludes other sorts of causality if they are not compatible with universal physical laws.

Whether the second claim is true is a matter of empirical fact. It is a contingent fact that as to whether non-physical properties (e.g., the mental properties of an observer) do not affect the physical properties of a system. In principle, some physical theories may admit non-physical forces. The dynamical equations of Newtonian mechanics can have non-mechanical parameters (e.g., Coulomb forces) and could admit non-physical parameters like mental forces to determine the mechanical parameters of a system. Newtonian mechanics sets no constraints on what kinds of forces exist.

Now CP together with (1) and (2) results in a restricted version of CC—Causal Closure restricted to the domain of intended application of physical laws. The addition of claim (3) brings us to the general and very problematic thesis of CC. Some would make this third step on the basis of faith that a grand unified theory of all the physical forces can be attained which would be universally true. However, CP and my arguments do not require the attainment of such an ambitious and speculative achievement. While some argue from CP as a premise for the Causal Closure of the Physical and for physicalism (cf. Melnyk 2003 and Papineau 2000), I view any reach beyond CP as unwarranted and unnecessary.

It is a recurrent theme of my critics that I am a reductionist because of adopting CP (see see Lowney 2013, Gulick 2013, and Héder 2013). In the context of Polanyi’s notion of dual control by different types of laws, reduction would amount to some sort of inter-theoretic relation by which higher level laws can be reduced to lower level laws. I reject the view that satisfactory inter-theoretic reduction can be achieved in all cases. I side with those who have serious reservations with even paradigm examples of inter-theoretic reduction like the reduction of phenomenological thermodynamics to statistical physics. CP does not require ontological or inter-theoretic reduction. Moreover, CP does not entail ontological reductionism (contrary to CC) or inter-theoretic reduction. Both forms of reductionism involve a relation between physical objects and properties and prime facie non-physical objects and properties, saying that the latter can be reduced to the former. Note, however, that the thesis of the Completeness of Physical Theories...
does not refer to anything else but to physical objects and properties.

It says nothing about whether there are non-physical entities and properties and if yes, how they are determined. Obviously, the claim that Newtonian mechanics determines the dynamical properties of the billiard balls on a table—position and momentum, etc.—does not entail that their many other properties such as their color are also determined by Newtonian mechanics. In sum, CP is not a reductionist thesis about the structure of the world either inside or outside of physics.

**Polanyi’s Argument from Dual Control**

It is Polanyi himself who, like other emergentists, places emergent systems within the domain of the intended application of physical theories. According to the theory of dual control, every emergent entity is also a physical entity to which the laws of physics apply. Machines, living organisms, human beings, and cultural entities are the main categories of emergent entities for Polanyi. Their behavior is controlled by both lower level natural laws including those of physics and higher level laws often called operational principles. For the sake of simplicity, let us discuss only machines in detail.

Operational principles define the purpose of a machine and its function-supporting structure that realizes the purpose; they specify how parts fulfill their special function in combining to an overall operation which achieves the purpose of the machine. For example, a watch “is kept going by its mainspring, uncoiling under the control of the hair spring and balance wheel; this turns the hands which tell the time. Such are the operational principles of a watch, which define its construction and working. The principles cannot be defined by the laws of nature” (*KB* 153). The purpose of a watch is to tell time. As to the relationship between the higher and lower levels, “each higher level principle controls the boundary left indeterminate by the next lower level” (*TD* 49) and “it is impossible to represent the organizing principles of a higher level by the laws governing its isolated particulars” (*TD* 36) on the lower level. Machines are subject to the laws of physics:

Thus a machine can be described as a particular configuration of solids... [A] particular specimen of a machine is characterized by the nature of its materials, by the shape of its parts and their mutual arrangement, which can be defined by the boundary conditions of the system. ... [T]he laws of physics and chemistry are equally valid for all solids, whatever their materials and shapes, and the boundary conditions determining their arrangement. From which it follows that neither the materials... nor their arrangement, can be derived from physics and chemistry” (*KB* 175).

From texts like these (see also *PK* 348), Polanyi’s argument can be reconstructed in terms of the following premisses:

1. Lower level (physical and chemical) laws are not fully able to determine the properties or control the behavior of higher level (emergent) entities.
2. Higher level laws/principles are necessary to do this, and they do it by making use of boundary conditions.
3. Higher level laws/principles and their concepts are irreducible to lower level laws and concepts.
4. Therefore, these entities are ontologically emergent entities, and their properties controlled by the higher level laws/principles are emergent properties.
The Critique of Polanyi’s Argument without Reduction

My counterarguments proceed from the following question: How is such dual control possible from the point of view of *physics*? Is it compatible with standard physics? My conclusion will be that standard physics is incompatible with the role it is supposed to play in dual control. The conflict arises from that both laws of physics and operational principles are going to determine the same type of physical parameters.

Higher level operational principles governing emergent machines determine two types of physical parameters. On the one hand, the constituent parts of a machine and its structures, like the properties, shape and arrangement of its parts (e.g., the shape of the balance wheel and the coefficient of elasticity of the hair spring), will be determined by an operational principle. On the other hand, the operational principle must establish and control the dynamic processes that fulfill the functions of the machine (e.g., the rate of rotation of the hands of the watch). What is true of machines would appear to be true of all emergent entities, including human beings, since all realize their higher level role via physical changes. Living organisms feed and reproduce by bringing about physical changes inside and outside their bodies. So higher level laws (including operational principles) of necessity determine structural and functional physical parameters the determination of which is the competence of physics.

Two Counterarguments to Dual Control

Thus Polanyi’s higher level laws are claimed to be able to determine some of the physical properties of machines and other emergent entities according to premise (2) above. That is, Polanyi thinks operational principles exhibit downward determination. Moreover, premise (1) asserts that the laws of physics cannot account for all the physical properties and behaviors of an emergent entity—at least not for the physical parameters that are controlled by higher level laws. I will challenge premise (1) by what I term the counterargument of no difference, and I will counter premise (2) with the notion of completeness articulated in CP.

So Polanyi’s argument presupposes that laws of physics together with their input parameters cannot define certain physical parameters of emergent entities. This claim is highly dubious. Its problematic nature is revealed when we consider the physical similarity between the rotation of the Earth and the rotation of the hands of a watch. Emergent entities (watches) are also physical entities with physical parameters. Higher level laws determine certain physical parameters of emergent entities (the rotation of the hands). Polanyi’s theory of dual control assumes that these physical parameters of emergent entities cannot be fully determined by physics. However, standard physics *can* determine the same type of physical parameters of non-emergent entities (the rotation of the Earth), and there is no *physical* difference between the physical parameters of emergent and non-emergent entities according to standard physics (both are rotation with certain rotation rates). Therefore, standard physics *should be able to* determine the physical parameters in both cases: just as it can determine the rotation rate of the Earth, it should be able to determine the rotation rate of hands. Consequently Polanyi’s theory of dual control is inconsistent with standard physics.

It could be objected that a watch is not only a physical object but also a machine, and as a machine it falls also within the domain of intended application of higher level laws. But this reply misses the point. What should be proved is that the motion of the hands of the watch does not lie in the domain of the application of physics, and not that their motion is subject to other laws as well. But since Polanyi recognizes that a watch is a physical object, almost by definition the *physical* properties and behavior of the watch are subject to the laws of physics.

Lowney (2013, 24) in agreement with Gulick points out that machines and organisms are telic entities,
whereas planets are not. However, this rejoinder misses the point in the same way the previous reply did. It shows only that that one set of physical properties (the higher level) has an emergent property (being telic) that is missing in the case of the lower level physical properties. But we are not told why one physical set of properties can be fully determined (given initial conditions) by physics while the other cannot.

By now it should be clear that the no difference argument involves no reduction in any sense. It includes claims only about physical parameters of systems and makes no reference to non-physical properties that could or should be reduced to physical ones.

Now let us turn to my second argument, to the argument from CP. In brief, it runs like this. Physical theories are complete in standard physics, that is, physical laws and their input parameters describing an emergent entity qua physical object determine all the physical parameters of that entity. Therefore higher level laws cannot determine physical parameters of emergent entities (save the cases in which they are redundant). According to the theory of dual control, higher level laws should determine some of the physical parameters of an emergent entity. Therefore standard physics is inconsistent with the theory of dual control in which higher level laws are physically efficacious.

The point of this argument is that the completeness of physical theories excludes that higher laws be physically efficacious. CP rules out the possibility of downward determination in dual control. Higher level laws cannot determine, account for and explain physical parameters. Operational principles, for example, cannot determine the shape and material structure of the parts of machines and their mutual arrangement, their motion, electric properties, etc. Biological laws cannot determine the motion of organisms—the physical processes of their digestion, reproduction, etc.—because all involve some physical parameters that have already been determined by physics.

Of course higher level laws may stand formally in a determinative relation with physical parameters, but this determination is only epiphenomenal on physical determination. My argument does not exclude the possibility that higher level laws and their inputs determine non-physical properties, such as the purpose of the motion of the hands of a watch, the function of the balance wheel, or the cultural significance of keeping time. Thus the argument from CP does not involve reductionism. It does not question the ontological autonomy, the reality, or the irreducibility of higher level emergent entities. But it does entail that these higher level laws cannot explain changes in physical parameters because that explanation is reserved to physics—at least if standard physics is applied on the lowest level.

The laws of physics can determine the physical state of a system only together with initial conditions. It might be argued that an engineer designing a watch is establishing the initial conditions for the mechanical keeping of time. But of course the production of a watch is itself conditioned by prior physical conditions. The first point where some initial states are left indeterminate is at the moment of the Big Bang. It is a misleading epistemic abstraction to think that there can be isolated physical systems immune from previous determination by the laws of physics.

**Conclusion**

Theorists of emergence would like to satisfy two demands. On the one hand, they would like to retain our well-established and highly successful physical theories and laws to describe the physical aspects of our world. On the other hand, they would like to build a complex ontology that is much more complex than physics provides us and that satisfies our philosophical concerns for meaning and purpose while being compatible with physics. The conclusion of this paper is that both demands cannot be satisfied at the same time. A completely new logical structure and epistemology of physics would be necessary to resolve the
incompatibility between physics and physically efficacious higher levels. Polanyi’s theory of dual control is a noble but unsatisfactory attempt to articulate how such a complex ontology might be envisioned.

Endnotes

1An intense correspondence with Walter Gulick and a discussion with Mihály Héder helped me to explicate my position with more clarity. I am especially grateful for Walt’s benevolent, though passionate, criticism and his friendly encouragement.

2It is a contingent fact if CC or physicalism is not presupposed. If either is presupposed, then CP plus (1) and (2) cannot be used to argue for CC without begging the question.

References

The articles by Gulick, Héder, Kertész, and Margitay which are cited are in TAD 39:2 (2013). The TAD article by Lowney which is cited is in this issue, TAD 40:1(2013).


After the Relational Turn: Recent Studies in Personhood

Andrew Grosso

Key words: personhood, human nature, selfhood, Christian Smith

ABSTRACT

This brief article provides a critical review of several recent interdisciplinary studies of human nature, personhood, and the self (with particular attention given to the work of Christian Smith) and offers some tentative suggestions as to how those interested in the thought of Michael Polanyi might contribute to this area of on-going inquiry and reflection.

Ten years ago, F. LeRon Shults documented the “turn to relationality” in late modern Western philosophy and science and examined the consequences of this turn for our understanding of human nature (Shults 2003). He identified a number of “reconstructive opportunities” that have emerged in the wake of this development and laid out how these opportunities afforded new perspectives on familiar problems (Shults 2003, 164). He also sought to demonstrate that the turn to relationality had important implications not only for the content of the intellective enterprise but for its practice as well: the relational turn, he argued, encouraged a rethinking of precisely which strategies and habits are most effective for providing students with opportunities for “transformational learning” (Shults 2003, 61-76).

Since that time, the question of personhood has continued to occupy many working not only in the areas of philosophy and science but in pretty much every area of formal inquiry. The purpose of this brief essay is to examine several more recent efforts that demonstrate the abiding influence of the “turn to relationality” on contemporary studies of personhood. First, I will summarize the research contained in two interdisciplinary anthologies. Second, I will review Christian Smith’s more integrative attempts to employ the concept of the person as the foundation for a constructive research program. Finally, I will offer some cursory suggestions as to how those interested in the thought of Michael Polanyi might contribute to the further study of personhood.

In Rethinking Human Nature (2011), Malcolm Jeeves presents a series of papers first discussed at a conference sponsored by the Pontifical Academy of Sciences. The purpose of the conference was to bring together scholars from a range of disciplines to consider the question, “What is our real knowledge about the human being?” These studies explore personhood from historical, philosophical, scientific, archaeological, and theological perspectives, and together provide a very informative and erudite summary of the state of the question.

The two essays in the first section examine the question of personhood from a historical perspective. Felipe Fernández-Armesto suggests that “mutual recognition” provides a more stable and “elastic” foundation for securing human rights than do functionalist anthropologies, but also highlights how tenuous communities of mutual recognition can be (11-29). Fernando Vidal analyzes modern expectations of the relationship between the material and immaterial dimensions of human experience, and suggests that controversies about human nature and identity are often symptomatic of deeper “aspirations and anxieties” having to do with our seemingly intractable inability to live up to our own ideals (30-57).

The second section includes three essays of a more philosophical bent. Jürgen Mittelstrass examines the on-going quest for a “rational” ethic, one that is both “normative” and “universal,” and compares and
contrasts what he describes as anthropocentric, pathocentric, biocentric, and physiocentric approaches to this project (61-69). Evandro Agassi suggests the proliferation of specialized studies in the empirical and human sciences represents both an opportunity and a challenge inasmuch as it provides us with a wealth of perspectives to the question of personhood even as it raises the question of how to integrate or reconcile these perspectives (71-81). Franco Ciareghin considers whether or not aesthetics affords a particularly incisive approach to the question of human nature and identity, and proposes the “production” of art much more so than its “evaluation” gives us an especially important clue to this question (82-104).

Like the collection as a whole, the section dedicated to studies from the sciences adopts an avowedly interdisciplinary perspective, and includes insights gleaned from genetics, evolutionary theory, neuropsychology, sociology, and archaeology. Graeme Finlay provides a very thorough and detailed introduction to contemporary genetic theory but in the end judges that genetics is not able to provide a comprehensive account of human nature (107-148). Similarly, R.J. Berry reviews a number of evolutionary theories (both pre-modern and modern) but likewise concludes natural selection is ultimately incapable of accounting for the full range of the human experience (149-175). Jeeves himself examines recent studies in neuropsychology and argues nonreductive physicalism does a better job of accounting for the correspondence between mind and brain than can either dualism or monism (176-205). David Myers notes that any account of human nature must include some consideration of the social dimensions of human identity and experience, and outlines some of the more important forms of social attachment (206-223). Alison Brooks draws on archaeology and paleontology in order to highlight the difficulties involved in efforts to clarify human distinctiveness by way of morphology (227-268).

Finally, Joel Green and Janet Martin Soskice offer two theological reflections on human identity. Green bears down in a more focused and extensive manner on a problem that crops up in several of the earlier essays, namely, the doctrine of the imago Dei. Although he appreciates the contributions of other disciplines, he resolutely grounds his account of human distinctiveness in the doctrine of the incarnation and suggests christology provides the most stable foundation for any consideration of not only the doctrine of the imago Dei but any comprehensive account of human identity (271-294). Martin Soskice extends this line of thinking by way of her analysis of the way the doctrine of the imago Dei bears on gender, and like Green suggests the concept of human nature signifies an eschatological reality (295-306).

Taken together, the essays in Rethinking Human Nature provide a far-reaching introduction to many of the issues and problems associated with the contemporary study of personhood and human nature. Despite the variety of perspectives, the essays all seem to move more or less in the same direction, and the reader is left with an appreciation of both the complexities of the subject as well as a nascent awareness of the need to integrate the various perspectives in a cohesive and comprehensive manner.

As does Jeeves, J. Wentzel van Huyssteen and Erik Wiebe bring together an impressive range of interdisciplinary studies in their anthology, In Search of Self (2011). In some ways, the essays in this volume are a bit more focused than those in the collection edited by Jeeves: most of the contributors demonstrate a particular concern for questions having to do with selfhood and identity. However, because several of the authors come to radically different conclusions about the nature, origin, and dynamics of the self the overall effect of this volume is not as unified or cohesive as is Jeeves’s Rethinking Human Nature.

Unlike Jeeves, who organizes the essays in his volume according to various disciplinary approaches to the question of personhood, van Huyssteen and Wiebe organize the essays in their volume around larger questions pertaining to the self. The first section includes studies that explore the origins of the self, the second essays that examine the relative integrity of the self, the third investigations into the concept and experience of self-identity, and the fourth essays that describe the emergent character of the self. Again,
although this strategy provides the reader with an expansive survey of current research, the differences between the various essays make it difficult to reconcile them to one another.

The five essays in the first section draw on evolutionary theory, neuroscience, morphology, and linguistics in their attempts to identify the origins of the self. Ian Tattersall examines the emergence of language and its effects on the evolutionary history of the species (33-49). Ian Hodder elucidates the connections between the self, the community, and material culture by drawing on insights from archaeology (50-69). Barbara King tackles the problem of the similarities and differences between humans and other animals (70-82). Eric Bergemann, et al., explore the boundaries between neuroscience and spirituality and propose the self is nothing more than a “cortically mediated and culturally sanctioned illusion” (83-103). Emma Cohen and Justin Barrett seek to ground their account of the self in a developmental schema that accounts for both nature and nurture (104-122).

The second and third sections of *In Search of Self* explore territory that does not receive much attention in Jeeves’s *Rethinking Human Nature*, namely, the integrity of the self in the face of the threat of fragmentation. Léon Turner suggests the “pluralization” of the self, far from being maladaptive, is in some instances not only understandable but necessary (125-140). Pamela Cooper-White rejects both strict singularity and strict multiplicity in favor of a “braided” understanding of the self (141-162). Hetty Zock presents Hubert Hermans’s theory of the “dialogical” self as one that accommodates the experience of an integrated “true self” while also resisting “monological closure” (163-181). Helene Tallon Russell and Marjorie Hewitt Suchocki provide readings of both Kierkegaard and Whitehead that highlight the inevitable multiplicity of the self (182-197). Maxine Sheets-Johnstone finds a certain consistency between Husserl’s understanding of temporality and Buddhist meditative practice, but also notes these two perspectives offer different judgments with regard to the perdurance of the self (198-219).

In the third section, the perspective shifts towards more phenomenological accounts of the experience of the self. Calvin Schrag revisits Kant’s account of the “transcendental unity of apperception” and then examines how the “hermeneutical turn” and the “historical turn” in Western thought both contributed to the emergence of a different understanding of the self (223-242). Jennifer Thweatt-Bates draws on the work of Katherine Hayles, Andy Clark, and David Chalmers in an attempt to elucidate a cybernetic, “posthuman” account of the self (243-255). Jan-Olav Henriksen considers the apprehension of the self within the context of the experience of desire and love as expressed both between human beings and between the human and the divine (256-272). João Biehl presents a chilling case study that illustrates what can happen when the self is subjected to “pharmaceuticalization” and the person is transformed into the “material and means of a continual process of experimentation” (273-298).

Finally, the fourth section takes up the question of emergence and the dynamics associated with the manifestation and perdurance of the self. Catherine Keller sketches a theological approach to the problem and draws on pneumatology, ecclesiology, and eschatology in an effort to provide an account of the self that accommodates “cooperative autopoiesis” and “infinite unfolding” (301-318). James Haag, Terrence Deacon, and Jay Ogilvy reject what they regard as the false dichotomy of eliminativist or existentialist accounts of meaning and provide an alternative account of teleology, agency, and subjectivity (319-337). Roger Scruton, moving in a rather different direction, grapples with the challenge of neurobiology and ends up suggesting the “self-conscious subject is in principle unobservable to science” (338-356). Finally, Philip Rolnick draws on twentieth-century studies in mathematics and physics in his exploration of an account of knowledge and agency that avoids both determinism and nihilism (357-374).

Most of the essays in *In Search of Self* make a more determined effort to engage distinctly religious and theological concerns than do some of those in *Rethinking Human Nature*. Many of the contributors
to the former are anxious to explore the possibility of reformulating traditional doctrines in a manner they expect is necessary given contemporary research and sensibilities. Unfortunately, several proffer arguments that are unnecessarily tendentious. Others, however, provide insights and perspectives that are potentially much more fruitful; the essays by Zock, Russell and Hewitt Suchocki, Schrag, Henriksen, Scruton, and Rolnick are especially noteworthy in this regard.

One topic that (surprisingly) does not receive more attention in either *Rethinking Human Nature* or *In Search of Self* is the practice of medical ethics in light of contemporary accounts of human nature. Biehl’s contribution to *In Search of Self* is the only essay to take up this problem in an extended manner, but the conclusions he draws from his analysis of the hazards of “pharmaceuticalization” may not readily transpose to questions pertaining to abortion, reproductive technologies, stem cell research, or cloning. Kevin Corcoran’s *Rethinking Human Nature* (2006) is thus a helpful supplement to the essays in these two volumes, not only because he includes some consideration of each of these issues but also because his nonreductive physicalism represents another effort (like those in the collection edited by van Huyssteen and Wiebe) to wrestle with the theological implications of contemporary philosophical and scientific accounts of human nature.

What neither Jeeves’s *Rethinking Human Nature* nor van Huyssteen’s and Wiebe’s *In Search of Self* ultimately manage to do (or even, it should be said, set out to do) is integrate the considerable variety of perspectives they each employ to analyze human nature, the self, and personhood. Thus, one of the clearest things to emerge from both volumes is the need for an interdisciplinary strategy capable of coordinating the many opportunities for additional study and reflection in a comprehensive, integrated conceptual horizon.

Enter Christian Smith: for the last several years, the Notre Dame sociologist has been engaged in the development of a research program organized around the concept of the person and aimed at reforming the way sociology is both practiced and taught. His first draft of this program appeared in his *Moral, Believing Animals* (2003), and he has more recently presented an elaborated version in his *What is a Person?* (2010).

In *Moral, Believing Animals*, Smith appropriates insights from late modern moral philosophy and epistemology to address sociological problems and questions (not the least of which is the way sociology itself is conceived). First, he argues that purposive human action is always embedded in a horizon of meaning and value, and that social and cultural institutions are organized around (indeed, as) morally structured principles and purposes (7-43). Second, he argues we must include in any account of knowledge a willingness to accept the determinative influence of the fundamental assumptions that shape our worldview(s), assumptions that are neither self-evident nor universal (45-61). This leads, third, to a narrative account of culture, identity, and the negotiation of pluralism; not only are we animals who make stories, we are animals who are made by the stories we make (63-94). Smith then considers, fourth, the place of religious belief in the creation and perpetuation of culture, which leads him to suggest that contemporary sociological treatments of religious faith and practice are somewhat lacking (95-123). Finally, he examines several sociological attempts to account for human motivation and action (Bourdieu, Swidler, Shusdon, et al.) and finds them wanting because of their tendency to collapse motivation and action into some other category (125-145). After all is said and done, Smith suggests, the “most adequate approach to theorizing human culture and social life must be a normative one that conceives of humans as moral, believing, narrating animals and human social life as constituted by moral orders that define and direct social action” (147-148).

Smith’s *What is a Person?* further elaborates all of these themes and then some. The broad contours of both works are quite similar: they each open with an identification of primary sources and fundamental commitments, include critical analysis of trends in contemporary sociology, argue for the primacy of persons
(i.e., their motives and purposive actions) as the key to understanding social and cultural dynamics, and
devote significant attention to related moral and ethical questions. What distinguishes What is a Person? from Moral, Believing Animals is the level of detail and sophistication of Smith’s arguments.

The first two chapters of What is a Person? are taken up with introducing Smith’s primary arguments and identifying his principal resources. One of his overarching concerns has to do with recovering an appreciation for the complexity of persons and their experience. He decries the various forms of reductionism that influence late modern thought and devotes a significant amount of attention to exploring the dynamics of emergence (25-42). He then further complicates things by presenting a veritable laundry list of the parameters and capacities that characterize human experience and behavior, all of which need to be taken into account in any comprehensive attempt to describe human nature and identity (43-59). In light of all these complex, emergent capacities, Smith suggests we should think of the person as a “conscious, reflexive, embodied, self-transcending center of subjective experience, durable identity, moral commitment, and social communication who … exercises complex capacities for agency and intersubjectivity in order to develop and sustain his or her own incommunicable self in loving relationships” with other persons and with the world (61; cf. 73-75). The rest of the book is to some degree nothing other than an exploration of the ramifications of this definition.

Critical realism, personalism, and phenomenology are the principal theoretical resources Smith uses to make his arguments. The first Smith sees as an alternative to (on the one hand) “positivist empiricist” reductionism and (on the other) “constructivism, postmodernism, and certain versions of the hermeneutical perspective” (92; cf. 198). The second, he admits, is a term that refers to a “broad philosophical school of thought” that does not admit to easy generalization but nonetheless offers a viable alternative to various late modern accounts of human nature and identity, including individualism, collectivism, and materialism (98-104). By the third he chiefly means the post-critical perspectives developed by Charles Taylor, Michael Polanyi, and others who have sought to move beyond the vacuity of modern objectivism and reductionism (104-115; cf. 207-220).

With these tools in hand, Smith turns to the task of critically analyzing various trends in contemporary sociology he believes undermine the possibility of properly understanding social behavior and interactions. He distinguishes between “weak” and “strong” forms of social construction, and suggests the former “need some maintenance” but the latter are “simply bankrupt” (134). Strong constructionism is ultimately self-stultifying but managed to take hold in late modern thought because “conditions were ripe in the last decades of the twentieth century for many people in particular knowledge class positions to want to believe it” (147). Structuralist accounts of experience, knowledge, and language were distilled through the intellectual frustration and pessimism that followed the collapse of existentialism, resulting in diminished and jaundiced accounts of human identity and experience (149-157). Smith readily acknowledges the reality of social construction, but contends knowledge and language should be seen less as a “confining prison” and more as an “enabling medium” whereby we make contact with reality (171-173). The reality of social construction may mean we have no “objective, indubitable, absolute, general, positive knowledge,” but we can have personal, engaged, responsible, skillful, and purposeful knowledge (179-184; cf. 217-218).

Following this more general critique, Smith turns to an analysis of network structuralism, also known as relationalism or network analysis. He identifies three different forms of network structuralism, i.e., the determinist, instrumentalist, and constructivist varietals. Only the third, he believes, has any real staying power, owing to the fact that the first two are incapable of accounting for purposive action: determinism leaves no room for it, and instrumentalism conceives of it solely in contractual terms (226-228). Accounting for the influence and dynamics of any network requires accounting for the capacities, needs, motives, and actions of the agents embedded within the network, but this should not result in the
presumed dissolution of those agents (235-239). He examines the structuralism of several prominent network theorists, and focuses on “theoretically oriented structuralists” rather than on those devoted to “applied empirical work” in order to excavate the tacit assumptions associated with this school of thought (271). Harrison White’s approach seems to offer intriguing possibilities, but Smith ultimately rejects the conclusions of White, Stephen Fuchs, and (especially) Bruce Mayhew and Donald Black because of their “naturalistic, reductionistic, and antihumanistic” tendencies (241-272).

Similar arguments can be made, Smith suggests, about variables analysis and its tendency to “reinforce problematic models” of human identity and action (278-279; cf. 289-299). Basically, the problem with variables analysis is that it tends to encourage an understanding of the person as being nothing more than a “conglomeration of scores” (286) and thus undermines all accounts of “equality, dignity, and justice” (288). Variables analysis can indeed be a helpful tool for understanding the conditions that give rise to social relations (296), but oftentimes what goes on “between the variables” is more interesting than the variables themselves (306). Given the contingencies and limitations of our knowledge, we should not expect to be able to explain each and every dimension of our experience, and need to admit that sometimes not knowing something is preferable to knowing something erroneous, which is all too easy when we attempt to quantify every dimension of our experience (308-311).

Having outlined his approach and distinguished his efforts from others he believes are inadequate, Smith offers a constructive and programmatic account of persons and their social interactions. He first describes the emergence and development of stable social structures, and in this section picks up on many of the themes he introduced in *Moral, Believing Animals*. Structures to a significant degree embody the tension between human capacities and human limitations, and thus any description of action within social structures must account for both (331-340). The dynamics of structures simultaneously encourage unity and diversity, similarity and difference, dwelling in and breaking out, and because of these tensions will inevitably manifest “social inequalities of various kinds” (345-356). Any given culture will include a large number of such complex structures, all distinct but “tightly linked” both “horizontally” and “vertically” by way of material resources, conceptual categories, moral commitments, juridical codes, etc. (357-365, 369-377). Given the complexity of these structures, sociologists should aspire only to describe as accurately as possible what really happens within the context of these structures and should eschew the presumption of being able to identify nomothetic laws that determine what must or should be the case (367-368, 379).

No account of purposive action can neglect some consideration of moral value, so Smith next turns to a consideration of “the good.” He revisits the “naturalistic fallacy” and traces the tendency in late modern thought to try and separate descriptive and prescriptive accounts of human experience (386-396); indeed, it was precisely the attempt to do so that led to the moral catastrophes of the twentieth century (427-428). Because we cannot completely avoid moving from “is” to “ought,” we should be attentive to the means and motives we use to do so (388-391). Discerning the good requires that we recognize and affirm that human life is a narrative quest whereby we seek to overcome the limitations and brokenness of our lives without thereby imagining we can escape the contingencies of our existence (399-406). This effort is always undertaken within the context of concrete relations: thus, our own well-being depends immediately on our willingness to contribute to the flourishing of others (406-421).

All of this leads Smith, finally, to an account of human dignity. In light of the moral quality of all human action and experience, dignity is a constitutive part of human identity; social structures are likewise fraught with moral significance, and the moral character of persons and structures are interdependent (434-445). Dignity will be expressed in varying ways depending on social conditions, but the differences between cultures will not be as great as will their underlying similarities (445-446). The two traditional means of grounding human dignity are both problematic in today’s world: neither accounts grounded in
particular capacities nor those grounded in religious faith are likely to garner much agreement. However, a realist, emergent account of persons (i.e., human beings in both their individual and their relational modes of existence) can support a strong commitment to dignity because it fosters an awareness of the possibility of human flourishing in every dimension of our lives (446-461, 472-478). Thus conceived, dignity should be a particular concern for sociologists inasmuch as it provides them with a standard for analyzing actions within particular social structures, helps adjudicate difficult decisions about institutional practices and the allocation of resources, and curbs our tendency towards self-aggrandizement by keeping before us the challenges associated with securing dignity for all (481-488).

Smith recognizes his recommendations would require the “disruption or adjustment of a host of well-established assumptions, tendencies, beliefs, habits, boundaries, practices, methods, standards, and systems upon which a great deal of mainstream American sociology is built” (491). He also recognizes the need to supplement his arguments with additional studies and insights from psychology, feminism, juridical theory and practice, and medical ethics (493). It is to no small degree because his work evokes such a wide range of opportunities for further study that his work merits serious consideration.

In order to round out this brief survey, I’d like just to mention several ways those interested in the thought of Michael Polanyi might both appropriate some of the findings of the research described herein and also contribute to on-going efforts to clarify the nature of personhood. There are, obviously, many points at which Polanyi’s work lines up rather nicely with the themes and ideas explored in the works described above.

Everyone, it seems, agrees that the Western tradition is in the midst of a major reconsideration of the legacy of modernity. Polanyi’s account of moral inversion could help further refine the critique(s) offered by those dedicated to identifying and tracking the problematic dimensions of late modern thought and culture. More specifically, Polanyi’s reading of the intellectual history of modernity accommodates neither uncritical acceptance nor facile rejection, and would thus help balance more contentious readings of the modern project (and the Western tradition in general).

Polanyi’s exposition of the tacit dimension and the dynamics of indwelling provide an unsurpassed way of describing how it is that persons embody and actualize their practical, philosophical, and moral commitments. While it may be true to say more recent studies in embodied perception, cognition, and articulation can help refine some of Polanyi’s arguments, it nonetheless remains the case that Polanyi managed to situate his analysis of indwelling within a more general account of purposive action and meaningful experience in a way other theorists have not always managed to do.

Finally, Polanyi did not shy away from recognizing either the moral or the ontological ramifications of his account of knowledge, but neither did he succumb to the hubris of boldly asserting his metaphysical assumptions as self-evident axioms. He was thus able to conceive of the intellective enterprise—and, indeed, our whole lives—as a fragile, risky, but nonetheless authentic opportunity to actualize our highest aspirations (cf. Polanyi 1962, 405). His work represents an expansive, integrative, and compelling effort to account for the human experience in a way that encourages us to engage in life as a quest for truth, beauty, and goodness, mindful of our contingencies and brokenness but nonetheless inspired to strive for continual discovery and transcendence in a world that presents itself to us as nothing so much as a gift.

Endnotes

1 Parenthetical references that follow are to Jeeves 2011.
2 Parenthetical references that follow are to van Huyssteen & Wiebe 2011.
References


Plausibility and Common Sense:  
*Mind and Cosmos* by Thomas Nagel  
Jon Fennell

**Key Words:** Thomas Nagel, Michael Polanyi, Neo-Darwinian worldview, evolutionary naturalism, materialism, mind-body problem, philosophy of mind, teleology, common sense, skepticism.

**Abstract**

*Thomas Nagel’s Mind and Cosmos, an analytic philosophical excursion into the meaning and implications of the mind-body problem, has striking parallels to Michael Polanyi’s thought, especially as it is captured in *Personal Knowledge*. Indeed, Nagel’s courageous and honest challenge to the evolutionary naturalistic orthodoxy that is currently ascendant in elite opinion is perhaps best understood, via Nagel’s emphasis on plausibility and common sense, in terms of the faith and commitment that Polanyi places at the center of his thought. But the relationship between the two philosophers moves in both directions: Study of Nagel casts useful light on Polanyi as well.*


“And so long as we can form no idea of the way a material system may become a conscious, responsible person, it is an empty pretence to suggest that we have an explanation for the descent of man.”

*Personal Knowledge*, 390

In his own review of *Mind and Cosmos*, John Haldane, Chairman of the Council of the Royal Institute of Philosophy, states that Thomas Nagel “is rightly regarded as among the most significant philosophers writing today and one of the most acute and consistent authors in contemporary analytical philosophy.” But Haldane’s judgment is far from universal, as demonstrated by *Mind and Cosmos* receiving the 2012 award for “Most Despised Science Book of the Year” from *The Guardian*. What could occasion such radically divergent vehement opinion?

In pursuing this question it will be necessary to identify Nagel’s intentions in writing this short yet important text. As we will see, there are numerous parallels between Nagel’s project and that of Michael Polanyi in *Personal Knowledge*. Among the rewards of reading *Mind and Cosmos* is a better understanding of the reception extended to Polanyi’s work by contemporary mainstream intellectual culture.

Readers of this journal will find much in *Mind and Cosmos* that is familiar. Consider for example the following passages:

1. The hope is not to discover a foundation that makes our knowledge unassailably secure but to find a way of understanding ourselves that is not radically self-undermining, and that does not require us to deny the obvious. The aim [is] to offer a plausible picture of how we fit into the world (25; cf. 110).
2. The essential character of [the hoped for] understanding would be to explain the appearance of life, consciousness, reason, and knowledge neither as accidental side effects of the physical laws of nature nor as the result of intervention in nature from without but as an unsurprising if not inevitable consequence of the order that governs the natural world from within (32-33).

3. Each of our lives is a part of the lengthy process of the universe gradually waking up and becoming aware of itself (85).

4. Natural teleology would require...that the nonteleological and timeless laws of physics...are not fully deterministic. Given the physical state of the universe at any given moment, the laws of physics would have to leave open a range of alternative successor states... (92; cf. 66-67).

5. This is a revision of the Darwinian picture rather than an outright denial of it. A teleological hypothesis will acknowledge that the details of that historical development are explained largely through natural selection among the available possibilities on the basis of reproductive fitness in changing environments. But even though natural selection partly determines the details of the forms of life and consciousness that exist, and the relations among them, the existence of the genetic material and the possible forms it makes available for selection have to be explained in some other way. The teleological hypothesis is that these things may be determined not merely by value-free chemistry and physics but also by something else, namely a cosmic predisposition to the formation of life, consciousness, and the value that is inseparable from them (123).

6. The best we can do is to develop the rival alternative conceptions in each important domain as fully and carefully as possible, depending on our antecedent sympathies, and see how they measure up. This is a more credible form of progress than decisive proof or refutation (127; cf. 126).

Each of these six excerpts from *Mind and Cosmos* contains a theme that represents a bridge to Polanyi:

1. The fallibility of our conclusions (coupled with criticism of performative contradiction and respect for common sense);

2. Articulation of a third alternative to a) purposeless materialism and b) divine intervention;

3. A teleological unfolding of the universe, issuing in consciousness of that very process (cf. *PK*, 405: “the awakening of the world”);

4. Acknowledgement of authoritative impersonal laws of nature married to recognition that these laws may be enlisted in the service of other, superior forces (cf. Polanyi’s “boundary conditions”);

5. Retention of Darwinian evolution in a form subservient to operation of underlying teleological forces residing in the fundamental nature of the universe (cf. Polanyi’s “ordering principle” and its decisive role in evolution and the appearance of life in particular [*PK*, 384]); and
6. Humility regarding the capacity of reason to command assent (following from recognition of the significance of existing commitments as well as the rearing and initiation that gave rise to them). (cf. PK, 315).

Given such strong *prima facie* evidence of fundamental agreement between Nagel and Polanyi, it becomes particularly interesting to wonder just how deeply the similarity extends. Can we say that they share foundations in common? Or might it be the case that at a critical point they diverge and that Nagel might have something important to learn from Polanyi? Indeed, might the cogency of his position depend on the insights Polanyi has to offer?

The subtitle of *Mind and Cosmos* is *Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False*. The primary strategy by which Nagel intends to establish the conclusion announced by this subtitle is to establish through appeal to common sense that consciousness, cognition, and value do in fact exist and then to point out that if the “materialist neo-Darwinian conception of nature” were true, it would follow that these things are not real. We are asked to conclude, therefore, that the materialist neo-Darwinian conception of nature is erroneous. More fundamentally, Nagel aims to spell out the larger implications of the “mind-body problem.” For centuries philosophers have been troubled by the connection between mind and body. In what conceivable way can the eminently physical body interact with the very different subjective world of mind? One response to the problem is to deny that there is anything to “mind” that is not understandable in terms of the body. On this view, all the seemingly significant mental states are, under appropriate analysis, seen to be reducible to physical categories—which is to say to physiology, if not in the end to chemistry and physics. Nagel cannot abide this conclusion. And, in suggesting why it is false, he believes that he has uncovered facts about the universe that are just as important as what he has established about the mind (42 and, especially, 57).

There is, in addition to common sense, a second reason why Nagel cannot accept reductive materialism. A consistent and thoroughgoing materialism is guilty of performative contradiction. In short, what materialism says regarding the nature of mind is incompatible with the intention to make the case that the mind is in fact that way. (Readers will be reminded of Polanyi’s treatment of the neurological model of mind on pages 262-263 of *Personal Knowledge.*) After all, it requires a mind capable of logical inference and recognition of proper and authoritative implication in order to offer and make a case. But there is no room for these phenomena in the materialist account. Nagel makes no mention of performative contradiction but instead cites Alvin Plantinga and his concept of “warrant” (27). Referring to the evolutionary analysis that has been eagerly seized upon by materialists in order to overcome traditional mind-oriented objections to their account of mental life, Nagel states:

Mechanisms of belief formation that have selective advantage in the everyday struggle for existence do not warrant our confidence in the construction of theoretical accounts of the world as a whole…The evolutionary story leaves the authority of reason in a much weaker position…Evolutionary naturalism implies that we shouldn’t take any of our convictions seriously, including the scientific world picture on which evolutionary naturalism itself depends (27-28; cf. 81 and 125).

Nagel’s argument (as well as that offered by Polanyi and Plantinga, respectively) is a variant of “the argument from reason” employed by C.S. Lewis to defeat naturalism in Chapter 3 of *Miracles*. Given the materialist and neo-Darwinian orthodoxy that reigns in the contemporary university and among elite opinion generally, it will come as no surprise that Nagel faces excommunication for consort with Christians.
It is further evidence of Nagel’s analytic caution that he admits that his argument does not so much show that reductive materialism in its evolutionary naturalistic form is wrong as it demonstrates that such an account is incompatible with our “ordinary judgments” regarding ourselves and the world (29). What would convert this argument into a refutation of reductive materialism is the authority of those ordinary judgments—the authority, that is, of common sense. Early on, he states, “I would like to defend the untutored reaction of incredulity to the reductionist neo-Darwinian account of the origin and evolution of life” (6). But, as various critical assessments of Mind and Cosmos illustrate, what Nagel regards as his most secure foundation is widely viewed as his Achilles’ heel. He is vulnerable to the incontestable observation that the history of science is repeatedly marked by the overthrow of common sense. (The sun, despite appearances, does not orbit the Earth.) The success of science, which itself is undeniable, is in fact attributable to the willingness to call ordinary judgment into question. Nagel’s critics portray him as a defender of ignorance and superstition—as an apostate from critical reason. In contending with this critique we have the first of the crucial junctures at which Polanyi has something significant to offer Nagel.

Nagel’s “common sense” is closely tied to belief which, in turn, is grounded in a conception of plausibility. Early in Mind and Cosmos, as Nagel sets the stage for subsequent discussion, he states,

I do not find theism any more credible than materialism as a comprehensive world view. My interest is in the territory between them. I believe that these two radically opposed conceptions of ultimate intelligibility cannot exhaust the possibilities (22, emphasis added).

“Belief” is ambiguous. It may refer to the product of reflection or it may refer to a starting point. In this passage we see the latter. Nagel, in a tone reminiscent of Polanyi during several confessional statements in Personal Knowledge, declares here what he will not seriously doubt: these two choices cannot be all there is. This is where he will dig in his heels. The argument will proceed on this basis. Why? Because it would be implausible to do otherwise. To his credit, Nagel’s text is replete with admissions of his personal starting point (in all cases, the emphasis is added):

- His project is constrained by “an assumption that certain things are so remarkable that they have to be explained as non-accidental if we are to pretend to a real understanding of the world” (7).
- “Mind…must be included as the most recent stage of this long cosmological history, and its appearance, I believe, casts its shadow back over the entire process and the constituents and principles on which the process depends” (8).
- “I confess to an ungrounded assumption of my own, in not finding it possible to regard the design alternative as a real option” (12).
- “My guiding conviction is that mind is not just an afterthought or an accident or an add-on, but a basic aspect of nature” (16).
- “I am not disposed to see the success of science in this way. It seems to me that one cannot really understand the scientific world view unless one assumes that the intelligibility of the world…is itself part of the deepest explanation of why things are as they are” (17).
- “I find it puzzling that [the orthodox naturalistic] view of things should be taken as more or less self-evident, as I believe it commonly is” (20).
- “That is really my question. The implausibility of the reductive program that is needed to defend the completeness of this kind of naturalism provides a reason for trying to think of alternatives…” (20).
- “The inadequacies of the naturalistic and reductionist world picture seem to me to be real” (22).
- “There must be a very different way in which things as they are make sense…” (53).
Finally, at the close of Chapter 2, Nagel’s thoroughly introspective assessment of his enterprise, he expresses the “hope” that a viable alternative to evolutionary naturalism will as a result emerge. Such hope sustains the iconoclastic venture which has made him the target of widespread disdain.

In the first of the above passages the emphasis on “assumption” brings to our attention the personal dimension of Nagel’s endeavor. But the term “remarkable” is even more revealing, as is Nagel’s reference on the same page to the “astonishing” nature of the world. Nagel is compelled to write his critique of the materialist neo-Darwinian conception of man and the world because in his mind this account plainly cannot account for what he finds astonishing. This raises the question of how it is that Nagel (or anyone else) is capable of astonishment. In considering this matter we are, to begin with, taken back to the episode of the white pebbles at the Welsh train station in Chapter 3 of Personal Knowledge. The reader will recall that these pebbles spelled out “Welcome to Wales by British Railways.” In the face of this spectacle, Polanyi says, we judge that the organization of the pebbles is intentional. After all, the odds of the many pebbles coming together on their own to spell these words is infinitesimally small in comparison to their innumerable alternative possible arrangements. He then asks us to imagine returning to the station at some later time, finding the pebbles lying hither and yon. He observes that we would now be apt to judge that their location was a matter of chance. Polanyi states that this second judgment is peculiar because the odds of the pebbles residing in the new configuration are no less than their coming together to spell out the words. Any single configuration of the pebbles is infinitesimally unlikely. So, why were we so impressed when we read the earlier message from the railway, but not now? Polanyi’s answer is that we were impressed because we tacitly attributed orderliness to the stones when we encountered the message. It was only in the context of such (attribution of) order that we found the configuration striking. Polanyi adds a second illustration of the point by noting that we are considerably more impressed with being the 500,000th visitor to an exhibition than we are by being the 573,522nd visitor, even though the latter is the less likely. It turns out that what is responsible for our reaction is the perception of order (an English sentence spelled out in pebbles and the round number, 500,000) coupled to the realization of the myriad alternatives. Polanyi then adds—and this is his central point—that recognition of order is necessary not only to being impressed by what we perceive, but also in order to make the claim that the phenomenon is accidental. Therefore, one cannot properly say that the distribution of the white pebbles on the return visit to the station was either accidental or non-accidental. This is because there was no order about which such a question could be raised.

Let us now bring this discussion to bear on Nagel. Both the evolutionary naturalist and Nagel recognize order—in the existence of species, in the operation of mind, in the intelligibility of the world, and so on. In the face of these things the evolutionary naturalist speaks of chance outcomes in accordance with impersonal laws while Nagel, in contrast, is astonished. In Polanyi’s terms, the evolutionary naturalist recognizes order and then denies its “reality,” whereas Nagel recognizes order and then points to (or at least hopes for) an “ordering principle.” Nagel conducts his search because he cannot and will not be satisfied short of identifying an underlying meaningful dynamic. Why is that?

Polanyi’s answer for Nagel is the same as he gives for himself. Each of the philosophers is the person he finds himself to be. Like Polanyi, Nagel recognizes the contingency of his beliefs, ideals, standards, and intellectual expectations (24-25). He believes that “[t]he best we can do” is to develop and present conceptions “depending on our antecedent sympathies” (127). We see such sympathies operating when Nagel refers to “the kind of comprehensive self-understanding we are after” (29) and speaks of his “ungrounded intellectual preference” for a “systematic account of nature, one that makes” such things as mind, reason, and the intelligibility of the world “neither brute facts that are beyond explanation nor the products of divine intervention” (26). In essence, then, Nagel joins Polanyi both in choosing to believe that there is meaningful explanation for these phenomena—one that tells us why as well as how they
come to be—and in being resolved to pursue it (113). In principle, no one need hold this belief. But Nagel and Polanyi do, recognize this fact, and self-consciously embrace it. That is the sort of people they are and they invite us to join them. Nagel therefore yearns for a satisfying explanation of what is apparent to common sense. A mere causal account will not suffice (47; cf. 50-58). In response to this yearning he commits himself to the two-pronged task of suggesting how such an account would appear while demonstrating that evolutionary naturalism is incapable of providing it.

Polanyi’s first contribution to Nagel, then, is a deeper understanding of the ideals and standards which underlie his expectations and aspirations. Nagel’s project, positive as well as negative, proceeds from a respect for common sense combined with a vision of intellectual satisfaction. Granted, these have an indelible personal character. But so, too, do the competing standards and measures of satisfaction that are operating in the minds of his adversaries. Polanyi brings out into the open the true dimensions of the conflict. Just as Nagel is someone who is “strongly adverse to the idea” of God (12), his materialist and evolutionary naturalistic foes are wedded to a conception of the universe without intrinsic meaning and are offended by the very thought of the alternative. In suggesting the existence of a teleological order, Nagel is simultaneously expressing a commitment and electing to do battle. What else can an honest man of courage do?

Do we have, then, simply a war between competing commitments? Is there no truth of the matter? Well, it is certainly the case that *Mind and Cosmos* constitutes a skirmish in a larger battle between conflicting commitments in alliance with their associated ideals, standards, and expectations. But this is not all that it is. In grasping this fact Polanyi makes yet another vital contribution to our understanding of Nagel’s book. Polanyi observes that through our intellectual commitments we aim to arrive at reality, i.e., at that which is true. But some commitments are superior to others. In a conflict between commitments, the superior candidate is the one which, when embraced and acted upon, leads to the truer outcome. One’s claims, and hence the vision that inspires them, will be adjudicated by subsequent explorers within a tradition of inquiry. Nagel and his adversaries are locked in combat, vying for the allegiance of those who study their arguments and whose collective views, at a later time, will constitute authoritative opinion. It is clear from *Mind and Cosmos* that Nagel has at least an intuitive grasp of this process. But in *Personal Knowledge* Polanyi articulates it explicitly in rich detail.

This deep similarity between Nagel and Polanyi is illustrated in their respective responses to skepticism. *Personal Knowledge* is for Polanyi an attempt “to stabilize knowledge against scepticism” (*PK*, 245). On his view the political horrors of the twentieth history were largely the consequence of an extreme yet hypocritical skepticism that grew out of Cartesian systematic doubt. Polanyi’s chief foe is a proud and habitual skeptical frame of mind; the central purpose of his philosophical career is to overcome its influence and decisively defeat the underlying impulse (see, for example, *PK*, 381). Interestingly, Nagel, due to his energetic suspicion of reductive materialism and evolutionary naturalism, is often characterized by his critics as a skeptic. This is fair since he refers to himself as such (7, 11). But “skepticism” too is an ambiguous term. On the one hand it can refer to a general and systematic stance toward any and all claims to know. (This is the target of Polanyi’s critique and is challenged, with something less than Polanyi’s confidence, by Nagel as well [24].) But, on the other hand, skepticism may refer to doubt in regard to a particular claim or set of claims. It is only in this second sense that Nagel can responsibly be classed under the heading of “skeptic.” Indeed, as noted above, *Mind and Cosmos* is to a striking degree characterized by statements of faith and commitment. At the heart of the book is belief in common sense and an affirmation of the plausibility of our belief in the reality of mind. Whatever skepticism Nagel exhibits is the product of such belief (7). His fundamental attitude is the furthest thing from skepticism in the global sense and, in his stance of commitment and affirmation, Nagel finds himself in deep alliance with Polanyi. We can justly regard *Mind and Cosmos* as an application to philosophy of mind and the mind-body problem of the central themes of *Personal Knowledge*. 
Perhaps the most important matter raised by *Mind and Cosmos* for students of Polanyi is this: where does Polanyi (and where do they) stand in regard to the several competing world views whose treatment constitutes the heart of the book? At first glance it appears that Nagel is concerned with three positions: materialism, theism, and his own third alternative—one that is “secular” and “naturalistic” yet “transcendent,” “immanent,” and teleological (22, 32, 29, 95). But there is a fourth possibility. We could choose “to give up the project of external self-understanding altogether and instead to limit ourselves to the sufficiently formidable task of understanding our point of view toward the world from within” (29-30). In Nagel’s view this fourth option is as radical as any of the others. However, because “[t]he question is there, whether we answer it or not,” the fourth possibility is unsatisfying and he rejects it out of hand (30). We are left, then, with the other three.

Nagel confesses to being atheistic by temperament (12). Because of his kinship to Polanyi regarding the important role played by belief and commitment, Nagel acknowledges the significance of such a starting point. But his opposition to the theistic position (or the “intentional alternative,” 94) is also predicated on an argument. Nagel starts from the premise that only a “unified” explanation will do (12, 33). By this measure theism is deficient. He states,

> Theism pushes the quest for intelligibility outside the world. If God exists, he is not part of the natural order but a free agent not governed by natural laws. He may act partly by creating a natural order, but whatever he does directly cannot be part of that order. (26)

He then adds that under theism “[t]he kind of intelligibility that would still be missing is intelligibility of the natural order itself—intelligibility from within…Such interventionist hypotheses amount to a denial that there is a comprehensive natural order” (26). Earlier, he noted, “So long as the divine mind just has to be accepted as a stopping point in the pursuit of understanding, it leaves the process incomplete, just as the purely descriptive materialist account does” (21). It is for this reason that Nagel concludes that “both theism and naturalistic reductionism fall short. Theism does not offer a sufficiently substantial explanation of our capacities, and naturalism [due to performative contradiction as well as implausibility] does not offer a sufficiently reassuring one” (25).

Nagel’s preferred worldview—the teleological—declares that purpose is immanent in the constituents of nature themselves. This view is simpler than theism insofar as nothing external to nature is required to account for those things—mind, consciousness, cognition, and value—whose autonomy materialism and evolutionary naturalism will not allow. For this reason, the teleological position is “unified.” Readers familiar with Polanyi will understand why simplicity, parsimony, and unity count so heavily in determining plausibility: they are constituents of beauty, and the truth is known by, among other things, its elegance. Nagel, while not denying a role for “aesthetic preference,” says that the more important factor in adopting an explanation is that it “gives greater understanding” (17; cf. 114). Polanyi would observe that what Nagel takes to be a distinction is instead largely a synonym. The constituents of “greater understanding” are intrinsically aesthetic in nature.

Polanyi rejects materialism and reductionism in any guise, and he embraces teleology under the headings of the “success” of life (*PK*, 381-382), the “aim” of man and his world (*PK*, 405), and, in the end, “emergence” (*PK*, 382ff.). But is there in *Personal Knowledge*, despite its respectful citations of Christianity and its occasional yet passionate references to God, any more provision for divine intervention (i.e., for the “intentional alternative”) than there is in *Mind and Cosmos*? While recognizing that such a conclusion will be controversial, this reviewer believes the answer to be “No.” On page 265 of *Personal Knowledge* Polanyi declares, “If man died, his undeciphered script would convey nothing.
Seen in the round, man stands at the beginning and at the end, as begetter and child of his own thought. Is he speaking to himself in a language he alone can understand? (Emphasis added.) The answer to this haunting question appears somewhat later:

God cannot be observed, any more than truth or beauty can be observed. He exists in the sense that He is to be worshipped and obeyed, but not otherwise; not as a fact—any more than truth, beauty or justice exist as facts. All these, like God, are things which can be apprehended only in serving them. (279; cf. 393, 395, and 398)

As noted by Louis P. Jones in his review of Mind and Cosmos, Nagel offers “a self-purposed universe blossoming in empty time-space,” one “whose final goal, Mind, is an end that always abided in its beginning.” In this respect at least, the roles are reversed and it is Nagel who helps us understand Polanyi.

Although Mind and Cosmos is brief, it treats some of the most important issues of our time (or any time). In examining the book there is always more to say. But every review must end and so, too, will this one, leaving untouched a number of additional consequential matters, not the least of which is emergence, a theme central to both Nagel and Polanyi. Such further study, stimulated by Nagel’s courageous and honest labor, is the work of another day.
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Articles, meeting notices, and notes likely to be of interest to persons interested in the thought of Michael Polanyi are welcomed. Manuscripts normally will be sent out for blind review.

*Articles* should be sent to Paul Lewis at [lewis_pa@mercer.edu](mailto:lewis_pa@mercer.edu)

*Book reviews* should be sent to Walter Gulick at [wgulick@msubillings.edu](mailto:wgulick@msubillings.edu).

All manuscripts should be submitted as a Microsoft Word file attached to an email message (.doc or .docx) and formatted as follows:

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As to other matters of style:

1. **Spelling:** We recognize that the journal serves English-speaking writers around the world and so do not require anyone’s “standard” English spelling. We do, however, require all writers to be consistent in whatever convention they follow.

2. **Citations:** We recognize that Polanyi’s work connects with scholars who work in diverse disciplines and typically use different style guides such that we are “fluent” in different conventions for citations, capitalization of titles, and so forth.

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**Deadlines:**

- For Number One of a Volume (October): 1 July
- For Number Two (February): 1 November
- For Number Three (July): 1 April
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WWW Polanyi Resources

The Polanyi Society web site (polanyisociety.org/ or polanyisociety.com/) provides information about Polanyi Society membership and meetings. The site also contains the following: (1) digital archives containing all issues of Tradition and Discovery and its predecessor publications of the Polanyi Society going back to 1972; (2) indices listing Tradition and Discovery authors, reviews and reviewers; (3) the history of Polanyi Society publications; (4) information on Appraisal and Polanyiana, two sister journals with special interest in Michael Polanyi’s thought; (5) a link to the “Guide to the Papers of Michael Polanyi,” which provides an orientation to archival material housed in the Special Collections Research Center of the University of Chicago Library, Chicago, IL 60637; (6) photographs of Polanyi; (7) links to a number of Polanyi essays (available on the Polanyi Society web site and other sites), Polanyi’s Duke Lectures (1964), as well as audio files for Polanyi’s McEnerney Lectures (1962), and Polanyi’s conversation with Carl Rogers (1966).

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

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