Tradition & Discovery
The Polanyi Society Periodical

Preface

At the November 16, 2012 Polanyi Society Board meeting, Paul Lewis was officially appointed the new editor of TAD. We have been working on this transition for some time. The production and mailing of the paper copies of TAD will move to Mercer University next summer. I will remain engaged with TAD but in the capacity of editor emeritus. Thanks go to the many people who I have worked with on articles or other material going into TAD over the last 21 years that I have edited the journal. Particular thanks go to Walt Gulick, who has worked on TAD as long as I have, and to Paul Lewis, who also has labored many years.

Phil Mullins

I confess that it is with some trepidation that I step into this role as TAD editor. Phil has set high standards during his long service to the Society as editor (and much more). Moreover, it is humbling to take over from my undergraduate mentor. Who knew when I took a course on modern religious thought during my senior year many years ago that I would end up here!

My main goal as incoming editor is to indwell the tradition of excellence that this journal has come to represent, at the same time realizing that we likely will need to break out of some past practices in response to the emerging realities of academic journal publishing. In doing so, I will rely on Phil and Walt for their wise counsel, as well as members of the Polanyi Society Board. The Board has authorized me to put together an editorial board for TAD, so some of you will soon be hearing from me—or if you would like to serve on an editorial board, I will certainly consider volunteers!

In the meantime, business continues as usual. This issue features a symposium on Tihamér Margitay's essay from *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi*, "From Epistemology to Ontology: Polanyi's Arguments for the Layered Ontology"(see Phil's introduction on p. 9) and reviews.

Paul Lewis

NEWS AND NOTES

Dues Payment and Address Changes

The Oct. and Feb. but not the July issue of *TAD* include a membership flyer and an addressed envelope to be used to mail annual academic year dues and/or to make donations to the Polanyi Society. US postage regulations require that **EVERY** copy of *TAD* mailed in the postage class used must weigh exactly the same. Thus, even if you pay your annual dues in October, you will, nevertheless, receive these membership materials in your February copy of *TAD*. Dues remain $35 ($25 for libraries and $15 students), a bargain in the academic journal world. Except for those residing outside the US, members should pay dues with a check. The Society can no longer easily and inexpensively process credit cards. For those living outside of the U.S., there is a Pay Pal payment option on the Polanyi Society membership web page (http://polanyisociety.net/register/join-renew.php). Dues and donations are handled by the Polanyi Society Treasurer, Charles Lowney (Dept. of Philosophy, Baker Hall 213, Washington and Lee University, Lexington, VA 24450 USA). Paul Lewis (LEWIS_PA@mercer.edu) should be contacted directly for *TAD* address changes.

Recent Publications and Awards

David Nikkel, who recently joined the Polanyi Society Board of Directors, received the University of North Carolina Board of Governors' Award for Excellence in Teaching for the University of North Carolina--Pembroke for 2012. This is the highest award granted by the UNC System and comes with a stipend and medallion.

David W. Agler, who recently received his Ph. D. and currently is a lecturer in Philosophy at The Pennsylvania State University, recently published *Symbolic Logic: Syntax, Semantics, and Proof* (Rowman & Littlefield, 2012).

Electronic Discussion List

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.

2013 Society Annual Meeting Call for Papers

The annual meeting for the Polanyi Society in 2013 is tentatively scheduled for November 23, 2013 in Baltimore. Two Saturday sessions (each with slots for two papers plus responses) will be held in conjunction with the American Academy of Religion annual meeting.

Proposals are invited on any topic related to the ideas of Michael Polanyi and the subsequent development of Polanyi-influenced thought. Proposals (250-300 words) are due April 15, 2013 and should be sent as attachments to Walter Gulick, Program Chair (wgulick@msubillings.edu). The following topics have been suggested:

• A session on Polanyian conceptions of the person in relation to contemporary views such as those of Christian Smith's *What Is a Person?*

• Polanyian ideas that ought to influence social theory today.

• Polanyi and biosemiotics—Polanyi's philosophy in relation to the thought of Deacon, Hoffmeyer, etc., and this new semiotic approach to the life sciences.

• Responses to recent themes/articles in *Tradition and Discovery*: e.g., the relation of epistemology and ontology, Polanyi and Peirce, Nye on Polanyi and social construction in history and philosophy of science, Jardine's political theory, etc.

• Tradition and the place of identity politics vs. individualistic rationalism in politics.

• Charles Taylor and Michael Polanyi: convergences and divergences.

• Assessing on a comparative basis how well Polanyi's thought about religion and meaning accords with the variety of theological work in recent decades:

a) investigating theological writing of figures like Colin Gunton and Jeremy Begbie (figures who make use of Polanyi but have not been treated in an annual meeting). Or reflecting comparatively upon the work of these figures and/or other Polanyi-influenced theological writing such as that of Allen, Moleski, Meek, McCoy, Clark, Grosso, Apczynski, Nikkels, and Gelwick.

b) examining how Polanyian thought relates to other recent or contemporary religious thinkers such as Oliver O'Donovan, Rosemary Ruether, Harvey Cox, Jean-Luc Marion, Sallie McFague, Stanley Hauerwas, Alister McGrath, Cornel West, Fergus Kerr, Robert Jenson, David Tracy, N. T. Wright, John Cobb, Rowen Williams, Miroslav Volf, Ivona Gebara and/or Wesley Wildman.

Polanyi Society Speakers Bureau

The Polanyi Society's Speakers Bureau helps organize talks to groups by Polanyi scholars. If you know anyone who might be interested in a speaker, send the name and e-mail address to Phil Mullins (mullins@missouriwestern.edu). There is now a link on the Polanyi Society web page with general information about the Speakers Bureau. You will find there a précis of the talks given by Marty Moleski S.J. and Richard Gelwick. Several Society members have indicated interest in speaking on different aspects of Polanyi's thought. It is likely that the Society can arrange for someone nearby to provide a talk on a topic of interest.

Travel Assistance For Younger Scholars Attending Polanyi Society Annual Meeting

For students and other young scholars planning to attend the Polanyi Society Annual Meeting in Baltimore in November 2013 limited travel funding is available. Society members are urged to inform worthy candidates about this assistance. Candidates and anyone who want to nominate a potential candidate, should contact Walter Mead (wbmead@ilstu.edu) who administers the travel fund.

Contributions to the travel fund are, of course, always welcome. Those who wish to contribute should e-mail Walter Mead. Send checks directly to Charles Lowney, the Polanyi Society Treasurer (Department of Philosophy, Baker Hall 213, Washington and Lee University, Lexington, VA 24450). Donations can also be made using the link for the Pay Pal Donation Form on the membership page on the Polanyi Society web site (http://polanyisociety.net/register/join-renew.php). All donations are eligible for an IRS letter certifying a charitable deduction. Related information about travel funds is available on the Polanyi Society web site (polanyisociety.org).

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).

Polanyi Society Board Minutes

8:30 PM, November 16, 2012
Baumgarten Hall, Loyola University

Present: David Rutledge, Gus Breytspraak, Diane Yeager, Andrew Grosso, Phil Rolnick, Charles Lowney, Dale Cannon, Walter Mead, Martin Molesky, Walter Gulick, and Phil Mullins.

- President David Rutledge called the meeting to order at 8:25 PM.

- The Minutes of the November 2011 meeting were approved as submitted.

- Charles presented the Treasurer's Report in the form of a handout. We have about $10,000 in our account. He noted that the interest in our Endowment account of 0.4% is a problem we should address. A motion was passed to restore the Travel Account to its prior level from the general fund, after travel expenditures for the June 2012 Chicago conference. We discussed moving a portion of the current balance to the Endowment Fund, and locating the Fund in a different place in order to keep up with inflation. The Society has received several gifts in response to the end-of-the-year challenge grant noted in the TAD 39:1 (Oct. 2012); one was a $1000 stock donation which Treasurer Charles Lowney is currently deciding how to add to the Endowment Fund. The Treasurer's Report was accepted.

- David announced that Esther Meek and Tony Clark (now moved to Scotland) have completed their terms as Board members and will need replacement. He went on to say that David Nikkel has agreed to come on to the Board. He would be Esther's replacement and next year would be the first year of his three year term. Esther will need to wait two years before she is eligible for another term. Our By Laws require that we have 5 to 11 Board members. It is not essential that we replace Tony at this time. If another person were elected, she/he could begin by filling out the last two years of Tony's third term and thereby not disturb the rotation pattern. Diane suggested that it would be good to have a new person who would have a primary role in planning the next Polanyi Conference. Andrew expressed interest in helping plan the next Polanyi Conference. It was decided to have the Nominating Committee review the cycle of Board membership and come up with new names for next year. David Nikkel was accepted as a new member of the Board. Charles Lowney was accepted as a Board member to commence serving his second term and Zhenhua Yu to commence serving his third term.

- Gus summarized the Subcommittee Report on the transition to a new TAD Editor that had been sent out in advance (with extra copies at the meeting). The Subcommittee recommended that Phil become Editor Emeritus and that Paul Lewis become the Editor, and that TAD be moved to Mercer University. Mercer has tentatively agreed to work out ways modestly to subsidize some TAD expenses such as mailing. The Subcommittee recommended that the print version of TAD be continued until postal costs make it impossible. The Subcommittee Report was accepted. Wally Mead suggested that donors be solicited to continue the printed version if it is needed. Diane initiated a discussion by asking, "What are our dues for? We need to come up with a clearer answer. Are they effectively 'solicited donations'? An electronic copy still costs money." Dues clearly support the activities of the Polanyi Society. What might we do besides produce a journal? Extra donations recently have gone to the Travel Fund. Might we have an Essay Contest? A Polanyi Prize? Put syllabii up on the website? James Van Pelt has suggested that we create an electronic course on Polanyi through the website. Dale suggested that we do a thoughtful review of

the website to make it more of a teaching device, and presented a motion to create an ad hoc committee to review the website for teaching purposes, with links to the parallel European societies.

- Phil next presented the TAD Report (by way of a handout and summary). Diane suggested that we coordinate our fiscal year with that of Mercer University. A motion to empower Paul Lewis to appoint an Editorial Committee was passed. Diane suggested that we carefully monitor subscription costs for persons outside of the US. A discussion ensued about options other than keeping TAD an open access journal. There are pros and cons with any of these options. One reason we might consider JSTOR or MUSE is that many researchers do not these days look elsewhere. Resources identified by databases and resource aggregators are the first choice in today's scholarly academic world. Phil pointed out that the contracts with such groups (e.g., JSTOR and MUSE) are various, but that it is likely almost all contracts would require that TAD no longer be an "open source" journal available free on the web and listed in the Open Source Directory. The Open Source Directory is increasingly used by academic librarians since there is a war going on between (1) those increasingly fewer operations publishing increasingly pricey academic journals and (2) open source publishing. Academic libraries are caught in the war zone and some seem to be supporting the open source publication movement. Phil also pointed out that although some aggregators/databases like JSTOR do make search and retrieval easy, there are other things to be aware of. Some schools/academic libraries cannot afford JSTOR. Even if an academic library has a subscription, there is no assurance that it will automatically include TAD because different types/levels of subscription include different packages of journals.This sort of multi-level subscription option also is more or less true of the databases like EBSCO that TAD currently is included in. Some subscription packages seem to provide subscribers with full text of TAD and some apparently do not. Some index a few years and others index a broader range of years. Phil also pointed out that to be included in something like JSTOR one must apply and be evaluated for "fittingness" or "desirability." In Phil's previous applications for inclusion in JSTOR, he believes that the most significant question for JSTOR applicants was "How many libraries now subscribe to the journal?" This question provides JSTOR with some indication about how "desirable" (from a JSTOR perspective) it might be to include a journal in one of their subscription options. JSTOR and other databases are businesses and they wish primarily to include journals already in libraries since libraries can save space and dollars on individual subscriptions for such journals, labor, etc. and thus libraries who have ample budgets will opt to subscribe to JSTOR. JSTOR, in Phil's view, has little motive to include small subscription, specialized, limited circulation journals like TAD. Someone suggested that we ask our university/college librarians to include TAD as one of the open access journals they list. That is, if there is a local library list of open access journals, TAD should be added to it. In sum, the Board will follow the Subcommittee's recommendation that for the present we stay the current course of continuing to publish a print journal at Mercer which we distribute independently and that we continue to produce an open-access, identical version for the web. Phil emphasized the continuing need to regularly re-evaluate TAD options; this requires continual monitoring of the changing electronic publishing landscape and options like JSTOR and MUSE.

- Marty reported on the June Loyola Conference, going over the highlights of his written report. Phil stated that next time the Treasurer should be in the middle of Conference planning as we did this year. It was recommended that 2016 be the next Conference. Kudos to Marty, and Phil also, for their many, many roles in making the Conference a success, and to Marty for such a helpful report. It was proposed that we appoint a group no later than next year and perhaps right away to begin setting up the 2016 Conference. Charles, as Treasurer, agreed to be part of the planning.

- Wally next presented the Travel Fund Report, which was accepted after a brief discussion.

- Dale went over the current state of planning for the William H. Poteat Conference to take place June 6, 7, and 8, 2014 at Yale Divinity School. James van Pelt, on the staff of Yale Divinity School, will be setting up the Conference. It was suggested that donations be solicited well in advance, because Yale Divinity School will be requiring an advance payment, likely $1500 to $2500. Such donations can be funneled through the Polanyi Society, as it is a 501C3 charitable institution with the IRS.This will be better than going through Yale. The question of liability was raised, for unexpected expenses and losses. This could be handled by having the Polanyi Society be the official sponsor of the Conference. It was suggested that Dale look carefully into James' situation at YDS. A contract with YDS will need to be signed well in advance to lock in prices and will not be contingent upon James being there. The possibility of a sculpture by Evangelos Moustakas in honor of Poteat was brought up. It was suggested that that project not be closely tied to the Conference itself. Lots of "potholes" were brought up that will need to be steered around. Dale was instructed to get a formal proposal to the Polanyi Society Board as soon as possible, with rough costs, including an honorarium for Bruce Lawrence, a colleague and friend of Bill Poteat, who will be giving the opening plenary. It will then be sent around to Board members via email for discussion and action.

- Walt Gulick reported on the current state of the Polanyi Reader. He has not had time until recently to work on it. He went to the University of Chicago Press today. They said that they would like for him to have all copyright releases in hand. Next semester Walt will not be teaching and the Reader is his next priority. The Reader is/will be the only comprehensive source on Polanyi. He would like to obtain a clearer response from the University of Chicago Press than he has currently received. They have not been easy to deal with. Wally will give Walt the name of the person who handled the recent republication of *The Tacit Dimension*. Additional suggestions were made: (1) consider the earlier offer from Templeton Press for a subvention; (2) consider self-publication, if nothing else becomes viable; (3) consider web-publication—e.g., in connection with an on-line course on Polanyi at the Polanyi website.

Respectfully submitted,
Dale Cannon, Secretary

Treasurer's Report

On page 8 is a spread sheet covering the Society's most recent fiscal year. Travel Fund grants for the Loyola conference were mostly handled via conference fee reductions and via paying for the guest rooms of the grantees. In the few cases that cash was issued to cover further travel expenses, the transfer of donations was handled through the general account and did not pass through the travel fund account. Thank you to the generous donors who helped to keep us in the black.

Respectfully submitted,
Charles Lowney, Treasurer

Polanyi Society   Treasurer's Report - Fiscal Year Sept 1, 2011 – August 31, 2012

General Fund:

Opening balance 9/1/11:				$	4,986.52
Revenue:				$	25,234.34
	dues:		$	3,457.00	
	loyola revenue (minus refunds):		$	14,984.85	
	donations to any		$	2,683.00	
	donations for Endowment:		$	1,395.00	
	donations for loyola:		$	1,414.15	
	donations for travel fund:		$	1,250.00	
	misc		$	50.34	
Transfers out:				$	3,523.80
	To endowment fund (11/12):		$	1,395.00	
	To travel fund grant recipients (by check):		$	528.80	
	To TAD Account		$	1,600.00	
Expenditures:				$	16,012.07
	To Loyola (for Conference)			12,981.75	
	bank & Paypal fees		$	76.75	
	other expenses		$	492.40	
	Honoraria		$	2,461.17	
Balance 8/31/12:				$	10,684.99

Travel Fund :

Opening balance 9/1/11:				$	1,074.69
Revenue:				$	2.92
	interest:		$2.92		
Balance 8/31/12:				$	1,077.61

TAD account (at Missouri Western):

Opening balance 9/1/11:				$	846.33
Revenue: 9/1/11-8/31/12				$	1,985.08
	Transfers from General Account:		$	1,600.00	
	credit card pd dues or donations		$	370.00	
	misc adjustment		$	15.08	
Expenditures:				$	2,631.46
	printing		$	1,632.05	
	postage		$	999.41	
Ending Balance 8/31/12:				$	199.95

Endowment Fund:

Opening balance 9/1/11:				$	9,950.24
Donations :			$	1,395.00	
Interest:	(currently .4 AYP)		$	57.80	
Ending Balance 8/31/12				$	11,403.04

Tihamér Margitay on Polanyi's Ontology: An Introduction
Phil Mullins

ABSTRACT Key Words: Polanyi's hierarchical ontology, Tihamér Margitay.
This issue of Tradition & Discovery *includes (1) six responses to Tihamér Margitay's recent criticisms of Polanyi's hierarchical ontology as well as (2) Margitay's responses to his critics. This is a brief introduction to this special issue.*

Tihamér Margitay, Chairperson of the Department of Philosophy and the History of Science at the Budapest University of Technology and Economics, is a very capable young Hungarian scholar with a serious interest in Michael Polanyi's thought. The department he chairs has since 1989 provided leadership for the Michael Polanyi Liberal Philosophy Association, which introduced Polanyi's thought to post-communist Hungary. The MPLPA has sponsored several conferences on Polanyi's scientific accomplishments and his philosophical thought, and it publishes *Polanyiana*, for which Margitay now serves as editor.

In 2008, Margitay chaired an MPLPA-sponsored conference in Budapest entitled "Reconsidering Polanyi." At that conference, he gave a provocative paper entitled "From Epistemology to Ontology: Polanyi's Arguments for the Layered Ontology." That paper, included among thirteen essays from the conference in *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi* (Tihamér Margitay, ed. [Newcastle upon Tyne: Cambridge Scholars Publishing, 2010], pp. 128-140), raised large questions about how successful Polanyi was in making his case for his hierarchical ontology.[1] Shortly after publication of this book, I asked Margitay if he might be interested in using his essay as a centerpiece in TAD for discussing the adequacy of Polanyi's stratified ontology. He not only welcomed my proposal but generously volunteered to help in organizing such a discussion. I am pleased that this project has come to fruition in this issue of TAD.

The six respondents who comment on Margitay's essay in this issue were chosen because they come at Polanyi from a variety of different angles and have somewhat different backgrounds and interests. Some are older scholars who were involved in earlier discussions of Polanyi's ontology, stretching back thirty years, discussions that spilled over into articles in this and other journals and books. Others are younger scholars, several of whom have published recent essays in TAD that broached ontological issues. Two comments are from Hungarian scholars very interested in Polanyi. In a subsequent issue of TAD, there will be some further discussion of issues treated here. I want to thank Tihamér Margitay for his thoughtful reflections on the variety of responses his article elicited. The discussion brings greater clarity to the complex range of issues that are involved in making ontological claims from a Polanyian perspective.

Endnotes

[1]Most subsequent references to this article in this issue of TAD are simply noted in the text in parenthesis by page number(s). Beginning on page 42, Margitay summarizes the main arguments he makes in his article, and those unfamiliar with his claims may find it useful to read these first three pages of his article before turning to the individual responses.

Multiple Paths to Ontology:
Recasting Margitay's Critique of Polanyi

Walter B. Gulick

ABSTRACT Key Words: Michael Polanyi, Tihamér Margitay, personal knowledge, epistemology, ontological levels, scientific realism, emergence.

In a recent article "From Epistemology to Ontology," Tihamer Margitay argues that Polanyi fails to establish the necessary correlation he claims between the two levels involved in tacit knowing and corresponding ontological levels. I argue that Margitay correctly shows that such a correspondence does not hold in all cases, but I also point out problems in Margitay's interpretation of Polanyi and suggest additional bases for ontological claims that go beyond Margitay's analysis.

In "From Epistemology to Ontology: Polanyi's Arguments for the Layered Ontology," Tihamér Margitay argues that Polanyi overgeneralizes when he claims that all ontology is grounded in epistemological experience.[1] The basic thrust of Margitay's paper is to deny the claim made by Polanyi that in skillful human performances and "*all other instance of tacit knowing*" there is "*correspondence between the structure of comprehension and the structure of the comprehensive entity which is its object*" (TD 33-34, Polanyi's italics). Margitay claims that Polanyi only demonstrates the correspondence for first person accounts involving knowledge-like entities. In my view, Margitay's article makes some telling points that reveal the complex sort of ontology needed if one is to adopt Polanyi's view of the nature of reality in the light of his overall philosophical vision.

Before proceeding further, however, it should be emphasized that Margitay's claims, even if entirely convincing, would not by themselves discredit Polanyi's vision of a layered ontology. Polanyi's claim that there are different levels of reality, some of which are emergent on others, is an interpretation of publicly available, empirical evidence to answer such questions as, "What is the relation of conscious experience to the activity of neurons?" His interest in the relation of epistemology to ontology is triggered by his desire to account for the Meno paradox: how is it we have foreknowledge that can serve as the basis for scientific discovery? One of his answers is that we can gain explicit knowledge of empirical reality because in evolutionary perspective we, like other animals, tacitly indwell some features of empirical reality that are conducive to survival (PK, Part IV). Discovery involves a fallible process of articulation that requires crossing a gap separating tacitly sensed features from explicit description or formula.[2]

However, I will suggest that in addition to the valid points Margitay makes, he misrepresents Polanyi's thought and the evidence in several significant ways. I will offer the following numbered points to further probe what both Polanyi and Margitay are claiming. My aim is to lay the groundwork for an adequate Polanyi-based ontology that sustains the significant insights of Margitay without these insights being undermined by his problematic claims.

1. Polanyi: "all knowledge is ultimately personal" (PK xi). The distinction between the first person and the third person perspective, made use of by Margitay (139), is often relied upon by philosophers in

the analytical tradition to distinguish subjective from objective statements. This distinction is at odds with Polanyi's view that statements with an objective or third person form are, if they represent the views of the person making the claim, *personal* assertions made with universal intent (PK 28, 304-308). He states that all acts of knowing, even in the exact and descriptive sciences, "include an appraisal; and this personal coefficient, which shapes all factual knowledge, bridges in doing so the disjunction between subjectivity and objectivity" (PK 17). Margitay's distinction (139) between the validity of ontological claims made from a first person in contrast to third person perspective seems to restrict the personal dimension of knowing to the former perspective only. He thus departs from a basic point in Polanyi's epistemology.

2. Polanyi's fundamental claim that all knowing is personal does not imply that the objects that are known are all of the same ontological order. There is a fundamental difference in Polanyi's ontological vision between a) the world discovered by the physical sciences, b) the type of ordering that that is properly relied upon by the biological sciences in comprehending how life functions, and c) the realms of meaning dependent on discursive symbolism within human culture.[3] What I have referred to as the dynamo-physical world,[4] the world comprehended by the physical sciences, is a world beyond (as well as including) the self. I see no compelling evidence that Polanyi ever gave up his scientific realism insofar as he refers to the world understood through the laws of physics and chemistry. He claims, for instance, that, while both art and science involve forms of personal knowing, in natural science (unlike the creation of a work of art) "the final whole lies not within the powers of our shaping, but must give a true picture of a hidden pattern of the *outer* world" (SFS 32, my emphasis). Knowing in the physical sciences involves a submission to a discovered, independent spatial or temporal order (see KB 119-120). The scientific comprehension of the external world is rooted in perception, in sign learning (PK 76, TD 29). Perceiving the world in scientific terms involves an application of learned cognitive order in cases of description and recognition (reversible understanding, PK 105) and irreversible heuristic insight in cases of discovery or novel interpretation.

3. I find Margitay to have shown persuasively that Polanyi's postulated correspondence fails to obtain in reversible recognition and identification (see especially 132 and 138). What is at stake is Polanyi's claim that there is a parallelism between the epistemological structure by which we know the perceived object and the ontological structure of the object itself. Margitay denies this. His example of the inadequacy of what he terms the Correspondence Thesis is the structure by which we recognize a watch. A watch is a kind of machine in which its organizing principle facilitates the movement of watch hands in a way that allows persons to tell time. The time-telling function of a watch is a feature following rules different than and emergent from the properties of springs, a case, hands, etc. all organized in a specific manner. Our knowledge that a certain object is a watch does not rely upon how its parts support its organizing principle. We perceive watches in terms of internalized notions of largely surface features that have little or nothing to do with its structure, function, or organizing principle: its shape, a position on one's wrist, etc. There is no correspondence between the surface features by which we recognize the watch and its separate levels. Margitay's denial that the Correspondence Thesis always pertains seems vindicated by this and similar examples of how we recognize objects in perception. At least Margitay's argument seems established with respect to reversible cases of recognition; he does not analyze the correlations involved in the heuristic act of scientific discovery.

4. Polanyi himself can be used as a witness against the universality of the Correspondence Thesis. He refers to Rubin's ambiguous "vase or faces" picture and, using gestalt figure-ground insights, notes that the subsidiary background switches depending upon whether the faces or vase are made focal (KB 110). A

featureless background *frames* what is focused upon. How do differing but essentially featureless backgrounds have ontological status? The notion of constantly changing backgrounds to the series of objects we perceive certainly seems irrelevant to the hierarchical notion of reality that Polanyi wants to support through his Correspondence Thesis.

5. The part-whole gestalt account of recognition seems at odds with what Polanyi sensed but did not state clearly in his Correspondence Thesis. As Margitay correctly notes (132), there are different cognitive achievements included under the broad category of knowing. Recognition, identification, use, and understanding culminate in different sorts of comprehensive entities. Margitay's analyses of recognition and identification leave unexamined the heuristic achievements Polanyi was most interested in comprehending: learning, inventing or discovering something. There is an important distinction in Polanyi between reversible applications of indwelt knowledge and irreversible insights that can change to some small degree our very being. The Correspondence Thesis is plausible only in relation to irreversible achievements: the distinction between tacit knowing and explicit insight can be correlated with understanding the rules/relationships governing parts/particulars and the different rules/relationships governing the comprehensive entity.

6. Margitay's summary of the lessons he learns from his analyses (132-133) is off base in at least two respects. Because he does not recognize the difference between reversible and irreversible achievements, he writes, "Knowledge of an entity is always emergent on the clues integrated into it, even in the case of ontologically non-emergent entities" (133). For Polanyi, is 145 emergent as a solution to 53+92? No, the knowable answer is a reversible logical achievement; 53 and 92 are on the same ontological level as 145. True, the mental answer is emergent from the embodied neural processes by which the answer is created. But this sort of emergence is true of all cases of consciousness—hallucinations as well as knowing. Mathematical and logical processes are generally linear and reversible, giving answers that are not emergent. Moreover, there is a problem with speaking of "non-emergent entities," because the frame of reference is all-important. While the path of a planet may be completely determined by the laws of physics and chemistry (132), the discovery that a certain patch of light is a planet can be seen as an emergent epistemological event for the discoverer. And there are many ontological levels in the dynamo-physical world; the planet is likely emergent from interstellar gases and debris.

7. Again and again, Polanyi returned to how we are able to learn skills. He speaks of a "two-leveled structure of intentional action." Learning how to ride a bike illustrates "how an imaginative intention can evoke covertly, inside our body, the means of its implementation" ("Creative Imagination" in SEP, 259). Subsidiary feelings in our body, connected to muscular adjustments, jointly contribute to focal achievements of balance and propulsion. There does seem to be a certain analogous correlation between the lower level structure of the bike as organized to support its higher level function of providing transportation as compared to the lower level embodied sensitivities and muscular action in relation to higher level achievement of riding.

8. As already noted, Polanyi's is highly interested in understanding the processes by which scientific discoveries are achieved. Here is another path. "This is what the existing body of scientific thought offers to the productive scientist: he sees in it an aspect of reality which as such is an inexhaustible source of new and promising problems" (KB 79-80). That is, certain details of existing knowledge can function as suggestive clues to yet deeper insights into the nature of reality. A non-rigorous version of the Correspondence Thesis is thus proposed: the suggestive particulars of current knowledge can be indwelt and function as subsidiaries to higher level discoveries. Subsidiaries and focal insight of the knower are parallel to lower and higher (more general) levels in reality.

9. Now let us return to the issue of to what extent it makes sense to claim that in tacit knowing there is a correspondence between our structure of comprehension and the structure of the comprehensive entity which is its object. A crucial issue here, it seems to me, is how we are to understand what Polanyi means by a "comprehensive entity." I find it useful to distinguish between internalist and externalist notions of comprehensive entities. On the internalist view, comprehensive entities are the products of our integrative efforts to know and understand the world. For an internalist, we live and have our being within experience, and projection beyond our experience is at best speculative. The classic mode of strict internalism is idealism in its various manifestations. Phil Mullins, in his masterful study of comprehensive entities, expresses a gentle but definitive internalist understanding of the Correspondence Thesis when he states, "Polanyi's account is a perspective that marks how impossible it is ontologically to separate the knower and the known."[5]

10. Margitay, in his example of how we know a watch, seems to be opting for an externalist view of comprehensive entities. However, when he acknowledges the emergent nature of "knowledge-like entities," he seems to be accepting an internalist view with respect to how we understand others and their activities (such as their strategy in playing chess). I believe different contexts call sometimes for an internalist and sometimes for an externalist perspective. Thus I accept in general what I take to be Margitay's acceptance of both internal and external comprehensive entities. No doubt some will see this affirmation as a return to a Cartesian duality between mind and matter that so many thinkers have rightly sought to overcome. I see the great problem with Cartesian thought to be its articulation in terms of irreconcilable substances, not in any distinction between our experience and what our *sensory-based* experience refers to.

11. Surely Polanyi, with his commitment to the external world known in science as well as his internalist analyses of meaning, would agree with the bifocal acceptance of both perspectives (see, for instance, PK 195). That he recognizes a clear distinction between epistemology and ontology, and the need for care in speaking of ontological levels, is made evident in an important passage in *Personal Knowledge*. He says that, "strictly speaking, it is not the emerged higher form of being, but our knowledge of it, that is unspecifiable in terms of its lower level particulars. We cannot speak of emergence, therefore, except in conjunction with a corresponding progression from a lower to a higher *conceptual* level. And we realize then that conceptual progression may not always be existential, but that it becomes so by degrees" (PK 393-394).

12. Although I appreciate Margitay's demonstration that Polanyi's Correspondence Thesis does not apply in all cases of knowing, I find his criticism of Polanyi's notion of dual control to be flawed. "In the case of machines," he writes, "the lower level is governed by the laws of physics and chemistry determining the material and the shape of the parts of a machine, while the boundary condition for this lower level is provided by the higher level operational principles of the machine" (135). Polanyi's notion of operational principles has a greater reach than Margitay appears to recognize. How Polanyi, in contrast to Margitay, looks at a watch can be instructive here. 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). So it is that operational principles deal not only with the purpose of a machine but also with the structure and working whereby that purpose is realized. Therefore, contrary to Margitay, the lower level laws do not determine the type of material used in a machine (this is a matter of ascertaining what materials have the right properties at the right cost) nor do they determine the shape of the parts of a machine. Rather the shape and organization of the parts are among the boundary conditions imposed by a designer to achieve some goal. Certain types of metal having the needed properties (tensile strength, resistance to corrosion, etc.), which are subject to the laws

of physics and chemistry, would be selected based on higher level concerns. True emergence can only take place where there are open conditions and stable properties at a certain level of being which can be utilized via the imposition of boundary conditions without there being any chemical reaction (or violation of the laws of physics) between the levels. If there was, say, a chemical reaction, then one would witness a process of chemical change at the same base level rather than the emergence of a higher level subject to different rules than those of the lower level. Because in emergence the lower level laws and properties are disengaged from the higher level, the lower level has a supportive rather than a causal influence on the higher level. The actions of neurons *support* particular thoughts, they don't cause them. Rather it is what one has just perceived or thought or remembered that directly influences new thought, not a particular set of neurons firing.

13. Margitay attempts to buttress his critique of dual control by substituting the solar system for the machine (135). But these two terms are not equivalent. The solar system lacks the elements of design and purpose that the machine has. The operational principles of machines are telic; they are designed to achieve some purpose. The shape and operation of the solar system is fully determined by the laws and forces resident in the dynamo-physical world. It has no structuring purpose. "Inanimate nature is self-contained, achieving nothing, relying on nothing and, hence, unerring" (TD 44). A further assumption offered by Margitay also seems problematic: that the laws of physics are "complete" (135-136) and leave no indeterminacy so that any emergence must be controlled by these laws. The notion of such a deterministic universe is an expression of an objectivist perspective that is seriously at odds with Polanyi's emphasis on the many indeterminacies that limit what we can claim with certainty about ultimate reality.

14. Further, Margitay argues that "the class of nuts, bolts, wrenches, cogwheels, pneumatic tyres, medicines" (138) etc. are comprehensive entities that can be identified by their adherence to industrial standards that can be described in physical-chemical terms. But if identification is made just in terms of a physical-chemical topography, an important aspect of their being is left out: what they are designed to accomplish so that they exist in the first place. Margitay's reductionist agenda does not take purpose into consideration.

15. Summing up: Margitay is on target when he critiques the universality claimed by Polanyi in his Correspondence Thesis. But his rejection of the ability of the Correspondence Thesis to support a layered ontological interpretation of the external world is by itself insufficient grounds for rejecting Polanyi's concept of emergence and a hierarchical structure of being as a whole. In reverting to a kind of reductionistic objectivism that not only Polanyi, but many others have successfully questioned, he seems to have rejected a basic objective of post-critical philosophy. His reversion is puzzling, because in the first several sections of his article he presents a clear and well-articulated description of Polanyi's epistemology and theory of emergence. This is not to suggest Polanyi's layered ontology is beyond question. For reasons that go beyond the scope of this paper, I question Polanyi's language of "levels" and "hierarchy," as such concepts sound too discrete and static in describing the messy reality in which we dwell. This language seems to mislead Margitay into the view that Polanyi envisions a ladder-like notion of an inflexible, absolute ontological hierarchy (130). Let me conclude by quoting one whose vision of the real is somewhat different than either Polanyi's or especially Margitay's. William Wimsatt opts for the following metaphorical vision of reality, patterned after a rainforest: it has "converging overlapping branches, and patterns of intersecting order, residents, and connections at a variety of levels, but no *single* stable foundational bedrock that anchors everything else. . .It yields a kind of multi-perspectival realism anchored in the heterogeneity of 'piecewise' complementary approaches common in biology and the study of complex systems."[6]

Endnotes

[1]Tihamér Margitay, "From Epistemology to Ontology," *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi.* Tihamér Margitay (ed.) (Newcastle upon Tyne: Cambridge Scholars Publishing, 2010), pp.128-140. Quotations from this essay are simply noted by page in parenthesis in the text.

[2]Polanyi's accounts of discovery also emphasize our sensitivity to coherence and "our acknowledgement of a beauty that exhilarates and a profundity that entrances us" (PK 15). An additional suggestion about how some discoveries arise is noted in point 7 above.

[3]"No richly endowed new reality can be seen emerging in the inanimate domain. This happens for the first time in the emergence of a living being from inanimate constituents" (PK 394). "While the first rise of living individuals overcame the meaninglessness of the universe by establishing in it centres of subjective interests, the rise of human thought in its turn overcame these subjective interests by its universal intent" (PK 389).

[4]See Walter B. Gulick, "Polanyian Biosemiotics and the From-Via-To Dimensions of Meaning," *Tradition and Discovery* 39:1 (2012-2013), 21.

[5]Phil Mullins, "Comprehension and the 'Comprehensive Entity': Polanyi's Theory of Tacit Knowing and Its Metaphysical Implications," *Tradition and Discovery* 33:3 (2006-2007), 33. Mullins outlines the growing range of reference for comprehensive entities in Polanyi's writing. It was first limited to living beings but eventually used in reference to all the objects we can know (27, 31). Hence it eventually can refer to either internal or external objects.

[6]William C. Wimsatt, *Re-Engineering Philosophy for Limited Beings: Piecewise Approximations to Reality*, Cambridge, MA: Harvard University Press, 2007, p. 12.

Electronic Discussion List

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.

On Margitay's Notion of Reduction by Definition

Gergely Kertész

ABSTRACT Key Words: Michael Polanyi, Tihamér Margitay, ontological levels, reduction, multiple realizeability.

In a recent article "From Epistemology to Ontology," Tihamer Margitay argues, in addition to other things, that the ontological arguments Polanyi provided for his ontological realism with respect to the levels of reality are insufficient. Although Margitay shows this correctly in the case of arguments from boundary conditions, his arguments are not that convincing against the unidentifyability thesis, the thesis that entity kinds on higher levels cannot be identified with descriptions given on lower levels. I argue that here Polányi relies on a version of the multiple realizeability thesis and this argument can be reformulated in a stronger version against which the counterargument Margitay provides is insufficient.

In his article on Polanyi's layered model of the world, Tihamér Margitay criticizes the arguments about the levels of reality Polanyi has developed in support of his ontological realism.[1] I find most of the provided counter arguments convincing and I agree with the basic claim Margitay sets forth through a step by step scrutiny of the relevant Polanyi texts. His strategy is to list all the distinctly Polanyian arguments for emergence, or, in the terms of present day analytic discourse, for the autonomy of higher level entities postulated by higher level sciences. He shows that they are non sequitur arguments, at least in the form they have been presented by Polanyi.

In what follows, I point out, that, although I think Margitay is basically right in his criticisms, his argument is not convincing enough at one particular point where he argues that the reduction of higher level entities such as machines and biological entities can be made unproblematic by reference to industrial standards, that is, in definitions of higher level notions in lower level vocabulary as in the case of nuts and bolts (137). What I will try to show below is that there is a plausible way to defend Polanyi against the argument from industrial standards. To achieve this goal, I will analyze the original Polanyian arguments, I will provide a slightly strengthened version of them in line with the original intentions of Polanyi and, lastly, I will point out that under this interpretation the argument is less easy to defeat.

In his article under point 5.2., Margitay scrutinizes Polányi's semantic arguments for the unidentifiability of higher level entities with lower level entities (136-138). As Margitay summarizes, by these arguments "Polanyi tries to show that machines cannot be identified by their physical-chemical topography." and therefore "machines are ontologically distinct from physical objects." To investigate the way Margitay criticizes Polanyi, first I will reformulate the Polanyian arguments to draw a picture of their structure and then I will turn to the counter arguments developed by Margitay.

Reconstructing the Original Arguments

As I see things, Polanyi has two main arguments for his ontological distinctness thesis. These have also been identified by Margitay, but I would like to give a more detailed analysis of their structure in order to facilitate my argument. The first argument has to do with the possible identification of machines as kinds with their lower level descriptions. In Polanyi's view "[a physical-chemical topography] could describe only one

particular specimen of one kind of machine" (KB 175). This means that a lower level token of a higher level kind would be insufficient to grasp the higher level kind, and would leave out many lower level configurations that are equally fitted to the higher level entity kind. So, the first premise Polányi relies on is that (i) there is a one to many relationship between higher level entity kinds and lower level entity kinds.

At another locus he adds further detail to the above premise: "[a physical-chemical topography] could not characterize a class of machines of the same kind, which would include specimens of different size, often of different materials, and with an infinite range of other variations" (KB 175). This amounts to two things. On the one hand, it implies that (ii) from a lower level point of view, any lower level difference (size, material, etc.) is relevant in identifying different particular specimens of machines. On the other hand, it seems that for Polanyi (iii) having an infinite range of different specimens of a higher level kind helps to warrant the unidentifyability thesis.

So much for the first starting point; in another place, Polányi says the following: "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*" (TD 39, my emphasis). Here the question is whether it is possible to deduce the higher level characteristics of an entity from its description at the lower level. The question is somewhat oblique in this form. A more precise form of the question asks: given the total absence of conceptual instruments to identify the higher level properties of an entity, are the lower level descriptions alone sufficient to deduce the higher level properties of the same entity? If not, then one cannot grasp the higher level entity as a comprehensive entity by relying only on a lower level description.

To sum up, the first argument says that one cannot identify the higher level entities or concepts with lower level ones, whereas the second argument says we are not able to deduce the higher level properties of an entity from knowledge about the lower level description of the same entity. The first argument is in parallel with the classical argument for multiple realizeability (MR) developed by Putnam and Fodor (Putnam 1960, 1967, Fodor 1974). In other words, it says that in cases of machines or living organisms, one cannot formulate the following biconditional statement: if something is a lower level X kind, then it is a higher level Y kind and if something is higher level Y kind then it is a lower level X kind. This amounts to the metaphysical statement that X cannot be identical with Y. So, from this point on I will call the first argument the argument from MR. The second might be called the underivability (UD) argument. UD says that one cannot simply deduce higher level properties on the lower level such as being a specific kind of machine or having a specific purpose.

Counter Arguments by Margitay

Against the above arguments, Margitay develops his counter argument in two steps. Firstly, he shows us that the argument provided by Polanyi for the unidentifiability of higher level entities with lower level ones is insufficient because there are working cases of reduction where the derivation can be done, and this rejects UD. His response is as follows: "It is generally *not* true that concepts and laws of a scientific theory cannot be reduced to that of another *just because* the latter does not have the concepts of the former" (137).

This is then warranted through the example of the reduction of thermodynamics to statistical mechanics. Although Margitay does not mention it, at least since Nagel's account (Nagel 1961) of this case, it became a

classical example of successful reduction. Nagel differentiates between homologous and heterogeneous reduction and this distinction helps to clarify relevant things. In the case of homologous reduction, the vocabulary of the reducing theory contains all the same terms that the reduced theory contains. In cases of heterogeneous reduction, the reduced terms are absent from the lower level vocabulary so to reduce the higher level to the lower we are in the need of special laws, so called bridge-laws, or connecting principles and only with their help are we able to connect the two frameworks. The reduction of the phenomenal theory of heat to statistical mechanics is a case of heterogeneous reduction, so to connect the lower level theory to the higher level one we are in need of extra generalizations. The connecting principle in this case connects a lower level derived property called mean kinetic energy with the term heat from the higher level. This is a one to one relation. After formulating the connecting principle on empirical grounds, the relation between the two theories becomes a deductive one and we have an adequate case of reduction.

Because this is a clear case of reduction, we can use it as a case against UD. As Margitay puts it "[t]he lack of concepts at the lower level is not enough to show the unidentifiability of the higher level entities by lower level descriptions" (138). At this point, one might rightfully ask what is the reason why Margitay does not use this example against the MR thesis, but this question can be answered easily.

In spite of its strengths, the above example of reduction has an important weakness in the context of Polányi's thought. It deals with a specific region of reality, the physical realm, where there is no emergence, according to Polányi. Therefore, the field is still open for the reply that in the case of machines, living things, or intentional beings, there are no plausible examples like this one and from relevant passages in, for example, *The Tacit Dimension* (33-34), it seems that for Polanyi the scope of his theory of emergence is restricted to machines and living things.

The second counterargument by Margitay can be seen as an attempt to fill in this gap. This is the most important phase of his argument. Here he considers the possibility of reducing machines as machines to their physical-chemical realizers to counteract the mentioned worries. As he formulates:

> But even a *much weaker reduction*, in which the concepts of the higher level theory are *identified* with or *defined* in terms of lower level concepts, would be enough to identify comprehensive entities by lower level descriptions" (137, my emphasis).

So, there are serious possibilities to consider and these are also more relevant against Polanyi. Margitay thinks that in the case of industrial standards neither the UD argument, nor the MR argument is enough to block reduction. With the example of thermodynamics, he made a good case against UD; the same is true of industrial standards. Now he turns to MR and from the case of industrial standards, he builds an argument against Polanyi's general conclusion that all machines are emergent, irreducible entities that can only be identified on the higher level by their operational principles. To achieve his goal he relies on the following starting points:

> (1) "[S]ome machines may be—and indeed are for some purposes—identified by their physical parameters in industrial standards" (138).

> (2) "[I]f a class of machines of a particular type were finite, it could be identified by the class of the physical descriptions of each specimen. […] unidentifiability is not true of several types of machines. Industrial standards reduce the possible variations of simple tools and fittings…" (138).

The argument goes something like this. There is a real example from a practical context, the example of industrial standards, where scientists define/identify higher level entity kinds by a finite list of lower level descriptions and this case is an exception to the MR thesis as it is formulated by Polanyi.

I think there are at least two interesting, but also somewhat problematic points in this line of thought. The first that I investigate is the relation of definitions and criteria for lower level identification with reduction. Is it enough to have a full-fledged reductive explanation to define a higher level notion by a list of lower level descriptions? The second point is relevant also to answer the first question. In his paper, Margitay argues that the reduction of the possible variations in simple machines by industrial standards is in itself a good case against the MR thesis. I think this is the point where a defender of Polányi might have a chance to block Margitay's argument. In my view, this argument is insufficient because the thesis that an infinite number of different realizers is necessary for the emergentist consequences of the MR thesis to hold is not true.

Let me start with the question concerning Margitay's suggestion of reduction by definition. Where Polanyi argues that "a complete physical and chemical topography of an object would not tell us whether it is a machine", Margitay argues that there are cases when machines can be identified without reference to their operational principles by lower level definitions in industrial standards. I think Margitay is right in that at least in some cases it is possible to identify machines by reference to industrial standards and therefore some machines as entity types can be selected from a lower level point of view, but I also think that this will not solve the problem of reduction or of emergence.

Although a definition of this kind helps us to provide lower level identity criteria for a higher level entity, it will not explain the entity reductively. In other words, it will not explain in the terms of the lower level the higher level order that is grasped by a higher level concept. This is because to achieve a reductive explanation that explains the higher level order and that also achieves ontological simplicity which is an important goal of reductive attempts, one has to find a special kind of identity statement, an identity statement that identifies a lower level property kind with a higher level property kind as in the mentioned case of thermodynamics and as suggested by Nagel (1961).

My second point will explain what is left unexplained in my first note. It concerns some details of the MR argument and its relation to the problem of identification and identity statements. In locus (2) Margitay explains why he thinks that in the case of industrial standards the MR argument loses its force. From that text, it is clear that he thinks (iii) to be a constructive, necessary component of the MR thesis. So, for him to have a case of MR, an infinite number of different realizations of a higher level entity kind is needed. In this case, the only possible lower level definition would be an open-ended alternation of lower level physical topographies and such an open-ended alternation is certainly not a viable definition.

Here it is useful to reconsider the MR thesis. In the introductory phases of this essay, I have tried to differentiate some aspects of the MR argument. Now I will focus on the first part of it (i) that says that in the case of machines and living things there is a one to many relationship between higher level kinds and lower level kinds. I think, although Polanyi's formulation of the MR argument is a bit fuzzy, his argument has the same tendency as that of Fodor's (1974) classical argument.

Fodor told us that the identity theorists in the context of the philosophy of mind are wrong but not simply because there are an infinite number of different realizers for higher level psychological kinds. In his view, the main problem is elsewhere; it is that there is no traceable correspondence between higher level and lower level kinds. We simply cannot find one lower level property or a property that is derivable in lower level theories which is common to every lower level realizer. Therefore from a lower level perspective, one cannot grasp the principle that unifies all the realizers and for the same reason one cannot explain the higher level laws or causal generalizations in lower level terms. If this is true, it does not help us that the lower level realizers belong to a finite number of lower level kinds, because, from a lower level perspective, the unity of these kinds and the higher level laws by which they can be covered are simply invisible. The set in which they belong can only be constructed by the use of higher level concepts and criteria encoded in higher level terms.

So, Margitay might be right that there are cases of MR where it is possible to define a higher level kind by a finite alternation of lower level kinds, but the unity of those lower level kinds itself belongs not to the lower level, but exclusively to the higher level. A one to one relation between levels means that the structure of the two realms is somewhat isomorphic. The absence of such structural connection between the realms is the only good reason why the higher level vocabulary is ineliminable. If this strengthened MR thesis is in place, it becomes clear why the low number of variations in simple tools is not enough to show that industrial standards are good counterexamples to the MR thesis.

To show that industrial standards are good counterexamples, Margitay should show us that the definitions given in the standards are not only finite but that they are able to grasp the order expressed by the higher level concept on the lower level. But for a standard to be able to do this the engineers have to find a lower level property that is strictly identical with that of the higher level kind; without this, it is not clear that a lower level definition can explain anything interesting on the higher level. In the end, this means that a proper definition that is able to explain higher level principles has to be an identity statement that connects a lower level kind to a higher level one. If there is no such connection, following Fodor and Putnam, one is justified to say that, although multiply realized higher level entity types are constituted of physical parts, their constitutive properties are not physical properties. So, Polanyi is right in saying that machines as machines are not physical things. I think this line of thought constitutes a weighty burden for anyone who argues against the Polanyian tenet.

If this strong MR thesis is true in cases of machines and living organisms, the Polanyian view that machines and living organisms are emergent entities and can only be identified by their operational principles remains defendable. Even if we are in the position of constructing definitions like industrial standards referred to by Margitay, prior knowledge of higher level principles is needed to construct the standard. The reasons why the elements of a finite definitive alternation are applied to the same group can originate only from the higher level description. So, the order that constitutes machines is up there and cannot be understood on the lower level.

As I see things now, there are only two ways to avoid this conclusion. The first is to prove that the MR thesis is false in general or, if it false in at least some cases, to prove there are industrial standards relying on proper bridge-laws as is required by the classical Nagelian theory of reduction. Both would prove Polanyi to be false in this respect.

Endnotes

[1]Quotations from Tihamér Margitay's "From Epistemology to Ontology" in *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi* are simply noted by page in parenthesis in the text.

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Submissions for Publication

Articles, meeting notices and notes likely to be of interest to persons interested in the thought of Michael Polanyi are welcomed. Review suggestions and book reviews should be sent to Walter Gulick (see addresses listed below). Manuscripts, notices and notes should be sent to Paul Lewis. Manuscripts should be double-spaced type with notes at the end; writers are encouraged to employ simple citations within the text when possible. MLA, APA or Chicago style are preferred. Because the journal serves English writers across the world, we do not require anybody's "standard English." Abbreviate frequently cited book titles, particularly books by Polanyi (e.g., *Personal Knowledge* becomes PK). Shorter articles (10-15 pages) are preferred, although longer manuscripts (20-24 pages) will be considered. Consistency and clear writing are expected. Manuscripts normally will be sent out for blind review. Authors are expected to provide an electronic copy as an e-mail attachment.

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What Engineers Can Do but Physicists Can't: Polanyi and Margitay on Machines

David W. Agler

ABSTRACT Key Words: Michael Polanyi, ontological emergence, technological reduction, industrial standards, philosophy of technology, philosophy of engineering.

This is a comment on Tihamér Margitay's "From Epistemology to Ontology," where he criticizes Polanyi's claim that there is a systematic correspondence between the levels of ontology and the levels of tacit knowing. Margitay contends that Polanyi supports this correspondence by appealing to a "purely ontological argument," one which concludes that it is impossible to reduce machines to a singular, chemical-physical type, and criticizes this claim by pointing to industrial standards (machines that do reduce to singular physical-chemical type). I respond to Margitay's claim by distinguishing two different "purely ontological arguments" in Polanyi's thought (one relying on the multi-realizability of a machine in different physical-chemical types, the other pointing to the inability of a purely physical-chemical ontology to account for the artificial shaping and functioning of machines). With these two arguments clarified, Margitay's criticism by appealing to industrial standards loses much of its initial force.

Michael Polanyi contends that the properties of machines supervene on physical-chemical properties (i.e., there is no difference in the mechanical properties of a machine without a difference in its underlying physical-chemical properties), but he rejects the ontological component of physicalism that physics and chemistry have complete authority over specifying what there is. Clocks, typewriters, boats, telephones, locomotives, and cameras are ontologically complex and emergent entities composed of (i) a lower layer consisting of physical-chemical particulars that are governed by physical-chemical laws and (ii) a higher layer consisting of novel properties belonging to machines and laws governing these properties (cf. Polanyi 1962 [1958]:328). Machines represent time, allow philosophers to punch out books, and ease our travels by land and sea but these functional properties are *ontologically emergent*. As such, they don't reduce to lower-level physical-chemical properties and the higher-level laws that govern these machines cannot be reduced to lower-level physical-chemical laws.

In no sense is it the case that higher ontological layers "break" physical chemical laws for Polanyi contends that machines are subject to "dual control," namely they are controlled both by lower level laws that apply to the particulars of the object in themselves and by higher level laws that apply to the comprehensive entity formed by these particulars (1966:36). Rather, while physics and chemistry may have full coverage over the particulars of reality, it does not have full coverage over the entities that emerge out of these particulars. So while machines are comprised of particulars that are themselves governed by physical-chemical laws, these laws do not cover certain novel properties that belong to machines.

Polanyi's Correspondence Thesis Argument for Ontological Emergentism

How does Polanyi establish this claim concerning the ontological emergence of machines? Polanyi's argument is this:

Polanyi's Correspondence Thesis Argument for Ontological Emergentism	
P1	*Correspondence Thesis*: There is a systematic correspondence between the levels of ontology and the levels of tacit knowing (cf. Polanyi 1966:33-34)
P2	*Structure of Tacit Knowing*: When we engage in tacit knowing, we integrate subsidiary clues into a focal whole (e.g., a recognized object, a skillful act, a justified belief). In this structure, it is impossible to reduce the focal whole to a single set of clues and to a single way in which they were integrated for (i) the same focal whole is realizable by heterogeneous types of subsidiary clues and (ii) the same subsidiary clues, in their functional relationship, can be realized by different focal wholes.
C	Thus, it is impossible to reduce complex ontological entities like machines to a single set of physical-chemical particulars and a single way in which they were constituted for (i) a machine as a type is realizable by heterogeneous types of physical-chemical particulars and (ii) one set of physical-chemical particulars, in their functional relationship, can be realized in different machine types.

Against this argument, Tihamér Margitay (2010) has argued that Polanyi's *general* thesis that there is a systematic correspondence between the ontological levels and the hierarchal levels of knowing (P1) is false. According to Margitay, we ought to moderate Polanyi's position by confining it only to skillful performances and not to ontology writ large. On his account, we cannot determine the ontological structure of a complex entity simply by appealing to the way in which we know these entities. There is nothing about the latter that determines the former. Thus, when Polanyi (1966:55) writes that "the structure of tacit knowing determines the structure of comprehensive entities," Margitay (2010:131) contends (and I agree) that this is an overstatement. In order for Polanyi to defend the correspondence thesis (P1), what he must do is pursue some purely ontological argument. However, Margitay also argues that Polanyi's purely ontological arguments don't work either. In what follows, I present two such ontological arguments, articulate Margitay's objection to one of these, and offer a Polanyian response to this objection.

The Multiple Realization (the Many-One) Argument

Just as it is impossible to reduce the focal whole to a single set of clues and single integration, Polanyi argued that it is impossible to reduce a complex entity like a machine to its physical-chemical parts. According to Polanyi, "[m]achines are solid structures made up of several parts, which have their several functions in the operation of the machine" (1969 [1962]:175). While a token of a machine can be defined through a physical-chemical description of the particular configuration of these solids, Polanyi argues that a *type* of machine cannot be defined in this way. Why? Polanyi's answer was that such a description would fail to take into account that there are an infinite number of diverse realizations of the same machine as the same machine could be made in different sizes and different materials (1969 [1962]:175, 1962 [1958]:328-29). Given that a higher level type (the machine) corresponds to several heterogeneous lower level types (the latter of these being given a physical-chemical description), there can be no *unified* physical-chemical account of what a machine is or how it operates. And so, given the infinity of diverse realizations, Polanyi concluded that a class

of machines "*cannot be even approximately specified in terms of physics and chemistry*" (1962 [1958]:329, 1969 [1962]:175).

Margitay argues that in putting forward the above argument, Polanyi overlooked the significance of industrial standards. "Industrial standards," Margitay writes, "show that comprehensive entities can be identified by physical-chemical parameters" as these standards "reduce the possible variations of simple tools and fittings which for Polanyi are emergent structures in the same way as machines are […]. Standards specify the physical-chemical topography of nuts, bolts, etc. by specifying their dimensions and chemical compositions" (2010:138). In other words, Margitay points to one higher level *type* (of machine) that corresponds to a single lower level type, the latter of which can be given a unified physical-chemical description.

Polanyi, I think, has three options. First, he could respond by saying that nuts, bolts, etc. are *not machines* and so while those types of things admit of reduction, *real machines* don't reduce. This seems a little ad hoc but whenever Polanyi refers to machines, the ones that he has in mind are clocks, typewriters, boats, locomotives, and cameras and his typical description of machines are those with multiple, separated, and interacting parts (see 1962 [1958]:328). Second, Polanyi could moderate his correspondence thesis and say that *some types* of machines are not emergent and these wholly reduce to physical-chemical types, but *other types* of machines (e.g., types that allow for heterogeneity of parts and size) are emergent and so cannot be reduced as Margitay suggests. Note that Polanyi would have to weaken the correspondence thesis (P1) so as to say that the structure of tacit knowing corresponds to the structure of ontology not in every case but just in those cases where the subsidiary parts are notably heterogeneous. Finally, Polanyi could contend that this argument is meant to be a knock-down argument. Instead, it is a part of a multi-pronged approach to showing that machines don't reduce to a single physical-chemical type. Thus, while the objection from industrial standards is effective, Polanyi might appeal another argument to shore up his correspondence thesis. But, for this to be an effective reply, Polanyi would need another purely ontological argument. It is to this that I now turn.

The Context-Dependence (the One-Many) Argument: What Engineers Can Do but Physicists Can't

Polanyi pointed to another way in which the levels of tacit knowing correspond to ontological layering, and thus another way in which machines are emergent entities that supervene upon (but don't reduce to) physical-chemical objects. Just as it is impossible to reduce a focal whole to a single set of clues and integration (as the same subsidiary clues can be realized by different focal wholes), it is impossible to reduce a single machine type to a single set of physical-chemical particulars as their constitutive relation allows for realization in different machines and even non-machine types. In other words, a one-many relation exists between physical-chemical particulars and higher-level types wherein the same physical-chemical particulars can be realized in several different machine types. This multiple realization of the same physical-chemical particulars on a higher level is thus due to the fact that lower level physical-chemical laws and particulars do not determine the upper level laws that govern machines.

Polanyi's argument for this position is similar to those who argue against biological reductionism. For example, a single allele can result in different phenotypes for the higher level property partially depends upon the *context* in which the allele occurs. For Polanyi, however, the contextual features that allow for a single set of physical-chemical particulars to be realized in different machine types are those relating to the human shaping, organizing, and developing of physical-chemical particulars for material human advantage.

Polanyi's argument begins with a definition of a machine as something that is both *artificially shaped* by intelligent beings and employed for a *specific purpose*, usually for some material advantage (1966:40, 1969 [1964]:153-54, 1969 [1968]:225).[1] Next, Polanyi contends that while physical and chemical properties and laws are independent of whether intelligent beings exist, the properties of machines and their laws depend upon intelligent beings existing (cf. Polanyi 1969 [1968]:225). On this account, to be a machine is to exist in a relation to an intelligent being's capacity to mold physical-chemical particulars in a certain way and to their goals. Thus, the same physical-chemical particulars could constitute several different types of machines for they might be integrated for different purposes or conceived as having different functions. But, perhaps more importantly, we might draw out the following consequence:

> from the point of view of the physicist qua physicist, if there were two objects x and y, both consisting of the same physical-chemical particulars but where x is both the result of human invention and plays an instrumental role in human life while y naturally emerged as a result of cosmic chance in a world devoid of intelligent life, then x and y would be metaphysically identical.

For Polanyi then, the above consequence shows that a reduction of entities to wholly physical-chemical entities would not allow for any difference between those complex objects that we intuitively recognize as machines (i.e., those that are the result of human shaping and that play a role in human goals) and those that naturally emerged. There is thus no one-to-one reduction between a unitary description of physical-chemical particulars and a machine type as machines only exist relative to the role they play in intelligent activity.

This lack of an ontological difference translates into an important explanatory difference with respect to physics and engineering. On Polanyi's account, there is something that engineers can, but physicists cannot, tell us, namely:

(i) whether an object is a machine (1966:39, 1962 [1958]:330),
(ii) how a machine works (1966:39, 1969 [1964]:153, 1962 [1958]:330), and
(iii) the purpose of a machine (1966:39, 1969 [1964]:153, 1962 [1958]:330).[2]

If we take a strictly physical and chemical perspective—abstracting the human element out of ontology—, then Polanyi contends we cannot explain (i)–(iii) precisely because the particulars and laws of physics and chemistry are specified independently of their artificially shaping by and functional purpose for humans. Thus, the correspondence thesis holds: for just as acts of tacit knowing require an integration of subsidiary clues into a focal whole, Polanyi contends that machines require a special kind of integration of physical-chemical particulars.[3]

Endnotes

[1]Concerning the point that something is a machine only if it can be employed to serve a purpose, Polanyi (1962 [1958]:330) writes: "We identify a machine by understanding it technically; that is, by a participation in its purpose and an endorsement of its operational principles."

[2]What is, however, a pretty constant point is that there are certain explanations that only physics and chemistry can provide, namely engineering cannot ultimately tell us why a machine failed (1969 [1962]:176,

1969 [1965]:217-18, 1966:39, 1969 [1968]:225). In relation to tacit knowing, Polanyi contends that we can use a machine skillfully without knowing how it works (1966:19-20; Polanyi and Prosch 1975:141) and that we can know how a machine works without knowing how to use it skillfully (1966:19-20).

3 Thanks to Phil Mullins, Ryan Pollock, Daniel Palumbo, and Steve Walton for comments on drafts of this paper.

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Does Polanyi's Thought Affirm A "Correspondence Thesis"?

John V. Apczynski

ABSTRACT Key Words**:** comprehensive entity, hierarchical structure of knowing and being, arguing across cultural frameworks, heuristic strategy.
These remarks are comments on Tihamér Margitay's criticisms of Polanyi's so-called "correspondence thesis" in his recent essay "From Epistemology to Ontology."

One of the most satisfying aspects of studying the thought of Michael Polanyi for me lies in its profundity. Time and again I have been surprised to discover implications in his writings that I had not noticed previously, but which emerged only as I approached his corpus with new questions. Implied in this phenomenon is the acknowledgement that an inquirer's assumptions contribute significantly towards the understanding of his thought. My upbringing in the Catholic intellectual tradition, for example, made the initial foray into Polanyi's thought more manageable, particularly in the context of the prominence of the then regnant forms of positivism and empiricism in the Anglo-American philosophy of my graduate school studies. Likewise this intellectual tradition allowed me to appreciate Polanyi's later reflections on deeper meanings sustaining culture and their process of transmission as continuous with his earlier reflections on the progress sustained by scientific communities, when some of Polanyi's students viewed this as discontinuous.

As I worked my way through the essays collected in *Knowing and Being*, several such capacious moments arose. One of the more stimulating, and for me troubling, features of Polanyi's thought brought forth here was Tihamér Margitay's claim that Polanyi proposed a "Correspondence Thesis" according to which the hierarchical structure of tacit knowing constitutes the basis for the hierarchical structure of comprehensive entities (130-31). That Polanyi proposed a structural similarity between the pattern of comprehension and the elements of a reality thus comprehended is a fundamental feature of Polanyi's thought well-known to all who study his work. In his essay, however, Margitay explicates this in a way that I find problemati—at least if I am understanding him correctly.

Let me first explore what I believe Margitay is proposing on this point. In the third section of his essay, "Reality Is Hierarchical Because the Way We Know It Is Hierarchical," he declares that "Polanyi wishes to model the structure of reality on the structure of knowing" (130). This curious way of phrasing Polanyi's intention gave me pause, particularly once he asks how the structure of knowing and the hierarchical ontology are related exactly—something I never thought Polanyi attempted. With this question in mind, Margitay then shows how Polanyi used the example of a skillful human performance as an example of a comprehensive entity with a structural similarity to an act of comprehension as the basis for a generalization for the ontological structure of all comprehensive entities. Margitay's focus is on the similarity of the structural patterns which he interprets in the strongest possible way: "the structure of the entity is *the same as* the epistemic structure of the knowing concerning that entity" (131). I take this to mean that the structure is identical. If so, he then

asks quite appropriately, why we should assume with Polanyi that this is generalizable to all entities. (In the original passage, Polanyi says "real comprehensive entities" [TD 34], not simply "entities.")

Here is where Margitay makes another claim about Polanyi's theory of personal knowledge that I had never entertained: it is the structure of tacit knowing that makes an object hierarchically structured. He bases this on a summary observation Polanyi made in the *Tacit Dimension*: "the structure of tacit knowing determines the structure of comprehensive entities" (55). Again, as I understand his focus, Margitay is pushing this in the strong sense of the knower's activity "shaping" or "constituting" the object known insofar as it is hierarchically structured. There are obvious problems with Polanyi's theory, if this is what he intended.

But do these strong claims accurately reflect Polanyi's position on the structure of tacit knowing and the hierarchical structure of comprehensive entities? If they do, I must acknowledge that in my years of studying and relying on Polanyi's insights I had not been aware of them. My own understanding is that Polanyi does not propose a "correspondence thesis" as Margitay presents it. How should we then understand Polanyi's proposal for a structural similarity? Here I wish to recall my initial observations about the way in which readers' assumptions affect their understanding of Polanyi's position. Polanyi was writing in a cultural context of an empiricist understanding of scientific practice with an attendant reductive materialism. Within such an intellectual framework, Polanyi had to persuade his audience to adopt—at least temporarily and provisionally—an alternative set of tacit assumptions to appreciate the thrust of his insights; he could not appeal to shared assumptions to prove an argument. In his introductory reflections in *The Study of Man*, for example, he attempts to portray the implications of an ideal of totally objective knowledge as logically impossible in the hopes that his readers might shift their awareness so that they indwell his understanding that all knowledge requires the personal participation of a knower for it to be genuine. There is no "argument" as such to prove or demonstrate his point since there is no common frame of reference. His reader makes the personal judgment to attempt to shift awareness or simply fails to understand Polanyi's point from the dominant framework with its more restrictive presuppositions. In this context, then, Polanyi is not arguing that the structure of tacit knowing demonstrates the reality of dual control manifested in comprehensive entities; he is using it as a clue to point a way out of a reductive materialism for understanding human reality and values.

Interestingly, Margitay seems to acknowledge this when he suggests that we may take the Correspondence Thesis as something like a heuristic device (133-34). Even though, as he points out, there are many textual instances from Polanyi's work that would support such an approach, he finally rejects it because it would not support the positing of a Correspondence Thesis in the strong sense that Margitay affirms. I believe he is correct in emphasizing Polanyi's heuristic interests, not in holding firm to strong correspondence.

Why, then, does Margitay continue to affirm this strong sense? My surmise is that he is working out of a set of technical philosophical assumptions that requires "proof" in a fairly strong sense to defend a claim—something rather different from Polanyi's originating context. If this is correct, he then works to salvage a portion of Polanyi's insight by claiming to demonstrate that his argument for the function of tacit knowing does support the claim of a hierarchically ordered ontology for knowledge-like entities. These are, he claims, emergent realities in the strong sense, with far-reaching consequences for human values of truth, community, and tradition (139). In this way his reflections merge once again with Polanyi's.

Emergent Knowledge and Its Challenge to Reductionist Thought

Mihály Héder

ABSTRACT Key Words: Michael Polanyi, Tihamér Margitay, emergent knowledge, reductionism, machines, standards.
The title of Tihamér Margitay's recent article "From Epistemology to Ontology" refers to a strong interpretation of Polanyi's correspondence between knowing and being that enables ontological claims on purely epistemic grounds. I accept Margitay's final conclusion which rejects strong correspondence, although on entirely different grounds. In addition, I point out that his treatment of Polanyi's ontological claims about machines is based on yet unfounded assumptions about the nature of physics and technical design.

Introduction

Tihamér Margitay's essay "From Epistemology to Ontology" in the new volume *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi*[1] gives an exceptionally interesting interpretation of Michael Polanyi's views on ontology and emergence. He discusses four central questions in a clear, straightforward, and refreshingly concise fashion. These are: What is the structure of knowledge? What is the structure of reality? What is the connection between the two? Are machines identifiable or fully describable in descriptions focused on standards? Later in my reflections I suggest why Margitay believes this latter question is relevant to the other questions. I think that Margitay's effort to define and address an interesting problem in Polanyi's thought by formulating and addressing these four questions is, in general, a solid and searching effort. However, I find that Margitay imports certain assumptions, sometimes explicitly acknowledged and sometimes unacknowledged, that are not supported by arguments. Margitay's conclusions based on these assumptions therefore do not seem convincing, although this does not diminish his article's thought-provoking character.

The Structure of Knowledge

Let me attempt to summarize what Margitay tells us in the first section of the article. Apparently, he is convinced by Polanyi's account of the structure of knowledge. Accordingly, Margitay contends that what he calls knowledge-like entities (for instance, our understanding of other persons) exist at a higher ontological level than, for example, physical things. In the concluding section of his essay, Margitay reassures us about this position; moreover, he claims that knowledge-like entities contribute to personhood. At the same time, he postulates that communities, truth, and other things that are personal have ontological status that is similar to the status of knowledge-like entities.

The Structure of Reality and Its Correspondence with our Knowing

In sections 2-4 of his essay, Margitay argues that, albeit convincing in itself, Polanyi's account of the structure of knowledge cannot serve as a foundation upon which to base the ontological structure of the world. These sections are underlain by a particular interpretation of Polanyi, according to which the structure of reality corresponds to the way we know it. In Margitay's interpretation, this claim holds for all the things we know as part of reality.

Margitay's interpretation of Polanyi is based on several passages from *The Tacit Dimension*. I do not agree that Margitay's literal reading of this material is what Polanyi intended. Margitay contends that Polanyi was affirming a strong, universal correspondence thesis. If a strong correspondence thesis were provable, it would give enormous power to Polanyi's philosophy. However, Margitay finds this strong claim inconsistent with Polanyi's other claims and ultimately Margitay rejects the strong claim.

First, let us see in detail how Margitay reconstructs Polanyi, based on *The Tacit Dimension*:

- M-P-1) Reality has a hierarchical structure; it consists of ontological levels. There are principles on the lower levels, e.g. physical-chemical laws, but these laws do not govern the structure of all things. There are emergent entities, the structures of which are controlled by higher-level principles within the limits left open by the lower-level principles.
- M-P-2) Polanyi wishes to infer the structure of reality from the structure of knowledge. Recall that Margitay has already accepted Polanyi's claim that knowledge-like entities have higher ontological status than lower level principles.
- M-P-3) There is a correspondence between the structure of knowing and its object.
- M-P-4) Moreover, things in the real world have a certain ontological status that "follows from" the way we know them.

Margitay's main argument against Polanyi's Correspondence Thesis is that Polanyi acknowledges the existence of certain non-emergent entities, like planets, that we know as complete wholes. As completely determined by the laws of physics and chemistry, planets have no higher or lower levels. Yet, the structure of our knowing planets is similar to knowing a scientific theory, for example. This means that, according to M-P-3 and M-P-4, the ontological structure of the planet should be similarly emergent. In this way, Polanyi contradicts himself. Margitay then concludes that in such cases there is no correlation or even a correspondence between the structure of our knowledge and the structure of reality.

But does the conclusion in Margitay's argument necessarily follow from the premises? Contra Polanyi, it could be claimed that the planet as a whole has a higher or different level of control than its parts. In other words, Polanyi may be seen to be wrong about postulating that planets are actually reducible to their parts, while being right about the Correspondence Thesis. Of course, this opens up a different discussion, but we could then directly link this correspondence to Polanyi's notion of grades of increasing "intensity of coherent existence" (*PK* 38). Developing this notion would present a major challenge for Polanyi's philosophy, but it would not be a larger challenge than proving the complete collapse of the Correspondence Thesis. In sum, I do not think Margitay proposed enough arguments about why we should abandon the Correspondence Thesis.

While it is logically possible that entities like planets can be seen as emergent, I do not think myself that this is the best counter to the contradiction postulated in Polanyi by Margitay. I think that "all instances of tacit knowing" in the *TD* passage Margitay quotes always refers to something that is capable of some achievement or performance. In other words, the reference is to what is active and independent. This is also why the word "effectiveness" is used in the next sentence (*TD* 34) following the section Margitay quotes. Thus what Margitay omitted in his Polanyi quotation, Polanyi's subsequent usage of the word "effectiveness," makes no sense if we try to apply it to a cobblestone or a planet. In Polanyi's perspective, "effectiveness" is the property of machine-like things that have functions (and for him these are mainly living organisms whose rationality is understandable by indwelling). Therefore, I think that the Correspondence Thesis definitively linking the

structure of real entities and the structure of our knowledge about them holds for things that are subject to some active principle.

Finally, let me concentrate on M-P-4. There is a certain ambiguity in how Margitay formulates his interpretation ("follows from"). Margitay rejects this "stronger" correspondence. However, it remains unclear what it would mean if this strong correspondence thesis were true. Is the higher ontological status of something *caused* by our knowing? Then, are animals, machines, etc. emergent *because* of the way we know them? And finally, is our personality emergent *because* we exercise the act of knowing ourselves? Truly, it is difficult to imagine how it would be possible that epistemology turns to ontology in this way. This would either mean that everywhere a knower appears, things start to be emergent, or that ontological emergence is not a property of an entity but rather a property of the relation between the knower and the entity.

To sum up, my criticisms of Margitay's treatment of strong correspondence are of several sorts. I think that his conclusion is not well-founded on its premises. Also, one of the arguments—that Polanyi's correspondence holds for every object that we know—seems based on an incorrect interpretation of the Polanyi passage in question. Undoubtedly, the "all other instances of tacit knowing" phrase is misleading, but the expressions in close proximity to the phrase do not support that we should understand it literally. And finally, interpreting the proposed strong correspondence to give epistemology priority over ontology (which Margitay's interpretation could be seen as suggesting) would not fit into Polanyi's scheme in general, in which life itself emerges from a previously inanimate environment at the beginning of evolution.

However, on totally different grounds, I agree with Margitay that correspondence could only be a heuristic device for discovering reality. This also means that Polanyi needs ontological arguments, which he indeed has. But I disagree with Margitay's statement that correspondence with "[the structure of reality] should be justified by *purely ontological arguments,*"(134, italics mine) as the necessity of this is not shown. Polanyi's arguments concerning reality must have *ontological content,* but those arguments are epistemological in nature at the same time.

Ontological Arguments

In section 5 of his article, Margitay reconstructs what he believes are some fundamental ontological claims that Polanyi makes. According to these claims, there are lower level laws, such as physical-chemical principles that—while always being in effect—do not completely determine the shape and structure of everything. Namely, there are emergent entities, some important aspects of which are co-determined by higher level laws operating within the limits left open by lower-level laws. In other words, a description relying on only the most fundamental physical laws will not completely account for all the entities that there are. Margitay counters this claim by postulating what he claims is the general view that physics is complete (135-136). Consequently, if physics is complete, then Polanyi's claim that some higher principle than physics is needed to account for some comprehensive entities cannot be true.

There is not much to say about Margitay's inference. It is absolutely true that if we know for sure that physics is complete, then there is no need for a higher-than-physical law to shape physical properties of objects. I think what is happening here is the clash of two alternative or incompatible ontologies: reductionism versus emergentism. Polanyi's hierarchical ontology only makes sense if we allow that there might be at least some entities that are not completely determined by physics.

Let us examine more closely the details of Margitay's argument in section 5.1. Before he somewhat out of the blue proposes the completeness of physics—again, if this is accepted, that is enough to destroy ontological emergence in itself—he recites Polanyi's affirmation that a reductionistic description of a planet in terms of only physical-chemical laws is adequate. In this argument, Margitay then replaces the planet with a watch ("the particles constituting a particular configuration of solids that we now call my watch" [135]) and asks why the same physical-chemical laws could not also determine the watch's particular particle configuration. However this question is an answer masquerading as a question since he already assumes that the watch as a whole is identical to the set of its particles. Moreover, if I actually traced back how the particular configuration of my wristwatch came into existence, I would soon find that a person designed the structure of the watch. Claiming that the watch is determined as much by fundamental laws of physics as a planet also implies that the human act of designing things (using one's knowledge) is also fully determined by physics. I think this is in contradiction with Margitay's final conclusion about the ontological status of knowledge-like entities, or, at the least, he weakens his case for knowledge-like entities by denying their causal effect on the physical world. I must admit though that had he used the example of a prokaryote instead of a watch, it would have been an entirely different argument, as prokaryotes are not designed.

Identifiability by Standards?

In section 5.2, Margitay recalls the case of statistical thermodynamics to illustrate how a higher-level theory (TH) can be reduced to a lower-level theory (TL). Then he goes on to consider technical standards, which in his view are able to fully identify machines. I think this is the least convincing part of his article. True, it might be logically possible that a standard is able to completely describe a machine, but in general, this is not the case. Moreover, exhaustive "physical" description is not even the goal, but only a side effect of standardization. It is only commonplace with certain types of machines that Margitay uses as examples—basically machines that have no moving parts. The goal of standardization in general is to enable technical collaboration and prevent vendor monopoly. Therefore, a standard should leave as many properties indeterminate as possible without breaking the functionality, so that a standard-compliant artifact can be manufactured in multiple ways and by multiple manufacturers. This is why testing and certification usually are important aspects of standard documents. And indeed, telecommunications standards like GSM or energy management standards like ISO 50001 are almost completely functional so that a variety of mobile phones or new kinds of energy efficient technical artifacts can be realized. Finally, Polanyi's remarks on destructive analysis, especially those that concern his industrial experiences with the Tungsram light bulb factory (PK 52) where he helped to develop a standard technology for krypton gas manufacturing, suggest that technical descriptions were known to him However, he simply did not attribute to them as much identification capability as Margitay does.

The matter of the scope of identity capability provided by standards is not my real problem with Margitay's arguments. He could argue that there are many machines that are identifiable by standards or their blueprints, regardless of the fact that many standards are function-oriented. My real problem is that he makes the standard description of a nut or bolt appear to be a matter of a *physical-only* description. The standard of a bolt is mainly based on a blueprint that depicts the object from left, right, top, cross-section, etc. True, physical-chemical parameters are also described, like width, height, composition; however, claiming that a full or exhaustive description is *all-physical* without any further explanation is turning physics into a *super-physics* that would include non-natural shapes and specific arrangements, which in my opinion occurs all-too-often in reductionist arguments.

This becomes more evident if one looks at the blueprint of a watch. Here, not only are shapes and dimensions depicted, but also relations, movement paths, rotation directions, and other complex matters. A proper reduction to physics would mean that all these parts are reduced to sets of particles, just as when the shape of crystals is reduced to molecule arrangements or thermodynamic effects are reduced to statistical particle positions. For instance, a rotating gear-wheel should be reduced to a particular set of particles that are moving together around a certain axis. Their movement is maintained by meshing with another similar particle set. In short, if we wish to really reduce technical descriptions, and not merely *merge* them into physics, we should think more along the lines of the *Laplacean daemon*. Of course, my argument here does not hold for coloring agents, food grade salt, etc. It is true that such elements are standardized, but this does not make them machines. I also admit that there are borderline cases, like bolts or complex medicine with enteric coating, but this does not change the status of machines in general. In my opinion, Polanyi's plan with discussion of machines in general was intended only to establish a category. Polanyi's machines as human designed purposive devices really are fundamentally akin to living organisms ("living mechanisms are classed with machines" [KB 226]). Our attention then should be directed towards the challenges associated with the reductive analysis of, for example, an amoeba. It is not a fixed set of particles, as it constantly replaces matter by metabolism. If we allow physics to talk about places or positions in an arrangement—that actual particles that come and go can fill—that still doesn't help, as the arrangement itself is constantly changing. Still, humans can quite easily keep track of a particular amoeba under a microscope and not get puzzled by the fact that the matter the animal is built from is constantly changing. In Polanyi's view, this is because the amoeba is truly irreducible to its parts. According to reductionists, the reduction of these kinds and other machines—while indeed challenging—could be done some day, just as it was possible to reduce crystals and thermodynamic effects. One could assume a waiting position to see whether an emergentist or reductionist ontology will have more evidence in the long run. Therefore, Margitay's statement that "the lack of [higher level] concepts [on the lower level] is not enough to show the impossibility of identification and to establish ontological differences thereby" (138) seems to be true. While the structure of our knowing of such machines is multi-leveled, that can be an illusion, and they might actually be simple physical-chemical things. *Yet, as long as the reduction is not done, we cannot establish this ontological position either.*

Conclusion

In the concluding part of his article, Margitay states that Polanyi cogently argues for the ontological emergence of knowledge-like entities. However, we can deduce from the way Margitay uses the watch as an example, that in his view these entities cannot co-determine the shape of simpler objects; in other words, there is no downward causation. Otherwise, he would have to accept that shapes of machines are co-determined by an emergent person who is irreducible to the physical-chemical laws. On his view, while knowledge-like entities are emergent, they are also detached from the physical world, and the person's actions are completely determined by the physical-chemical laws only. I think refuting that actions are determined by human knowledge is the main challenge that Margitay's view of emergent knowledge in an otherwise reducible world has to face.

Another issue that remains open is whether all living organisms—in Polanyi's system there is a gradual evolution of personhood, which began with the simplest life forms (PK 383-390) —also represent different levels of emergence. This, despite all the counter arguments Margitay provides, would result in a hierarchical ontology that is very similar to Polanyi's own system. Otherwise, we will get a dualistic worldview in that there will be a contrast between the emergent human person and the rest of the physical and biological order.

Although I think Margitay's arguments suffer from some internal inconsistencies and were shaped by preliminary assumptions that determined the outcome of his investigations regardless of Polanyi's arguments, I really enjoyed reading his paper. I am sure his clear and concise position is a very good start for a fruitful debate that will unfold interesting details of both the emergentist and the reductionist worldviews.

Endnotes

[1]Tihamér Margitay, "From Epistemology to Ontology," *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi* Tihamér Margitay (ed.) (Newcastle upon Tyne: Cambridge Scholars Press, 2010), 128-140. Subsequent quotations from this essay are simply noted by page in parenthesis in the text.

Notes on Contributors--continued from p. 26

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Tihamér Margitay (margitay@filozofia.bme.hu) is Chairperson of the Department of Philosophy and the History of Science at the Budapest University of Technology and Economics. His essay "From Epistemology to Ontology: Polanyi's Arguments for the Layered Ontology" in *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi* (Tihamér Margitay, ed. [Newcastle upon Tyne: Cambridge Scholars Publishing, 2010], pp. 128-1400), is the centerpiece for discussion in the six essays by other scholars in this issue of TAD.

Kyle Takaki (ktakaki@hawaii.edu) is an independent scholar interested in complexity and its relations to the continuum of tacit knowing. He continues to struggle with aligning this personalist project with the pursuit of sophia, amidst the fractures of modern philosophy.

Margitay on Emergence and Ontological Hierarchy

Kyle Takaki

ABSTRACT Key Words: complex-systems thinking, embodied realism, epistemic-ontology, pursuit of truth
Tihamér Margitay makes two key moves against Polanyi's hierarchical ontology in his essay "From Epistemology to Ontology." I address these two moves and defend Polanyi from a complex-systems point of view.

Tihamér Margitay's incisive essay draws out potential problems in Polanyi's hierarchical ontology. In this response piece I address two of Margitay's key points concerning his notion of non-knowledge-like entities, which he claims are not always hierarchical in structure. I first present portions of Margitay's argument, then suggest ways in which a Polanyian could respond by expanding upon Polanyi's hierarchical view.

I think Margitay identifies a tension in Polanyi's thought that I suspect Polanyi grappled with but lacked the conceptual resources to fully address. The tension issues from what Margitay calls the "Correspondence Thesis" (CT), which holds that the structure of tacit knowing maps to the structure of a comprehensive entity that is tacitly being understood. One implication of CT is that since focal objects of knowing are emergent wholes that aren't reducible to their clues, so likewise comprehensive entities are emergent wholes not reducible to their parts. Margitay thinks that CT is remarkable and holds for knowledge-like entities (and certain non-knowledge-like entities as well), but that CT is problematic when applied *in general* to non-knowledge-like entities. The tension that Margitay draws out in Polanyi's writings stems from CT applied to non-knowledge-like entities that are not clearly emergent, contrary to what the mapping for CT indicates. Below is a picture of CT that will provide guidance for addressing Margitay's criticisms:
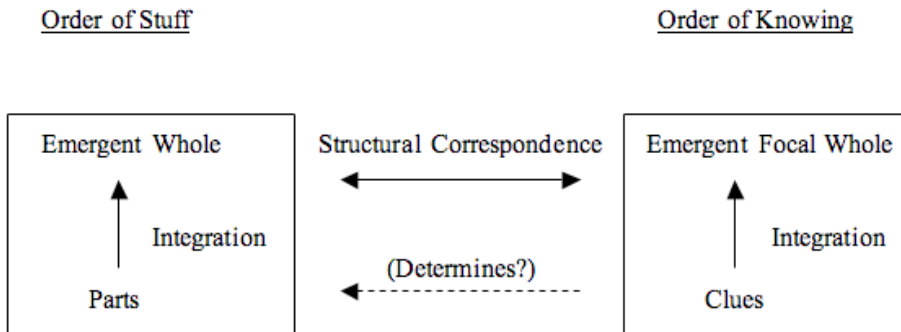
There are two key moves made by Margitay, both of which I think assume in the background a separation between the order of knowing and the order of stuff. The first move contests the structural mapping, seeking to break CT's link between the structures of knowing and stuff. Keeping in mind that Margitay seems to endorse CT regarding knowledge-like entities, for the remainder of the paper I focus on his notion of non-knowledge-like entities, which I shall just call "stuff." Now since all focal objects of knowing are emergent entities, Margitay asks about certain types of stuff and, granting them emergent status, whether they map to the structure of tacit knowing. In short, his answer is that the mapping is obscure at best. So Polanyi does not show that emergent stuff really has the structure of tacit knowing—if anything, it appears that Polanyi, while offering a number of supporting examples in his writings, largely assumes that stuff has the same structure

but does not actually articulate and defend *systematically* how the mapping works.

The second move contests the emergent status of stuff by way of Polanyi's own discussion of non-emergent stuff. Margitay cites Polanyi's claim that the laws of physics and chemistry completely determine the formation of a planet, and so while a planet is a whole (but a non-knowledge-like whole *qua* planet) it isn't an emergent physical object.[1] The issue Margitay then raises is an important one: if this counts as a case of a non-emergent ontological entity by Polanyi's own reckoning, might cases of putative emergent stuff actually be non-emergent? So while on the knowing side of CT the objects of focal knowing are emergent, there might not be *genuine* emergence in stuff. In sum, given these two moves and the apparent importance CT has for Polanyi's hierarchical view of comprehensive entities, it seems that if Margitay is right, his undercutting of CT ends up casting serious doubt on Polanyi's view of how tacit knowing relates to stuff—on how we get from epistemology to ontology.

I think these moves raise important issues concerning emergence and background frameworks for conceptualizing epistemology and ontology. Before discussing the latter issue, I first concentrate on emergence as it relates to Margitay's two moves. It is my suspicion that Polanyi was groping towards a view of emergence and complex-systems thinking while not being able to fully articulate what he was sensing across seemingly disparate domains of inquiry.[2] I would like to characterize Polanyi as a proto-complex-systems thinker, and in that light defend and expand on his insights in responding to Margitay.

The First Move

In Margitay's first move, he claims that it isn't clear there is a general correspondence between the two orders (the double arrow in the diagram). He first addresses a stronger claim that he attributes to Polanyi (the lower single arrow in the diagram), which holds that the structure of tacit knowing *determines* the structural order of things. Margitay offers a simple example challenging the determinative mapping: he contests the mapping from clues to parts and from an emergent focal object of knowing to the object itself, bringing into relief differences in how parts bear on an object versus how clues bear on the focal object of knowing. After knocking down this strong determinative reading, he then considers a weaker reading of the correspondence relation, namely a heuristic one, which claims that in general, parts bear on wholes merely in similar fashion as clues bear on focal objects of knowing. However Margitay objects that such a weaker reading does not offer any strong evidence that Nature has levels similar to tacit knowing.

I think we can finesse the strong reading by considering the tools by which the "determinative" relation operates. As a kind of realist and a once practicing scientist, it would make little sense for Polanyi to claim that tacit knowing *strongly* determines the order of stuff. A more sensible reading would be that as the practices of various sciences use tools to probe reality, there is an unavoidable need to create models as embodied vehicles for the activities of representing, intervening, reasoning, communicating, and so forth. Tacit knowing primarily "determines" the structure of these models, which then are taken in some capacity to represent aspects of Nature.[3] Since there is no direct access to Nature except by way of our models (theories, data, etc.), the degree to which we peer into the order of things is unavoidably mediated by the quality of the models we employ. Thus what tacit knowing "determines," via *connoisseurship*, are models (theories, etc.) that presumably gain some access to Nature.

As for the weaker reading, I don't think what Polanyi is saying amounts flatly to claiming that on-tological parts partially determine ontological wholes, as, for example, a classical Newtonian model of point particles partially determines phenomenological "wholes" concerning temperature and other higher-order thermodynamic notions. I think what Polanyi is struggling to account for is the sense that hierarchical emergence is in some sense real—which one can glean by moving "up" the hierarchy of the sciences—and not merely an artifact of what embodied realism projects by way of scientific models (theories, etc.). For beyond projection lies the radical nature of tacit knowing: a faith invested in a reality that reveals itself in unlimited ways, thereby affectively fueling the pursuit of truth. If I am right in offering the above two interpretations of Polanyi, I suspect what Margitay has brought forth in his insightful criticisms of Polanyi is actually a disclosure of latent (I suspect largely analytic) assumptions that result in a subtle misaligning of what Polanyi is really up to, and why his post-critical philosophy still remains a radical one.

Now let me get to several more specific responses, building off of these general interpretive sensibilities. In the previous paragraph I alluded to statistical mechanics, mainly because Margitay uses this in support of his argument that in general stuff may not be emergent, or at a minimum, that Polanyi has not shown that higher-level concepts cannot be defined by lower-level ones. Margitay cites a standard (analytic) interpretation of statistical mechanics, thought to support inter-theoretic reduction, where higher-level phenomenological thermodynamic notions (heat, temperature, etc.) are claimed to be reduced to the lower-level kinetic theory of gases. However this standard tale, largely influenced by focusing on logical considerations whose coarse-grained approach gives the appearance of successful reduction, has been contested when examined from a more detailed mathematical-philosophical viewpoint.[4] Even stronger, what appears to be the best case for inter-theoretic reduction—statistical mechanics—might actually be better accommodated by a complex-systems approach that takes epistemic emergence seriously.[5] What makes complex-systems thinking appealing is that an epistemic stance towards emergence—which resonates with Polanyi's notions of dual control and a hierarchical epistemic-ontology—can be applied to a very wide range of scientific theories.

Of course, part of the problem is that terms like "reduction" and "emergence" have numerous senses, not all of which are clearly defined. Thus the general tenor of Margitay's critique is well taken, given Polanyi's somewhat case-heavy approach that opens itself to the charge of being insufficiently developed. However, in defense of the hypothesis that Polanyi is a proto-complex-systems thinker, it should be noted that there is no precise, systematic account of how complexity works, other than extrapolating from cases of emergence and complexity that are exhibited across a range of sciences. I suggest that rather than viewing this as a problem, it be viewed as a virtue. The lack of a precise, systematic account might be construed *as* a problem from the standpoint of searching for a set of necessary and sufficient conditions for characterizing complexity, where the use of various tools of conceptual analysis would foreground where complexity and emergence come up short. But for whom would this be a shortcoming? The explosion of interest in complexity in the sciences over the past two decades or so suggests a different attitude be adopted. Thus I propose that instead of focusing on analysis, attention should first be paid to Polanyi's "forward-looking" philosophical vision, which in pragmatic fashion emphasizes the fruits of inquiry—the consequences of inquiry that make a genuine difference.[6] That is, rather than getting tangled in attempting to systematically develop what emergence might be for stuff, I want instead to concentrate on interpreting Polanyi's fiduciary framework in relation to complex-systems thinking.

The Second Move and Polanyi's Fiduciary Program

The second move, recall, is that levels and emergence might not really hold for stuff. In the previous section some responses to the second move were put forth; in particular, that separating ontology from epistemology is a non-starter for Polanyi, precisely because claims about ontology are epistemically embodied. Given that science has no unmediated access to reality, it is the use of models, theories, and so forth that enact what scientists believe when they probe reality. However this still leaves open the question: even if robust models (theories, etc.) epistemically project ontologies via the stratified structure of tacit knowing, do these projected ontologies really exhibit similar stratified levels? We need not worry about the nature of "noumena" to see the force of Margitay's critiques. Even within a Polanyian epistemic-ontology, the same sorts of issues can be raised.

In a previous paper I argued for projected levels and how emergence occurs within an epistemic-ontology.[7] I appropriated a technical rainbow example avoiding the charge that "stuff" might not really have levels; quite to the contrary, for our best working knowledge of rainbows there is no strong separation between the orders of stuff and knowing. Inter-theoretic reduction simply does not work, and if it is objected that Nature still might not have levels—which may after all be true—the point is that this is not known, and offers little comfort in the face of a rather robust account of rainbow phenomena. Moreover the lessons drawn I think also generally apply to other cases such as statistical mechanics (compare Auyang 1998 and Batterman 2002). Keeping this in mind, we can now formulate a version of Margitay's critique from the standpoint of Polanyi's epistemic-ontology: granting that there are cases (let's suppose even very good ones) of stratification within this epistemic-ontology, the question remains, how generalizable is the claim that levels are real?

There are several responses to this question. The first response is that if cases of presumed inter-theoretic reduction actually better support complex-systems thinking (statistical mechanics being the paradigm case), and such thinking has already been successfully applied elsewhere and is an area of active and vigorous investigation, why not inductively project levels to the ever-expanding field of epistemic-ontologies? The objection to this I think is clear: we can offer the counter-inductive sentiment that we simply don't know, and it may be that levels and emergence only work in a number of very interesting cases at the "edge of chaos and order," but that the vast plane of existence might not have levels—that epistemically speaking, they are either too noisy or boring for emergence and stratification. So a revised version of Margitay's critique would still remain.

A second response would be that, pragmatically speaking, we don't know if levels are generalizable, but it looks like a good working hypothesis. So we should adopt the attitude of letting the various research programs investigate complex systems, hopefully revealing in time whether levels generalize to any reasonable degree of scope within our epistemic-ontologies. After all, the fact that complexity and emergence seem to occur across so many domains of inquiry grants some warrant to projecting a generality of levels.[8] Again, this seems sensible enough, but the same sort of objection as above could be raised: we simply don't know just how generalizable complexity is. So it seems we have two positions with good inductive and counter-inductive reasons for stratification and against, respectively. The question is one of scope. How might Polanyi's fiduciary program respond?

I think here is where Polanyi offers something new to the discussion, and why his stratified epistemic-ontology—even if inaccurate in its details—presents a vision worth exploring and taking seriously. For reality is not just "stuff": from a Polanyian viewpoint, reality is a working hypothesis co-defined by inquiry—it is a participatory realism. Polanyi I think is questioning the very philosophical presumption that separates stuff from what is known, thus casting into question the picture suggested by CT. As alluded to previously, embodied realism provides a better fit with tacit knowing, and I think also provides a partial correction to the picture that CT suggests. More importantly, beyond embodied realism lies the consequential dimension of the fiduciary program, where communities of inquirers enact and articulate what reality is. Reading Polanyi through the lens of C.S. Peirce, it could be argued that if truth is that which would be fated to be arrived at by an ideal community of inquirers, then a full-blooded realism can only be projected as an ideal to be striven for—an ideal whose meaning-rich value also affectively enacts that very pursuit of reality, of truth.[9]

From this standpoint, while I can sympathize with the claim that Polanyi presents an underdeveloped view of a stratified ontology, I think we can more charitably argue that his proto-complex-systems approach serves as a speculative probe into a way of viewing reality that marks a radical reconceptualization of how to get "from epistemology to ontology." Firstly, the fiduciary aspect of Polanyi's realism suggests that as there is no hard line between knower and known, we need to invest a faith in what tacit knowing projects (but can never fully establish) to then articulate reality. Since reality informs our (skillful) inquiries in fruitful ways, suggesting ever more significant lines of further inquiry, we should adopt as a working hypothesis the informative nature of our epistemic-ontologies.[10] Secondly, by examining various sciences we can see that projected ontologies appear to have levels, especially so the more complex things get. Thus with regard to the counter-inductive intuitions mentioned above against stratification, we can now briefly respond: we won't know the extent to which reality is stratified unless we engage in the pursuit of that issue (a pursuit already underway and appearing to be quite a significant line of inquiry).

These responses might seem to beg the question against Margitay, as the same type of objection could be raised: even if our epistemic-ontologies appear to have levels, in the long run they might actually not. Perhaps levels are coarse-grained tools that upon refinement in the long run of inquiry will be "reduced" to, say, a single plane of existence. Perhaps. But there is another insight coming from Polanyi suggesting why a complex-systems approach may be a more interesting framework to adopt. From physics to chemistry and beyond, levels arise when our models (theories, etc.) consider many-body systems in the dynamic process of unfolding. Since we need to impose boundary conditions on these systems to have any understanding of what is going on, in the course of doing so we artificially constrain what that dynamism might actually be. It is precisely the imposition of boundaries (which bring systems into being) that induces levels of inquiry for taming dynamics. Counter-Polanyian narratives like inter-theoretic reduction, Cartesian dualities between knower and known, the physical closure of the universe, and so forth obscure just how difficult the general problem of understanding dynamics is in the sciences. Polanyi is one of the few thinkers to take this seriously, and who also constructs a post-critical philosophy respecting the need for a multi-tiered approach to inquiry. I hypothesize that his stratified epistemic-ontology is rooted not in tacit knowing as such, but rather in his tacit estimation that dynamical complexity is where it's at; and inquiry, if it is to be robust, consequential, and informative, needs to start there. I also speculate that this is perhaps the only response that can be offered to Margitay's problem—a problem that by its very nature is and will remain open-ended. If this is a flaw, it could also be the greatest virtue of Polanyi's fiduciary program.

Endnotes

[1]There is evidence that this view isn't quite right, and that the formation of planets involves emergence. See N. L. Kugland et al., "Self-organized electromagnetic field structures in laser-produced counter-streaming plasmas," *Nature Physics* 8 (2012), 809-812. In an interview summarizing their research, Kugland says that they've "created a model for exploring how electromagnetic fields help organize ionized gas or plasma in astrophysical settings, such as in the plasma flows that emerge from young stars. …These fields help shape the flows, and likely play a supporting role alongside gravity in the formation of solar systems, which can eventually lead to the creation of planets like the Earth" (http://phys.org/news/2012-10-lawrence-livermore-illuminate-cosmos.html).

[2]Polanyi suggests as much in his reflections on dynamical order. Phil Mullins observes that "some of Polanyi's examples of dynamical order are interesting since they seem to be drawn straight from the world of a chemist who has spent some years studying crystals. …He emphasizes that by cooling a solution, millions of molecules can be very quickly and cheaply sorted out and stacked in a regular formation. Polanyi draws this general conclusion: '…when very large numbers are to be arranged carefully, this can be achieved only by the spontaneous mutual adjustment of the units; not by specific assignment of the several units to positions in a pre-arranged plan'" (Phil Mullins, "Michael Polanyi's Use of Gestalt Psychology," in *Knowing and Being*, edited by Tihamér Margitay [Newcastle upon Tyne: Cambridge Scholars Publishing, 2010], 15).

[3]See for example Theodore Brown, *Making Truth: Metaphor in Science* (Chicago: University of Chicago Press, 2003), on embodied realism in the sciences. He argues that "we know the world only in terms of [embodied] perceptions, categorizations, and reasoning…grounded in our bodily capacities and life experiences and [are] inherently limited by them" (187).

[4]For a clear presentation of statistical mechanics as a paradigm of inter-theoretic reduction, see Patricia Churchland, *Neurophilosophy* (Cambridge, MA: MIT Press, 1986). For an overview of the philosophy of statistical mechanics—including its interpretive complications and a warning about whether it really supports inter-theoretic reduction—see Lawrence Sklar, "Philosophy of Statistical Mechanics," *The Stanford Encyclopedia of Philosophy (Summer 2009 Edition)*, Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/sum2009/entries/statphys-statmech/>; and *Physics and Chance* (New York: Cambridge University Press, 1993), Chapter 9. Lastly, for a discussion of the shortcomings of inter-theoretic reduction, see Robert Batterman, *The Devil in the Details: Asymptotic Reasoning in Explanation, Reduction, and Emergence* (New York: Oxford University Press, 2002). Batterman argues that standard philosophical territory (inter-theoretic reduction, supervenience, and so forth)—whose views have been used to interpret scientific theories (models, etc.)—does not suffice in capturing the mathematical structures present in some of these very theories (models, etc.). Thus he draws the general lesson that different philosophical concepts are needed, and proceeds to offer some new and interesting concepts that I think can be accommodated within Polanyi's fiduciary program (see fn.7).

[5]For example, see Sunny Auyang, *Foundations of Complex-System Theories* (New York: Cambridge University Press, 1998), whose orientation is akin to that of Polanyi's: a physicist whose experience informs her philosophical theorizing. She discusses how statistical mechanics presents a paradigm case of complex-systems thinking, and why reduction in its various guises only accommodates certain features of statistical mechanics.

[6]In an Aristotelian vein, it is important to discern where to expect precision, and where to apply the relevant tools of analysis. Complex-systems thinking is unusual in its deployment of highly precise tools of mathematical analysis along with epistemically irreducible qualitative concepts. Thus for all the many ways

in which physics is a different type of science from biology, it is commonly argued that both exhibit deeply similar patterns of complexity and emergence. See for example Stuart Kauffman, *The Origins of Order* (New York: Oxford University Press, 1993), and William Wimsatt, "The Ontology of Complex Systems," *Canadian Journal of Philosophy* supp. vol. 20 (1994), 207-274. Wimsatt writes: "Messiness—or at least the right kinds of messiness—is now almost a virtue in many of the sciences, as the recent explosion of interest in complexity seems to attest. Levels, perspectives, and causal thickets are major ontological players in these complex areas—domains with significant implications for how to approach many of philosophy's most refractory problems."

[7]Kyle Takaki, "Enactive Realism," *Tradition and Discovery* 38 (2011-12), nr.1, 43-59.

[8]To put the point in differing terms, Stuart Kauffman has argued that when we look at various mathematical models employed in studying complexity, the bigger problem remains that broadly speaking, we don't even know the initial or boundary conditions of the systems being studied—often these have to be imposed, assumed, or simplified. He most recently argues that things are more complex than complex-systems thinking can even begin to address; so if anything, by studying complexity one comes to glean the very reverse of Margitay's sensibility: that Nature apparently is more stratified, creative, and emergent than what our best epistemologies can ever project. See Kauffman, *Reinventing the Sacred* (New York: Basic Books, 2008), which continues his line of thought from *Investigations* (New York: Oxford University Press, 2000).

[9]Polanyi writes that " new knowledge can never be known at its birth. For it speaks of something real, and to attribute reality to something is to express the belief that its presence will yet show up in an indefinite number of unpredictable ways. …By trying to say something that is true about a reality believed to be existing independently of our knowing it, all assertions of fact necessarily carry *universal intent. Our claim to speak of reality serves thus as the external anchoring of our commitment in making a factual statement*" (PK, 311); see also PK, 315. For a metaphysical development of the pursuit of truth which I think meshes beautifully with Polanyi's fiduciary program, see Ron Bontekoe, "Truth as a Regulative Ideal," *Journal of Speculative Philosophy* 13 (1999), nr.4, 240 – 256.

[10]The informational turn is widely recognized in "higher-order" fields like biology (e.g., Horace Judson, *Eighth Day of Creation* [New York: Simon and Schuster, 1979]), cognitive science (e.g., David Marr, *Vision* [San Francisco: Freeman, 1982]), and philosophy (e.g., Frederick Adams, "The Informational Turn in Philosophy," *Minds and Machines* 13 [2003], 471-501). It is also finding an increasingly vocal audience in physics; see for example John Wheeler, "Information, Physics, Quantum: The Search for Links," in *Complexity, Entropy, and the Physics of Information*, edited by Wojciech Zurek (Redwood City: Addison-Wesley, 1990); Rolf Landauer, "Information is Physical," *Physics Today* 44 (1991), nr.5, 23-9; and Jacob Bekenstein, "Information in the Holographic Universe," *Scientific American* 289 (2003), nr.2, 58-65.
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Polanyi's Ontology *from Inside*: A Reply to My Critics

Tihamér Margitay[1]

Abstract Key words: David W. Agler, John V. Apczynski, Walter B. Gulick, Mihály Héder. Gergely Kertész, Kyle Takaki, Michael Polanyi, emergence, layered ontology, tacit knowing.

In this essay, I first sketch Polanyi's three arguments for layered ontology and the arguments against them which I put forward in Margitay (2010). I then discuss two recurrent themes in the several comments on my essay in this issue of Tradition and Discovery. *The balance of the paper gives detailed responses to each comment.*

I begin with a personal remark to provide a context for both my 2010 paper and my reply to the comments. Polanyi's multi-layered ontology and his theory of emergence are very appealing to me. Besides intuitive appeal, however, other merits are needed in philosophy, like good arguments, comprehensive and consistent accounts, support from a wide range of human experience, etc.—at least this is how I understand philosophy. In my 2010 paper, I wanted to probe into Polanyi's arguments in order to find out whether they can provide good reasons to believe in his ontological system. These arguments proved mostly to be less than convincing to me. This was a disappointing result. So I have always been on my critics' side and kept my fingers crossed for their success in defending Polanyi's ontology.

I am most grateful for my critics' comments not only because they devoted precious time to consider my paper but also because they helped me to reconsider the whole issue, to see the weaknesses of my points, to appreciate the strengths of Polanyi's *and* of *their own* arguments to find Polanyi's ontology more convincing. This exchange of ideas was extremely fruitful from my perspective. I have learnt much from the comments and they gave me further inspiration to refine the arguments *for* and against the Polanyian ontology. I am also deeply indebted to Phil Mullins and Walter Gulick for initiating and organizing this discussion in TAD.

Summary of My Arguments

In order to make explicit certain interpretations and to reinforce the common ground of discussion, let me first sketch my 2010 paper. I identified three arguments in Polanyi's works that were invoked to give reasons why we should accept his stratified ontology. The first one rests on his Correspondence Thesis (CT) and it runs like this (I cite Polanyi in this argument because his language and mine become an issue in later discussion):

>1. Knowing (comprehension) has a hierarchical emergent structure. The knowledge (comprehension) of an entity is emergent on the tacit knowledge (comprehension) of certain clues and their integration.
>2. Polanyi discusses in detail an example—the understanding of someone's skillful performance—in which there is a correspondence between the ontological structure of the comprehensive entity (the person's skillful performance) and the structure of another person's comprehension of the same entity. (The "comprehension of this real entity has the same structure as the entity which is its object" [TD, 33].)
>3. Then this correspondence is generalized over "*all other instances of tacit knowing the correspondence between the structure of comprehension and the structure of the comprehensive entity which*

is its object. And we would expect then to find the structure of tacit knowing duplicated in the [on-tological] principles of all real comprehensive entities" (TD, 33-34).

4. Based on this example, the structural correspondence consists in that a lower level in the structure of knowing of a particular comprehensive entity corresponds to the lower ontological level of the same entity; and, similarly, a higher level in knowing corresponds to the higher level in the ontology.

5. "[T]the structure of tacit knowing determines the structure of comprehensive entities" (TD, 55).

6. Therefore the ontological structure of *any* comprehensive entity is hierarchical because the structure of knowing the entity is hierarchical.

7. Therefore the world has a hierarchical ontological structure.

I raised three objections against this argument:

i. There are different kinds of cognitive achievements regarding a particular comprehensive entity (we recognize it, identify it, use it, understand it, etc.). All have the same emergent structure, yet we rely on different clues, and these clues are differently related to the ontological parts of the comprehensive entity.

ii. Knowledge of an entity is always emergent on the clues integrated into it, even in the case of those entities that are not ontologically emergent according to Polanyi. There is emergence in knowing without the ontological emergence of the object known.

iii. Knowledge of a comprehensive entity always relies on clues that are at an epistemologically lower level compared to the integrated whole, but some of these clues come from an ontologically higher level (e.g., our body and tradition, etc.) than the comprehensive entity (e.g., in the case of the recognition of a machine or a frog).

It follows from (i) and/or (ii) and/or (iii) that, given the relevant epistemological and ontological claims of Polanyi, there is no systematic correspondence between the ontological levels and levels of knowing. The CT simply proves to be false as a universal statement. In other words, it follows from (i) or/and (ii) or/and (iii) that, given the CT, what Polanyi says about the knowing of particular comprehensive entities is inconsistent with what he says about the ontological structure of those entities.

The argument from dual control is the second one invoked by Polanyi to support his hierarchical ontology.

8. Lower level (physical and chemical) laws are not able to determine/control the behavior of certain entities (i.e., emergent entities) fully.

9. Therefore higher level laws/principles are necessary to do this in terms of boundary conditions.

10. Higher level laws/principles and their concepts are irreducible to lower level concepts and laws.

11. Therefore these entities are ontologically emergent.

This simplified version is enough to formulate my two interrelated objections against (8) and, thus, against dual control:

iv. Emergent entities (e.g., machines) are also physical entities and as such they are subject to laws of physics. In the case of certain non-emergent entities (like the solar system), physics alone can completely determine (account for) their physical structure and physical parameters. (Quantum

indeterminacy is not an issue here.) Why cannot physics determine the *physical* structure and the *physical* parameters of an emergent (macroscopic) entity? Polanyi fails to explain what the difference is *in physics* in the two cases.

v. According to physics, physics is complete in the sense that, for *all physical bodies/particles*, physical laws and prior physical parameters of particles account for (determine) *all the subsequent physical parameters* of the particles. Therefore higher level principles cannot determine the physical shape, arrangement and working of emergent entities (that is, the physical parameters of, e.g., a machine) though they are supposed to do that. Therefore standard physics is inconsistent with the theory of dual control.

The third Polanyian argument for ontological emergence is the argument from identification. Polanyi developed its specific version for machines.

12. Identification is necessary for something to be an entity.
13. Higher level concepts and principles (e.g., operational principles, functional concepts etc.) can identify machines. (They are *sufficient* to identify them).
14. A *kind* of machine (e.g., pendulum clocks) can be realized—in theory—by infinitely many different physical-chemical configurations of particles.
15. Physics and chemistry do not have the higher level concepts and laws.
16. Therefore (from 14, 15 and 10) machine-types cannot be identified by their physical-chemical topography.
17. Therefore higher level concepts and principles (e.g., operational principles, functional concepts, etc.) are *necessary* to identify machines.
18. Therefore machines are emergent entities.

I challenged the steps from 14 and 15 to 16:

vi. For *identification*, no complete theory-reduction (like the supposed reduction of thermodynamics to statistical mechanics) is necessary. A weak conceptual reduction is enough in which the concepts of the higher level theory are identified with or defined in terms of lower level concepts (i.e., without the derivation of higher level laws from the lower level ones). By means of such a weak conceptual reduction, the higher level technical description of a kind of machine can be translated into a physical-chemical description and it can identify the kind. Industrial standards were cited as extremely important practical examples of weak conceptual reduction. Industrial standards define—by convention—machines (higher level concepts) like fittings and wrenches in terms of physical-chemical descriptions. Therefore there are machines that can be identified by means of lower level concepts, thus they are not emergent entities. Therefore, Polanyi's argument is insufficient to establish the ontological difference.

The overall conclusion of my critique is that Polanyi's arguments do not support his theory about the emergence of not knowledge-like entities and about their hierarchical ontological structure. The emergence of knowledge-like entities can be established by Polanyi's epistemology, but the general stratified ontology cannot be built on this ground.

Let me make explicit a methodological point: I meant to apply internal criticism in my paper. I analyzed all the arguments (that I know of) Polanyi brought up to back up his stratified ontology and I argued

that all of them are less than convincing because of internal tensions, inconsistencies and *non sequiturs*. Of course *internal* criticism of an argument—strictly speaking—is possible only very rarely. Primarily I had to rely on my own reconstructions. Some of them rested directly on citations, while others—I think—can be plausibly attributed to Polanyi on the basis of his commitments. Anyway, they all involve my interpretation. Even word by word citations can be questioned as to whether they do represent Polanyi's position properly (see below).

Common Themes in the Comments

Before giving detailed replies to comments, I reflect on the overall picture emerging from them. Two themes—two charges—appeared in most of the comments, and both of them are related to my methodology of internal criticism. Firstly, my reconstruction of the Correspondence Thesis elicited disapproval (Apczynski, Gulick, Héder, Takaki). My readers thought that the cited passages and their use do not represent correctly Polanyi's theory on the issue, thus they are misleading. Though my critics offered different explanations as to what the problem was with these texts, their remarks might have a common core that Phil Mullins formulated particularly clearly in personal correspondence (and analyzed in detail in Mullins 2006). He contends that

> it is a Polanyi bridge idea that affirms that you cannot split ontology from epistemology. I suggested [in Mullins 2006] that Polanyi's one unfortunate slip into the language of "correspondence" in TD is a single instance that all the other language about ontology elsewhere ("ontological aspect") makes clear he is not arguing for any sort of simple correspondence theory since this pulls ontology and epistemology apart and presumes that we can speak about the nature of real things apart from acknowledging our commitment that this is the way things are (an unsigned check). (Mullins, personal correspondence).

Consequently, using these TD passages as a starting point—so the first charge says—I interpreted Polanyi in an uncharitable way and this is why my criticism misses the point. Basically, I set up a straw man and argued against it.

This complaint struck me as odd because I fully agree with what Mullins says. Ontology is indeed inseparable from epistemology. The onto*logy* of a comprehensive entity is nothing but our theory about its ontological structure. Ontology can be discussed only as the structure of the known/knowable world. Our epistemology has a direct bearing on what our world can be like, and our ontological commitments bear on the kind of knowledge we have. And if you bear in mind this, then the citations from TD should not be misleading arguments. The TD-based form of the Correspondence Thesis is just shorthand for the correspondence between the structure of our knowledge of a comprehensive entity and what we know about the ontological structure of the entity. I have been taking CT this way. Anyhow, nothing hinges on *my* understanding of CT in my arguments since they are to show the inconsistencies within what *Polanyi* says about the structure of knowing and the ontological structures of things as they are known, obviously, by him.

Yet, it is true, I adopted the language of the passages cited from TD, the language I considered innocent abbreviation, but I was wrong. This language in my mouth was misleading

I took Polanyi's language literally and innocently as a basis for my critique. But I was wrong not to have examined the passage in light of a broader consideration of Polanyi's philolsophy.

The second charge recurrent in the comments is that I criticize Polanyi from some objectivist and reductionist standpoint relying on hidden and outdated assumptions that have been rebutted successfully by Polanyi and many other philosophers in the twentieth century. This charge probably ensues mainly from the previous one. If I had considered ontology as independent of any knower, from a God's eye perspective, then it would have implied objectivism indeed.

I was a bit embarrassed when I found myself accused of objectivism and reductionism again and again. I went through my arguments and tried to find the hidden objectivist and reductionist assumptions, but I could not—neither do I need these assumptions as it is clear from the outlines of my arguments. The only place I refer to reductionism is in (vi) but even there the notion of weak conceptual reduction serves only as *a theoretical explication* for *how* industrial standards identify standardized machines. My argument would pose the same challenge to Polanyi's also without this, if standardized machines were used merely as counterexamples. If the first four sentences are deleted from (vi), we get the following argument.

vii. Industrial standards define—by convention—machines (higher level concepts) like fittings and wrenches in terms of physical chemical descriptions. Therefore there are machines that can be identified by means of lower level concepts. Thus they are not emergent entities. Therefore, Polanyi's argument is insufficient to establish the ontological difference.

I think I can show point by point (and I will do it in due course in the answers below) that I am not guilty of the charges of objectivism and reductionism, and that these charges rest on misunderstanding. However, there is something alarming in recurrent misunderstandings. Furthermore, misunderstanding *simpliciter* is not a particularly fruitful explanation in a discussion, especially not in the present case. My commentators are excellent Polanyi scholars and they are sympathetic readers of my paper. There must be some substantial reason behind this rife misunderstanding. It cannot be the obscurity of my paper either, because I am sure they read it carefully and with charity to counterbalance all the imperfections of my style and disentangle all the obscurity of my words. What can be then the explanation for this misunderstanding?

My commentators might have an important truth behind their (mis)understandings. Assuming that the second charge results mainly from the first one, the problems spring from the language of CT and my critique. If you think that this language reveals and carries both epistemological and ontological commitments that are inconsistent with the spirit and words of the rest of Polanyi's works, then the attribution of objectivism and reductionism seems to be rational even if the literal reading of my paper runs contrary to the attribution of such positions. True enough, the language of the passages I cited and I used seems to separate ontology from epistemology. However, as I have suggested above, this language can be viewed as a mere abbreviation carrying no metaphysical or epistemological commitment at all. But why should it be so? What is the role of this language in Polanyi's argument and in my criticism? Is this parlance really so innocent? The first lesson to be drawn from the comments is that the burden of proof is on me in the discussion to show that Polanyi's argument and my criticism can really be formulated in a purely epistemological language without losing their force, in a language that explicitly excludes objectivist and reductionist assumptions. This project goes far beyond the scope of this reply. Thus I will take up this challenge in a forthcoming paper. (Its rather stale working title is Polanyi's Ontological Arguments Revisited.) For the time being, I will keep in mind carefully these lessons in my replies.

I must apologize that my replies are not proportionate to the comments. It is partly because I would like to answer a problem thoroughly at one place (at the place of its first occurrence) instead of giving fragmented replies every time when it comes up.

1. Reply to Walter Gulick

In point 1, Gulick correctly observes that it follows from my internal critical approach that my arguments cannot show the untenability of stratified ontology. If convincing, they can show at best that the stratified ontology cannot be like Polanyi says it is, or, at least that we need other reasons to accept this ontology.

Another consequence of this strategy is that I do not criticize Polanyi from an objectivist standpoint, and so I do not rely upon objectivist assumptions. Gulick is right when he claims that

> [t]he distinction between the first person and the third person perspective, made use of by Margitay (139), is often relied upon by philosophers in the analytical tradition to distinguish subjective from objective statements (Gulick, 10-11).

But then forgetting about the contingent "often", he goes on:

> Margitay's distinction (139) between the validity of ontological claims made from a first person in contrast to third person perspective seems to restrict the personal dimension of knowing to the former perspective only. He thus departs from a basic point in Polanyi's epistemology (Gulick, 11).

This represents a serious misunderstanding. The distinction between the first and the third person perspective does not entail objectivism or the rejection of Polanyi's epistemology. The distinction between the two perspectives can be made within Polanyian epistemology, and I make it in a Polanyian vein. For example, my perception is personal knowledge and the cognitive scientist's observations about my perceptual processes are also part of her personal knowledge.

The distinction between a first person's and a third person's personal knowledge came up in my paper where I explored the preconditions of the emergent status of knowledge-like entities. I argued that the relationship between the first person and the third person's personal knowledge is of extreme importance in Polanyi's ontology because the emergence of the knowledge-like entities depends, in part, on Polanyi's theory about how we can have access to other's knowledge (Einfühlung or indwelling[2]). Furthermore, the emergence of other entities—indeed the whole layered ontology—rests on the emergence of knowledge-like entities. So the emergence of the knowledge-like entities and, thus, the Polanyian theory of Einfhülung/indwelling are the cornerstones of the whole hierarchical ontology.

To see why our access to another's knowledge is important, let us begin with the emergence of knowledge-like entities. According to Polanyi, knowledge-like entities (perceptions, observations, discoveries, etc.) are emergent because, while integrating them into a focal whole, I cannot focus on the particulars and the integration process as they contribute to the focal whole. Their (functional, ontological and semantic) *role* in the whole is inaccessible for me because in order to make them work I have to focus on the focal whole; while to see them work, I should have to focus on their working. However, I can have only one focus at a

time (on the focal whole) and this is the first reason why the particulars and their integration are unspecifiable. Even if I could have a second focus, I could not observe the particulars as particulars having the appropriate functional role with respect to the whole but only as focal wholes by themselves. Turning the focus of my attention to the particulars changes their status. They cease to be particulars of the focal whole and become independent entities focally observed on their own rights, and this is the second reason for their unspecifiability. In principle, however, a cognitive psychologist (with her personal knowledge) can have access to my particulars and can observe them in their contribution to my focal whole. In principle, the whole process of *my* selecting the relevant particulars and integrating them into a focal whole could be the focal object of a third person and, in principle, she could lay bare and describe it. Of course, these observations will be part of the cognitive psychologist's personal knowledge. The description of the particulars and their integration of my perception would require that the psychologist be focally aware of my cognitive process (just as physicists can observe the process of the formation of crystals from single molecules or as biologists can observe the synthesis of protein). She need not be *focally* aware of my focal whole. It is enough that I assure her that, say, I watch the same object that she watched a moment ago. This possibility—that would demolish the emergent status of knowledge-like entities—is excluded, on Polanyi's view, in that the psychologist can know what I do only by means of Einfühlung/indwelling, copying my own process of knowing. Consequently, her focal observation of my process of knowing cannot lay bare my process of knowing for the same reasons that my focal observation of the particulars cannot reveal their contribution to the focal whole I integrated out of them. In short, the fact that a third person can have access to my knowledge only by dwelling in what I am dwelling in myself is part of what makes knowledge-like entities emergent. This line of thought presupposes that the third person has the same kind of personal knowledge as the first person.

In order to partially save CT, Gulick brings Polanyi's distinction (PK 105) between reversible and irreversible knowing (understanding, etc.) into play (see point 2-5, Gulick, 11-12). He agrees that "Polanyi's postulated correspondence fails to obtain in reversible recognition and identification" (Gulick, 11) as, e.g., in the recognition of a watch but "at least Margitay's argument seems established with respect to reversible cases of recognition; he does not analyze the correlations involved in the heuristic act of scientific discovery" (Gulick, 11). Gulick maintains that CT does hold in the cases of irreversible knowing, that is, in the cases of scientific discovery, invention, learning, etc. I cannot agree, I am afraid. My arguments (i), (ii) and (iii) do not depend on reversibility. If they work for reversible knowing, then they should work for irreversible cases too. And they do, indeed. Take for instance the great discoveries of particle physics, the discoveries of *elementary* particles from the photon to the latest Higgs boson. In particle physics, an elementary particle is a particle having no substructure. It is not made up of smaller particles or of any other constituents. In the Standard Model of particle physics (that is, according to the accepted theory of particles), the elementary particles include electrons, photons, neutrinos, bosons, etc.[3] These particles are *known*—and were known in Polanyi's time—to be ontologically simple entities according to physics, therefore they are not emergent entities in the context of physics and in the context in which they were discovered in physics. The existence of non-emergent particles in the ontology of physics obviously undermines Gulick's attempt to cast doubt on the existence of non-emergent entities. He writes:

> there is a problem with speaking of "non-emergent entities," because the frame of reference is all-important. While the path of a planet may be completely determined by the laws of physics and chemistry (132), the discovery that a certain patch of light is a planet can be seen as an emergent epistemological event for the discoverer. And there are many ontological levels in the dynamo-physical world; the planet is likely emergent from interstellar gases and debris (Gulick, 12).

This passage can be understood, I suspect, in three ways. First, we can read it as concluding that there are no non-emergent *knowledge-like* entities because the discovery of even a physical object (planet) is an emergent knowledge-like entity. This is in perfectly harmony with what I say in the first premise of argument (ii). "Knowledge of an entity is always emergent on the clues integrated into it, even in the case of ontologically non-emergent entities" (Margitay 2010, 133). So knowledge-like entities are emergent entities, but then, in this interpretation of Guilck's passage, there is no "problem with speaking of 'non-emergent entities.'" Secondly, the quotation above can be construed as concluding that there is no non-emergent entity in our ontology. It is a mistake in the light of how the ontology of physics describes elementary particles. Of course Gulick may dispute the ontology of standard physics, but it needs robust arguments and evidences. And they can hardly come from Polanyi's philosophy since he believed in physics. Thirdly, this paragraph may be taken as warning that the two sides of the correspondence should be in the same frame of reference when we substitute the structure of a particular instance of comprehension and the structure of the comprehensive entity which is its object into the correspondence relation. Gulick can be right about that depending on what the frame of reference and the sameness criteria mean. Anyway, the identity of this general frame of reference is secured intuitively when we compare the structure of someone's discovery of an elementary particle in the context of a theory *with* the ontological structure of the particle described by the same theory and accepted by the discoverer.

With these preliminaries we can reformulate the arguments (i), (ii), and (iii) for discoveries:

i'. Strictly speaking the original version of argument (i) does not apply to a non-emergent entity, but it can be modified in two different ways to work for elementary particles too. There are different kinds of irreversible cognitive achievements regarding an elementary particle (one discovers certain features of the electron, one develops its theory, one uses it in a novel scattering experiment to detect other particles, etc.). They all have the same emergent structure, yet these physicists rely on different clues, and these different clues are unrelated to the ontological parts of the elementary particle since it has no ontological parts at all. And this argument can also be formulated in a counterfactual way: There are different kinds of irreversible cognitive achievements regarding an elementary particle, they all have the same emergent structure, yet physicists rely on different clues, and these different clues would be obviously differently related to the selfsame ontological parts of the elementary particle if it had an ontologically complex structure.

ii'. The discovery of an elementary particle is always emergent on the clues integrated into it, but the entities discovered are not ontologically emergent. There is emergence in irreversible knowing without the ontological emergence of the object discovered.

iii'. Discovery of an elementary particle always relies on clues (like the theoretical model, mathematics, the design of experimental apparatus, etc.), that are at an epistemologically lower level compared to the integrated whole (i.e., the discovery of the elementary particle), but some of these clues come from an ontologically higher level (e.g., from physics, from the body of the experimentalist, from instruments, etc.) rather than the ontological level of the non-emergent elementary particle.

It follows from (i) and/or (ii) and/or (iii) that there is no systematic correspondence between the ontological structure of an elementary particle and the epistemological structure of its discovery in the light of Polanyi's other relevant ontological and epistemological claims and in the light of his commitment to physics. Consequently CT does not hold for irreversible knowing and understanding either.

In point 8, Gulick suggests a "non-rigorous version of the Correspondence Thesis … : the suggestive particulars of current knowledge can be indwelt and function as subsidiaries to higher level discoveries. Subsidiaries and focal insight of the knower are parallel to lower and higher (more general) levels in reality" (Gulick, 12-13). In this interpretation, CT is a kind of heuristic device (Margitay 2010, 133-134). CT makes only an analogy to explain how the lower and the higher ontological levels are related *provided that* you have already accepted the theory of hierarchical ontology. In this form, CT does not support the claim that higher level discoveries reveal more general levels of reality and that the more general levels of reality are ontologically distinct and constitute higher ontological levels. Furthermore, this analogy has, at best, only a restricted scope[4] as it is clear from the examples of elementary particles and from the analysis of the watch example (Margitay 2010, 132), that is, from the argument (i) and (iii).

In point 10, Gulick fleshes out a very intriguing ontological approach (Gulick, 13). He attributes it to me, but unfortunately it has never come to my mind, but I would be proud if it did! He suggests that we can use different ontological theories, externalist or internalist theories, depending on the circumstances perhaps, on our knowledge state. It is like what physicists do. They use different theories according to their purpose. The parameters of an accelerator are controlled on the basis of classical theories while the parameters of the accelerated and scattering particles are calculated by quantum theories. The proposal of a similar pragmatic use of ontological theories is a new and excellent example of Gulick's local pragmatism.

Point 13 is an attack on my argument against the possibility of dual control:

> A further assumption offered by Margitay also seems problematic: that the laws of physics are "complete" (135-136) and leave no indeterminacy so that any emergence must be controlled by these laws. The notion of such a deterministic universe is an expression of an objectivist perspective that is seriously at odds with Polanyi's emphasis on the many indeterminacies that limit what we can claim with certainty about ultimate reality (Gulick, 14).

Unfortunately, completeness is not my assumption. (I would be ready to discard it immediately.) It is a theorem of physics that physical theories account for all the physical parameters covered by their laws. (Think over how odd the opposite of the completeness theorem would be. Newtonian particle theory would be nonsense if it admitted that the fundamental law, F=ma, is true for some particles on some occasion, but for other particles, or on other occasions, it is not. And there is no physical criterion to separate the two cases because there is no *physical* difference between the two systems. So the completeness theorem is not the product of some outdated objectivism, instead it has a profound epistemological reason).

I fully subscribe to Gulick's reconstruction concerning operational principles (Gulick, 13-14). Operational principles determine the physical shape, arrangement and working both of the components of a machine and the whole machine; furthermore it specifies the purpose of the machine. So operational principles are also supposed to determine physical parameters (e.g., the motion of the arms of a clock). How is it possible that they can do this when these physical parameters are completely accounted for by physical theories and prior parameters of the system?[5] My argument (v) concludes that standard physics is inconsistent with the theory of dual control. It is not true that the notion of such deterministic (classical) physics is "seriously at odds with Polanyi's emphasis on the many indeterminacies". Polanyi points out many indeterminacies but, to my best knowledge, he never questions the deterministic nature and the completeness of classical physics. And he *merely postulates* the possibility of the control by operation principles over classical physical parameters.

Other indeterminacies revealed by Polanyi[6] do not help here, or at least, something more needs to be said about how they can make physics compatible with dual control.

I hope my detailed reply convinces Gulick that I am not "reverting to a kind of reductionistic objectivism" (Gulick, 14) and that I do not reject the basic objectives of post-critical philosophy. Instead, I am still working with him for these objectives.

2. Reply to Kyle Takaki

Takaki devotes his reply mainly to the problem of the Correspondence Thesis. Proceeding from a lucid figure in which he summarizes my reconstruction of CT, he analyses two issues that are the crucial components of my argument against CT.

He concedes that there is no systematic correlation between the structural elements of knowing and the structural elements of the object known. Therefore there can be no systematic correspondence, and therefore, contra Polanyi's thesis, the structure of knowledge cannot determine the structure of entities. He points out that this refutation of Polanyi's argument from CT rests on a strong notion of determination. As an alternative to this, in order to save Polanyi's argument, Takaki develops a witty (and Kantian) idea about how knowledge can determine the structure of the object known.

> [T]he practices of various sciences use tools to probe reality, there is an unavoidable need to create models … Tacit knowing primarily "determines" the structure of these models, which then are taken in some capacity to represent aspects of Nature. Since there is no direct access to Nature except by way of our models (theories, data, etc.), the degree to which we peer into the order of things is unavoidably mediated by the quality of the models we employ. Thus what tacit knowing "determines," via *connoisseurship*, are models (theories, etc.) that presumably gain some access to Nature. (Takaki, 36)[7]

This is a very sensible and persuasive determination relation. I know only certain methods of weaving fishing nets. The structure of my nets determines what sorts of fish I can catch. The fish that I catch determine what I know of them, and what I know of them determines my ontology of fishes. Hence my knowledge determines the structure of objects. However, this determination relation by itself cannot help Polanyi out for two reasons. First, remember Polanyi wants to argue for the layered structure of comprehensive entities by virtue of the layered structure of knowledge. For this, the emergent *structure* of knowledge should determine the emergent *structure* of things. Takaki's determination relation is far more general: some kind of knowledge *content* determines some ontological *content*. Why should the emergent structure of knowing result in such models that catch only emergent entities? It can happen only by chance not by determination. The second problem springs from the fact that my arguments (ii) and (iii) can be deployed *mutatis mutandis* against this determination relation as well. For example, our theorizing and discovery is always emergent even when our model describes non-emergent entities like elementary particles (see above). Consequently, Takaki's determination relation is very plausible, but not strong enough to support an inference from the hierarchical structure of knowing to the hierarchical structure of the object known.

As a complement to this determination relation, Takaki interprets Polanyi's ontological emergence in a radically realist way.

I think what Polanyi is struggling to account for is the sense that hierarchical emergence is in some sense real—which one can glean by moving "up" the hierarchy of the sciences—and not merely an artifact of what embodied realism projects by way of scientific models (theories, etc.). For beyond projection lies the radical nature of tacit knowing: a faith invested in a reality that reveals itself in unlimited ways, thereby affectively fueling the pursuit of truth (Takaki, 37).

I must admit that this interpretation can be defended by numerous citations. However, there are other references that indicate a different version of realism, probably a version that Takaki rejects. For example:

[S]trictly speaking, it is not the emerged higher form of being, but our knowledge of it, that is unspecifiable in terms of its lower level particulars. We cannot speak of emergence, therefore, except in conjunction with a corresponding progression from a lower to a higher *conceptual* level. And we realize then that conceptual progression may not always be existential, but that it becomes so by degrees (PK 393-394).

We cannot resolve this dilemma here, for sure. Anyway, because of the inseparability of epistemology and ontology, it is hard to sort out whether realism or projected realism is a better interpretation here—if they can be distinguished in Polanyi's theory at all.

Takaki comments on the possibility of inter-theoretic reduction. He has doubts about whether the standard example of this kind of reduction is a successful one, that is, whether phenomenological thermodynamics can be fully reduced to statistical mechanics. There is no need to convince me. I do not believe that it or indeed any alleged inter-theoretic reduction is a satisfactory one. I mentioned the standard inter-theoretic reduction (and its example) in my paper only to contrast it with what I called weak conceptual reduction. I wanted to state clearly that the standard inter-theoretic reduction is not necessary for identification. Much less than that—namely weak conceptual reduction—is enough.

In the final section of his paper, Takaki proposes ingenious variations and alternatives to Polanyi's arguments to save the layered ontological structure, and then he anticipates the possible replies by which I could defend my position. He does it so correctly—I can add hardly anything to them except that I highly appreciate his impartiality that generated sometimes better replies than I could have given. He gives rise to so many intriguing and coruscating links to Polanyi's layered ontology that I cannot discuss them within the framework of this reply. They could only be properly talked over in long afternoons in a quiet garden.

3. Reply to Mihály Héder

In his first and second sections, Héder discusses my arguments against CT and dual control. He raises objections apart from a single exception that are very similar to the ones raised by Gulick and I answered them in the reply to him. Thus they need not be treated here. One point not yet treated is the following:

Claiming that the watch is determined as much by fundamental laws of physics as a planet also implies that the human act of designing things (using one's knowledge) is determined and there is no freedom or human creativity. I think this is in contradiction with Margitay's final conclusion about the ontological status of knowledge-like entities, or, at the least, he

weakens his case for knowledge-like entities by denying their causal effect on the physical world (Héder, 32).

Héder is right about that. If the completeness of physics is in contradiction with the theory of dual control, then it also excludes the special form of dual control when knowledge-like entities, reasons, interest, and values would control the motion of a human body through higher level principles. Héder rightly points out that the completeness of physics is in direct contradiction with the causal efficacy of knowledge-like entities on the physical parameters of human bodies. In short, if physics is complete, then knowledge-like entities cannot influence our motion, what we do, how we act. That is, the completeness of physics excludes the possibility of human freedom in the sense that we commonly understand freedom. This is an age old problem much discussed in the philosophy of freedom. However, the lack of causal efficacy of the knowledge-like entities does not refute my final conclusion. Knowledge-like entities can be emergent entities without causal power. Yet it is clear enough that we (i.e., Polanyi and his readers, including me) would find little comfort in the emergence of physically inert knowledge, desires and values that cannot have any effect on our actions.

The situation is even worse than this because the completeness of physics gives rise to questions concerning the epistemic emergence of knowledge, that is, concerning the basis of the ontological emergence of knowledge-like entities.

Although this paper is about the analysis of Polanyi's arguments and not about my personal views, if, none the less, I may voice a personal view, I would suggest that in order to resolve the tension, we should do something about the completeness theorem of physics. However, we cannot dismiss it with simple hand-waving for, as it was pointed out above, the completeness theorem rests on serious epistemological considerations.

In the third part of his paper, Héder develops counterarguments against the possibility of identification by industrial standards. He starts this section with the reconstruction of my argument:

[H]e goes on to consider technical standards, which in his view are able to fully identify machines. I think this is the least convincing part of his article. True, it might be logically possible that a standard is able to completely describe a machine, but in general, this is not the case. Moreover, exhaustive "physical" description is not even the goal, but only a side effect of standardization (Héder, 32).

However, this is *not* my point of view. I do not think that standards can give or aim at complete description of machines. Moreover—and this is the most important in the present context—full or exhaustive physical description is not necessary for my argument (vi). I deeply regret this misunderstanding because he attacks the straw man's position later on, and he does it in a competent and knowledgeable way.

At one point, he writes:

The goal of standardization in general is to enable technical collaboration and prevent vendor monopoly. Therefore, a standard should leave as many properties indeterminate as possible without breaking the functionality, so that a standard-compliant artifact can be manufactured in multiple ways and by multiple manufacturers (Héder, 32).

I agree that standards exclude some possible physical realizations of a kind of machines but still leave open the possibility of infinitely many realizations. Furthermore, if the first part of the second sentence is correct, then Héder may put Polanyi's argument from identification in an even more difficult position than my own argument. Provided that the physical-chemical description in a standard specifies a machine to the extent that it is sufficient to guarantee functionality (it is commonplace), *and* it specifies possibly *only up to the extent that is necessary* for this purpose (this is what Héder's sentence seems to imply), then this would mean that physical-chemical descriptions in standards identify not only machines but also their functionality when standardization is successful, when a standard ideally fulfills its role.

In fact, complete description is not necessary for my argument to be effective against Polanyi's. It is enough that standards can specify bolts, wrenches, *bearings*, etc. (contra Héder [32], who thinks specification is possible only for machines having no moving parts) *in physical-chemical terms* such that if an object meets the physical-chemical specs then it is (such and such) a bolt. It is a proper identification of something as something by virtue of its parameters, and only this is required for ontology (By the way, quality controllers, salesmen, transporters, shop assistants, etc. identify, for example, bearings by specs without knowing what they are for or how they can operate).

One might counter that this kind of identification by sufficient conditions has all sorts of semantic, etc. problems. But this is not the point (about this, see Margitay 2010, 138). The point is that the identification by physical-chemical specs is *as good as* the identification by operational principles and higher level concepts. Since the latter can provide identification also only by sufficient conditions, thereby it is just as vulnerable to the semantic, etc. objections as the identification by specs.

To challenge Polanyi's ontological argument from identification, my argument does not require that all machines be identifiable by physical-chemical specifications. Nor does it require that living organisms that are akin to machines, be identifiable this way (see Héder, 33). It is not necessary either that all standards provide physical-chemical descriptions that can successfully identify machines. What my argument does require to be sound, however, is that *some* machines can be identified by physical-chemical descriptions without higher level concepts and operational principles. This much is enough to show that Polanyi's argument from identification cannot establish the emergent status of machines.

4. Reply to David Agler and Gergely Kertész

I treat Agler's and Kertész' brilliant comments together because both have many interesting and valuable things to say about the semantic argument from identification. The two papers put forward various suggestions that can fortify Polanyi's arguments enormously, and these proposals nicely supplement each other to make a really strong case for layered ontology.

Both Agler and Kertész identify two types of semantic arguments by Polanyi. The first one is the Multiple Realizability (MR) argument that is also called by Agler the Many-One argument. In a fine grained reconstruction, it runs like this.

19. A higher level type (a machine type) can be realized by infinitely many lower level entities.
20. Therefore a finite range of the description of lower level tokens (a finite range of physical description of specimens of a machine type) cannot identify a class of machines.

22. The lower level entities that can realize a higher level type belong to *different lower level types*, because a class of machines of the same kind includes specimens of different size, often of different materials, and with an infinite range of other variations (cf. KB 175).

23. Therefore a higher level type corresponds to several heterogeneous lower level types.

24. Therefore a higher level type cannot be identified by a lower level type or by any of their sensible conjunctions. In other words, there can be no *unified* physical-chemical account of what a machine is or how it operates. (Agler, 23 and Kertész, 17)[8]

They both claim that something like this is a correct reconstruction of what Polanyi says, but I think their accounts are definitely stronger than what is literally in Polanyi.

Both Agler and Kertész seem to accept that the argument (vi) from standards is effective against this Polanyian version (Kertész has some reservations that can be dispelled, I think, by what has been said in my previous replies).

Then they take different paths. Agler turns to the reconstruction of the second semantic argument (I shall come back to that later) while Kertész sets out to improve this one.

As a first step, Kertész points out that, though the descriptions provided by standards are enough for identification, they do not give us an explanation. An explanation would require a complete inter-theoretic reduction. A weak conceptual reduction does "not explain in the terms of the lower level *the higher level order* that is grasped by higher level concepts" (Kertész, 19, my italics). Why do we need this explanation? Kertész turns to Fodor's theory for the answer. Stronger reduction is necessary because—says Kertész (Kertész. 19-20)—the unity of the lower level kinds and the higher level laws by which they can be covered are simply invisible from a lower level perspective. The set to which lower level types belong can only be constructed by the use of higher level concepts and criteria.

Kertész believes that this improved version of the MR argument stands firm against the counterexample of standards. However, I am not fully convinced *yet*. Identification is, for sure, necessary for something to be part of an ontology, and industrial standards can provide us identification. But why do we need unity and the explanation of unity for an ontology? The purely ontological answers to this question generally refer to pragmatic (or aesthetic) reasons. We need unity, because we need ontological simplicity to get a manageable ontology. We should use Occam's razor because the simpler an ontology is the better it is. One could counter that industrial standards involve a very easily manageable and simple ontology. So I do not think that the Polanyi-Fodor-Kertész version of the MR argument really can block my argument from standards.

It seems likely that there is no ontological answer for the question why unity and explanation are necessary for an ontology. However, the Polanyian epistemology can answer this question, and this is the point where the inseparability of epistemology from ontology plays a crucial role. I suggest that we should add one more premise to Kertész' argument: We cannot comprehend an ontological category without unity and without the explanation of this unity. The comprehension of a whole requires that we see its parts in a comprehensive unity. Thus the comprehension of a machine type, that is, a class of machines as an ontological whole presupposes that we see its different type of physical-chemical realizations *in unity as they are integrated into the machine type*. That is we should understand the different lower level kinds in unity *and* we should also understand that this particular unity as the one that makes up (integrated into) the machine type. The

explanation of the unity in terms of the higher level principles unifying the different lower level kinds is part of the latter. So according to Polanyi's theory of knowing, *conceptual* comprehension of an ontological whole presupposes both the unity of the lower level types that realize the higher level whole and the explanation for this unity in terms of higher level principles. With the help of this premise, it follows that 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 parts of our ontology, therefore, they are emergent entities.

This sketch needs some more work to become a fully-fledged argument. However it is already clear that this result can also help me to reformulate the Correspondence Thesis in a more tenable form.

The Context-Dependence (CD or One-Many) argument is the second semantic argument that is treated by both Agler and Kertész although with a different emphasis on it. Kertész only mentions part of it and calls it the Underivability argument while Agler develops it into an independent argument for the emergence of machines.

Agler proceeds from the Polanyian tenet that higher level laws and properties that determine machine types, cannot be derived from physical-chemical configurations and from their lower level laws. This makes it possible that "a one-many relation exists between physical-chemical particulars and higher-level types wherein the same physical-chemical particulars can be realized in several different machine types" (Agler, 24) or in non-machine types. Thus it is not the object by itself that makes something to be a machine, but rather a particular machine-human relationship. Agler invites us to consider a scenario in which there are two physically identical objects. One of them is "the result of human invention and plays an instrumental role in human life" (Agler, 25) while the other emerged naturally by chance and has nothing to do with human beings.[9] A physicist using *only* physical observations could not tell the difference between them, though intuitively they are different. Their difference lies in their different relationship to human beings, or rather on the other way round; they are different because *we* have different relationships to them. This contextual factor makes the distinction. From this, Agler concludes that "[t]here is thus no one-to-one reduction between a unitary description of physical-chemical particulars and a machine type as machines only exist relative to the role they play in intelligent activity" (Agler, 25). This is an ingenious and a very impressive argument, I *must* admit. I really seem to be compelled to accept it because I am committed to the emergence of the knowledge-like entities. And, according to Agler, ultimately certain knowledge-like entities make one object to be a machine while the other is only a natural object.

5. Reply to Apczynski

In his succinct essay written in a personal tone, Apczynski says basically that I fundamentally misunderstood Polanyi, or, putting it in a less harsh way that fits better to his own gentle style, there is another interpretative frame neglected by me that could provide a more fruitful reading of Polanyi. I asked the wrong questions, especially with respect to the Correspondence Thesis, and therefore got wrong answers. Had I approached the text differently, I might have found what I was looking for: the insight that the world really *has* a layered ontological structure. Apczynski's approach is startling like a koan, like some teaching methods of Buddhist masters.

I approached Polanyi's corpus as part of the theoretical philosophical discourse, and asked what arguments he has to support for his far-reaching theory of stratified ontology. These arguments were scrutinized and they turned out to be defective.

However, Apczynski protests against this method and he is particularly dissatisfied with my reconstruction of the Correspondence Thesis. According to him, "Polanyi does not propose a 'correspondence thesis' as Margitay presents it" (Apczynski, 28). Consequently, Polanyi cannot build an argument on it. The strong claims from TD (in my compilation) do not reflect accurately "Polanyi's position on the structure of tacit knowing and the hierarchical structure of comprehensive entities" (Apczynski, 28). He criticizes, probably, not so much my reconstruction of Polanyi's words because Polanyi's texts were taken literally and closely followed in the course of the reconstruction of CT and his arguments, but rather my reading of these texts, my use of these passages. I focused on the text, and looked for the explicit reasons for the layered ontology.

To give me a hint about what I could have done as an alternative to this, Apczynski tells me a parable, about how Polanyi tried to illuminate his new insights to his dogmatic contemporaries. According to this parable, to find the right meaning of the cited passages, I should look at reality *through* them. I should use them as clues to see the ontological structure of reality. His very Polanyian criticism is that I relied on the explicit, focal meaning of these texts but their true meaning is what they have as clues in the focal meaning of the stratified ontology. Perhaps, instead of calling upon Polanyi to give explicit reasons in his texts, I should see the Gestalt of the layered ontology of reality dwelling in his texts.

I would be fully persuaded if he said that I should do both (i.e., look *through* and *at*). Argumentation, conceptual theorization and other methods used in the philosophical tradition are part of Polanyi's adopted arsenal; he uses them extensively, so it is not unfair to call upon him to use them rigorously in such a crucial question. Apczynski grants that "Margitay seems to acknowledge this [the alternative interpretation he proposed] when he suggests that we may take the Correspondence Thesis as something like a heuristic device" (133-34—seeApczynski, 28), but then I have not developed it into a real alternative. Again, I should agree.

Apczynski's comment points to a further possible conclusion too. Polanyi develops a philosophical system which includes a systematic account of knowledge, ontology and human values. However, his works can also be construed as edifying philosophy (cf. Rorty 1980), and included in his works—in the theory of tacit knowing—is how they are to be read as edifying philosophy. In his comment, Apczynski gave a masterful example how to do this Polanyian edifying philosophy in practice.

Endnotes

[1]While working on this paper, I was supported by the TÁMOP 4.2.2.B-10/1-2010-0009 project.
[2]It is not an entirely happy expression but its meaning is clear from Polanyi's description of how one can have access to another person's knowledge:

> [W]e consider the way one man comes to understand the skillful performance of another man. He must try to combine mentally the movements which the performer combines practically and he must combine them in a pattern similar to the performer's pattern of movements. Two kinds of indwelling meet here. The performer co-ordinates his moves by dwelling in them as part of his body, while the watcher tries to correlate these moves by seeking to dwell in them from outside. He dwells in these moves by interiorizing them (TD 29-30).

Man's skillful exercise of his body is a real entity that another person can know, and knows only by comprehending it, and that comprehension of this real entity has the same structure as the entity which is its object (TD 33).

[3]See, e.g., Griffiths 2008 about the development of particle physics and about the Standard Model. Cf. also "Elementary Particle", Wikipedia http://en.wikipedia.org/wiki/Elementary_particle#cite_note-1 (12.12. 2012.)

[4]Actually, it seems that it is even more restricted than the original Polanyian version. There are numerous examples in which discoveries relied on a wide range of historically accumulated clues, yet what was discovered was quite particular. The recent discovery of the water on Mars could be an example for this.

[5]Putting the matter this way indicates that the indeterministic nature of Quantum Theory does not matter here. First, because machines are macroscopic objects that behave deterministically in practice in accordance with classical physics. Second, because even if machines were microscopic objects that are subject to quantum indeterminacy, it would be quantum theory and the prior state of the system that would determine the probabilistic behavior of the system and *not* an operational principle.

[6]I discussed them in Margitay 2007.

[7]It is worth comparing Takaki's and Giere's (1990) concept of model and its role in science.

[8]In fact, I cheated in the reconstruction of the argument. I have made it up from the two reconstructions given by Agler and Kertész.

[9]This scenario resembles the one described by Putnam (1980 1-4) in which an aunt draws the picture of Churchill by randomly crawling around.

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REVIEWS

Jonathan Haidt, *The Righteous Mind: Why Good People Are Divided by Politics and Religion*. New York: Pantheon Books, 2012. ISBN 978-0-307-37790-6. $28.95, hb.

Jonathan Haidt, now Thomas Cooley Professor of Ethical Leadership at New York University's Stern School of Business, follows up his *Happiness Hypothesis* with this attempt to understand and overcome political and religious divisions in this country by means of insights drawn from contemporary research in moral psychology. As he puts it, "My hope is that this book will make conversations about morality, politics, and religion more common, more civil, and more fun" (xii). Whether he achieves that goal remains an open question. However, he does make an intriguing case that it is possible, although difficult, to overcome our evolutionary heritage which has given us a mind that is moralistic, judgmental, and critical. We can do so, Haidt contends, by attending to three principles that grow out of contemporary moral psychology.

Haidt organizes the book in three parts, each of which is devoted to one of those principles. Part I is devoted to the principle that "intuitions come first, strategic reasoning second." To make the point, he compares reason to a rider on an elephant, an image developed at length in his earlier book. The elephant refers to automatic cognitive processes (intuitions and emotions) and the rider to controlled, conscious, rational thought. According to Haidt, the rider evolved to serve the elephant, such that moral reasons are best understood as post-hoc justifications of judgments that people have made on other grounds (40). All is not lost, however, for the rider does have some ability to nudge the elephant in some directions—at least once the rider gets the elephant's attention. A subtext of this part of the book is that contemporary psychological research supports a view of the relationship between reason and emotion that is best described as a "social intuitionist model," which is more in line with Hume than Kant or Plato (Ch. 2; also 83-92).

Part II is devoted to the principle that "there is more to morality than harm and fairness." Here, Haidt suggests that just as we have taste buds, we also have six moral "taste receptors," which he describes as six sets of polarities. We have evolved to be sensitive to care/harm, fairness/cheating, loyalty/betrayal, authority/subversion, sanctity/degradation, and liberty/oppression. Unfortunately most moral theories center primarily on care/harm and secondarily on fairness/cheating while largely ignoring the other four sets of polarities (114-127). In support of the claim that there is more to morality than that, Haidt draws from a wide range of research, including student reactions to various scenarios, some true and some fictional. For example, he asks students to assess the actions of a cannibal whose "victim" (?) is a consenting adult, or those of a person who buys a dead chicken, has sex with it, then cooks it and eats it. Students uniformly think that there is something wrong, but struggle to articulate why, since there is no clear harm (e.g., 15-23). He also notes that perceptions of harm vary from culture to culture (Ch. 5). Haidt thus contends that contemporary moral psychology supports moral pluralism, i.e., the notion that there is a limited range of values that guide conduct that remains recognizably *human*. Different cultures may configure these differently, but there is a limit. In claiming this, Haidt distances himself from the naïve relativist view that anything goes or that one culture's solutions are as good as another's (113, 316).

At this point, Haidt makes his first connection to contemporary political and religious currents. He contends that liberals and conservatives differ significantly on two primary counts. The first is that liberals have a much less sensitive moral palate, as they operate mostly from a care/harm base, while on

occasion attending to liberty/oppression and fairness/ cheating. Conservatives are much more attentive to loyalty/betrayal, authority/subversion, sanctity/ degradation—thus Haidt ascribes the appeal of conservative views to the fact that conservative rhetoric activates more "taste receptors." Haidt also finds that even when liberals and conservatives appeal to the same "receptors" they construe them differently. For example, liberals define fairness as equality, whereas conservatives define it as proportionality. When liberals appeal to liberty, they put it in the service of oppressed groups, whereas conservatives appeal to liberty on behalf of their own groups (131-138, 175-181).

Moreover, Haidt argues that these dispositions are to a large extent innate, i.e., a "first draft of a book" that is later modified by experience (130-1). These dispositions have evolved in response to certain "adaptive challenges" in our evolutionary history, but what triggers them changes in later environments. For example, the loyalty/betrayal receptor responds to the need to form cohesive groups and originally was triggered by a threat or challenge to one's group. Today, groups have been replaced by sports teams or nation states. However, the emotional states, such as group pride or rage at traitors, remain, as do correlative virtues such as loyalty or patriotism (125). Thus, genes make some brains more reactive, for example to threat than others, which can lead people down different paths, with different experiences into different moral subcultures which are guided by different grand narratives (277-288).

Part III is devoted to the principle that "morality binds and blinds." In making this case, Haidt argues that we are "90% chimp and 10% bee." In Durkheim's words, we are *Homo duplex*, individual creatures who are, at the same time, participants in larger societies (233). Here, Haidt defends the existence of group selection to show why we are more "groupish" than selfish. We are, by this account, like chimps in that we are primates whose minds are shaped by competition of individuals with neighbors (Ch. 9). Success in that competition, however, favors groups that are more cohesive. Thus, while we are largely chimp, we are at the same time like bees, in that we can—at least under certain circumstances—transcend our individualism so that we come to see ourselves as part of a larger whole. In doing so, we switch on what Haidt calls the "hive switch." He identifies some of the ways that we can do so: "biotechnologies" that produce altered states of consciousness, such as ritualized movement or drugs (224-236), transformational styles of leadership (236-240), politics (240-244), and especially religion, which according to Haidt, evolved to promote group cooperation and cohesiveness (Ch. 11).

If humans have evolved as he says, then how can we leverage these principles to overcome our innate dispositions to overcome our (self) righteous minds? Haidt does not provide a step-by-step guide, but does offer some suggestions along the way. First, "talk to the elephants," i.e., develop and encourage the ability to see things from a variety of perspectives, thus re-educating intuitions (48-49). Moreover—and easier, he says, than retraining the elephant—is to design institutions that guide the elephant down the path toward understanding rather than division, so that good reasoning emerges from group processes (89-90). Third, we can strive to expand our moral palates. Thus, he suggests that conservatives need to learn from liberals that government regulations are sometimes necessary to restrain corporate excesses and dangerous externalities that markets ignore (296-300). At the same time, liberals need to understand the value of markets and realize that policies have to maintain the wellbeing of the hive (i.e., support social and moral capital) if one is to help individuals or subgroups (300-309). Haidt also recognizes how technology and residential patterns that sequester us with like-minded persons make it difficult to overcome these ideological divides (311-312). Finally, he suggests that utilitarianism is the moral philosophy that would best drive social policy, whereas virtue ethics is best for personal morality (272, 369).

In relation to Polanyi, one can find some thin affinities. Reminiscent of Polanyi, Haidt finds pattern recognition to be central to cognition (41). For Haidt, reason appears to rely tacitly on intuition and

emotions. Unlike Polanyi, however, reason does not automatically seek to understand and probe an ever more-intriguing emergent reality, although it can be made to do so, with the proper supports. Finally, Haidt and Polanyi would seem to have largely compatible views on markets and government regulation. Haidt is not Polanyian, but perhaps something of a kindred, progressive spirit.

Haidt is to be commended for his wide range of reading; he draws from moral philosophy, evolutionary theory, sociology, anthropology and moral psychology, to synthesize an account of morality. Although those readings are sometimes simplistic and his conclusions not entirely coherent (e.g., given his criticisms of utilitarianism, can he seriously mean it is the best we can do?) he strives for a comprehensive account of human morality. In fact, there is much to affirm about his definition of morality as "interlocking sets of values, virtues, norms, practices, identities, institutions, technologies, and evolved psychological mechanisms that work together to suppress or regulate self-interest and make co-operative societies possible" (270). Moreover, he makes compelling cases for moral pluralism and group selection.

At the same time, because the book is written to popularize research and advocate a point of view, it raises as many questions as it answers. Haidt does not address criticisms of his social intuitionist model (see, for example those raised by Darcia Narvaez, summarized in my review of her work in *Tradition and Discovery* XXXVII/3, p. 14). One also wonders if Haidt is a bit too certain about how certain moral taste buds evolved as adaptations for ancestral environments. To be sure, his accounts sound plausible, but they still come across as being "just-so stories" without more supportive evidence. Adherents of religion will find his account of the evolutionary origins and value of religion to be reductionistic and will be frustrated by his silence on matters of religious truth claims. To be sure, some of this can be excused because he writes as a social scientist, but given his generally positive account of religion (at least in relation to the "new atheists"), it is disappointing. Finally, one is left

wondering if morality is as cross-culturally variable as he suggests. For example, the Defining Issues Test, an assessment of moral reasoning adapted from the work of Lawrence Kohlberb by James Rest, has been shown to be reliable and valid across cultures. Again, there is more going on than Haidt allows and one wishes he did more to acknowledge that.

Interestingly, the "heroes" of the book do not turn out to be who he suggests at the beginning. Early in the book, Haidt says that the takeaway message of the book is that, citing Jesus words from the Sermon on the Mount, we are all self-righteous hypocrites (xvi). By the end of the book, however, the message is less Jesus' than Edmund Burke's, for whom our partial loyalties are the basis upon which wider loves can eventually be built, so long as moral capital is valued and nurtured (290, 307).

Overall, Haidt takes the reader on an entertaining journey that is part intellectual autobiography and part summary of research. It is quite apparent that his career has centered around communicating difficult ideas to undergraduate students. With its end-of-chapter summaries, lack of jargon, and conversational tone, this book would be a useful and provocative book for undergraduates, especially if it is supplemented in ways that address the weaknesses identified above.

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Michael S. Hogue, *The Promise of Religious Naturalism.* Lanham, Md.: Rowman & Littlefield Publishers, Inc., 2010. Pp. xxx + 253. ISBN 13: 978-0-7425-6261-5. $74.95 hb. Kindle edition, $38.89; Nook edition, $39.89.

Within five years of receiving his Ph.D. in theological ethics from the University of Chicago, Michael S. Hogue, who is now an Associate Professor of Theology at the dominantly Unitarian Universalist Meadville Lombard Theological School, published two valuable books in the broad area of science,

ethics, and religion: *The Tangled Bank: Toward an Ecotheological Ethics of Responsible Participation* was released in 2008, to be promptly followed by *The Promise of Religious Naturalism* in 2010. The strong ethical focus that is obvious in the title of the first also provides a defining element of the "promise" explored in the second. While the first engaged primarily the work of Hans Jonas and James M. Gustafson, *The Promise of Religious Naturalism* is structured as an elaborate counterpoint discussion of the arguments of Loyal Rue, Jerome A. Stone, Ursula Goodenough, and Donald Crosby. Hogue engages these four contemporary theorists because "[t]hey are thinkers who illustrate especially well the constructive potential of religious naturalism as an important contributor to religious ethical thinking amidst . . . the heretically immanent post-traditional religious conditions of the ecologically vulnerable moral present" (ix).

Firmly seated in the tradition of theological liberalism (though worried about its continuing vitality and viability), Hogue considers "religious naturalism" to be an emerging religious movement that is particularly well fitted to address the problems of our times—most notably the moral challenges associated with our threatened ecosystem, the problem of negotiating "religious and cultural differences" (x), and the need to find "new forms and ways and modes of being religious" in response to "the forces of modernization" (xxi).

The argument hangs on just what Hogue means by "religious naturalism," and Hogue's most convincing response is simply to point to what Rue, Stone, Goodenough, and Crosby (different as they are) are doing. Hogue operates with a fairly standard understanding of naturalism as the view that "nature is all that there is and all that can be known and all that is necessary for . . . purposefully moral lives and communities" (37). What he rejects is the conclusion that naturalism is the enemy of religion because it is "opposed to *supra*naturalism as well as to *super*naturalism" (38). On the contrary, he identifies a rich and growing literature that displays a variety of productive ways in which naturalism and religion can be brought together. The four authors whose work he examines represent four exemplary approaches (see Table 1 below).

The phrase "religious naturalism," however, suggests much more than the possibility of studying religion scientifically or developing less mechanically reductive forms of naturalism, and Hogue's own position seems to be that a new this-worldly form of religion is emerging in the West as part of a broad cultural trend toward regarding "immanence as a primary frame of religious meaning and belief" (38). It is a religious stance in which "naturalism's basic metaphysical and methodological chords are religiously thematized. It is a form of naturalism that interprets *nature in whole or in part as an object of religious concern, devotion, and reverence*" (203, italics original). It is, moreover, a religious stance offering a distinctive ethics, or at least a distinctive ethos. Hogue's own position does not always emerge clearly from his complex mapping and comparison of his four chosen theorists. He also tends to blend religion and ethics (except when he is discussing the work of Crosby, who very sharply differentiates the two). Historically, of course, naturalism does tend to reduce the religious to the moral, but I don't think that is actually Hogue's intention—although he does acknowledge that "religious naturalists blur traditional boundaries between metaphysics and morality" (202). Near the end of the book Hogue writes, "I have argued that religious naturalism can be interpreted as one of these new forms and vital modes of religious ethics" (226), and he has indeed represented in detail the disparate ethical postures of Rue, Crosby, Goodenough, and Stone. Nonetheless, his own religiously naturalistic views about what should be done and what is required remain oddly elusive.

This ambitious, complex book is organized into an introduction and five chapters, with notes and an index. In **chapter 1, "What's Going On?***"* Hogue examines our contemporary context in relation to which the value of religious naturalism is to be assessed, introduces the unnecessarily idiosyncratic notion of "religious and ecological *heresies*," and conducts

his first overview of the four religious naturalists. In **chapter 2, "Theory and Method in the Moral Present,"** he "theorizes" naturalism, religion, and ethics in order "to set the stage for the comparative analytic chapters to follow" (37). While the first two chapters establish the practical and theoretical context, the third and fourth chapters constitute "the substantive core of the book" (xxvii). **Chapter 3, "What is *Religious* about Religious Naturalism?"** identifies religious naturalism as "that form of *naturalism* that can generally be defined as a deliberately *naturalistic engagement with religion and religiosity"* (85, italics original), and then offers an extended close analysis of the work of the four authors in order to show how each "naturalistically interpret[s] the functions of religion and the phenomenology of religiosity" (141). This analysis is then followed by a "comparative summary" in which he revisits each, emphasizing commonalities and differences. In **Chapter 4, "What is *Ethical* about Religious Naturalism?"** the author turns to axiological and normative dimensions of the work of the four anchoring figures, again offering a well-developed analysis of each in turn, followed by a "comparative summary" in which each is revisited as relationships are stressed. **Chapter 5, "Appreciating Religious Naturalism,"** has five sections, the first four of which are correlated with the preceding chapters and are meant to consolidate what has been accomplished. In each of these sections the four authors are again reconsidered.

In terms of conceptualization, this organizational structure constitutes a logical way of managing a thematically progressive argument, and it has the advantage of both accenting the pivotal issues in religious naturalism and emphasizing that the variations within religious naturalism occur along a number of different axes. Unfortunately, it is also a structure that seems needlessly repetitive; moreover, it leaves the organic contours of the arguments of the four religious naturalists less accessible to the reader than would have been the case if the book had offered a chapter dedicated to each, structuring each study by means of parallel thematic subsections.

For good or ill, Hogue's organization of the book is no doubt deliberate. He identifies his "methodological compass" as "appreciative criticism," and it matters to him that the reader should grasp the importance of this approach and, ideally, adopt it. Appreciative criticism, offered as an alternative to "deconstruction," is characterized by "a charitable regard for and interest in the work of other thinkers . . . and the traditions out of which they work" (xxiii). It "entails considerable *contextualizing,"* which means primarily starting with the Niebuhrian question, "What's going on in the world?" (2). It proceeds comparatively, and it grounds its critical component in a "generative impulse" aimed toward constructive, creative work with a bearing on practice (xxiv). Appreciative criticism aims to "bring to life" (xxiv) the work being discussed, and this is to be accomplished in (at least) two ways: (1) by generous engagement that emphasizes the appealing strength and value of the works discussed, and (2) by explicitly and creatively connecting the author's contribution with the vital problems of our life in common. Hogue places the scientific and moral challenges associated with our threatened ecosystem at the top of the list of such problems, and this book in praise of religious naturalism is written to show its promise in yielding a form of religious ethics with the potential to "enable us to perceive and respond—individually, collectively, and institutionally—to our interconnected ecological and cultural vulnerabilities" (21) and "orient life in commerce with a changing, vulnerable world" (226). This is certainly a noble intention, and the texts in question do offer promising resources. Unfortunately, because they are so different, no cohesive ethical platform or singularly forceful moral program emerges here—nor is it quite clear what actual community is to be galvanized by this "movement" that founds no churches and grounds no specific practices. Still, in charity, perhaps it would be unfair to expect so much so soon—we are all feeling our way forward, burdened by an urgency we are not sure how to meet in a situation that is without precedent.

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TABLE 1: FOUR REPRESENTATIVE VARIETIES OF RELIGIOUS NATURALISM

Types of religious naturalism	Variation 1 LOYAL RUE	Variation 2 DONALD CROSBY	Variation 3 URSULA GOOD-ENOUGH	Variation 4 JEROME STONE
Understanding of religion	Religion is a natural system that has "emerged by natural causes in the creative process of cosmic evolution" (91).	Religion "phenomenologically integrates personal and cosmological meanings and meets the demands for an examined and relevant life-orienting faith" (134).	Religion offers "a cosmological account of how things are and a correlate ethical vision of what matters" (123); accent on "the affective or felt dimensions of religiosity" (137).	Religion constitutes "a quality of experience and a kind of being in the world" (99).
Relationship of religion to the author's naturalism	**Naturalized Religion**: the "morphology and function of religion" can be explained "in evolutionary biological terms." Religion has an adaptive function that science can understand, and ultimately it is "about" the requirements of the human organism.	**Religion of Nature**: "Nature as a whole [is] to be experienced as a religious object of reverence and devotion" (107). Reverence for nature as a *whole* includes moving beyond an anthropocentric focus, breaking worship free of morality. The focus is on "the transmoral generativity of nature naturing" (136).	**Naturalistic Religiopoiesis**: a fully modern scientific understanding of nature has religious potential and can stir distinctively religious emotions.	**Religious conception of naturalism**: *"there are religious aspects of this world which can be appreciated within a naturalistic framework"* (99). The aspects worthy of reverence are those that are "creative of good" (135).
Activist intention	An "apologetic [and] justificatory" intention to advance religious naturalism as superior to traditional religions.	An apologetic intention to encourage forms of "collective piety" (121) that is free of "anthropocentric hubris" (120).	To present a scientific cosmological vision that "will support a kind of collaborative ethos that she deems planetary moral challenges require" (136-37).	"to advocate for religious naturalism as a religiously legitimate and meaningfully naturalistic expression of the criterially religious concerns with scope, orientation, and disposition" (133).
Ethics	**Federated Eco-Morality**—a naturalistic metaethics yields a "layered interdependence of [conflictive] values" (189); the moral life is presented with overtones of tragedy.	**Ethics of ambiguity**—a "deeply tragic" and conflictural treatment that severs "religious rightness" from "moral goodness"; religious reverence does not yield "matching normative principles or duties for the moral life" (197).	**Ethics of mindful reverence**—"a naturalistically grounded virtue ethics" (193).	**Ethics of openness**—a naturalistic metaethics yields "action-guiding general principles and disposition-shaping imperatives" (193).
Universalist intention	Yes	Yes	Yes	Yes

Victor Lee Austin, *Up with Authority*. New York: T&T Clark International, 2010. Pp. ix + 172. ISBN 978-0-567-30809-2, $65.70 hb. ISBN 978-0-02051-2, $29.95 pb. Kindle, $16.47.

Victor Lee Austin states his thesis in the first sentence of the book: "[W]e need authority to be ourselves…we cannot have a flourishing human life… without the functioning of authority in the multiple dimensions within which we live." Austin divides these dimensions into four areas: freedom, truth, power, and God. These areas correspond, respectively, to society, epistemology, politics, and the church, which are given a chapter each.

This thesis, that we need authority in order to be human, is contrasted in the first chapter with the faulty understanding of authority Austin identifies as most prevalent today: that it is a necessary evil, instituted—if one takes a theological view of the subject—after the fall to compensate for the imperfections of humanity. While Austin agrees that authority curtails, at least in part, the deficiencies of sin, his view of authority is not limited to its compensatory function; rather, he sees the essence of authority as *enablement*, not restriction. Proper authority enables us (1) to maximize our freedom, (2) to know more, (3) to preserve our traditions and exercise right judgment, and (4) to truly confess Christ in word and deed (this is a theological work through and through). Since authority enables us to do more and better things, our need for it, rather than gradually diminishing, actually *increases* the more perfect we become, since our capacity for achievement increases accordingly.

In Austin's chapter on social authority, the authority of a conductor enables the skilled members of an orchestra to perform beautiful music. Her authority frees the members of the "mini-society" to exercise their skills in playing a symphony, something they would not be able to do without direction. In his analysis Austin relies heavily on Yves Simon, who sees freedom as "an increase in human capacity," and so an increase in causality and intelligibility—things that can be done and known (25). This means that as humans grow so does their potency to act upon an ever-widening range of choices. The consequence of this "amplitude of being" is the increased complexity of a given society as a whole, such that the exponential increase in possible avenues toward human flourishing must be coordinated for the sake of the common good. An individual's reason and goodwill are simply insufficient to determine the common good, and so there must be a "power in charge of unifying common action through rules binding to all" (26). What form this power takes is purposefully unspecified, as it depends on the needs of the society under consideration (e.g., conductor, majority vote, etc.).

In chapter three (epistemic authority), a judge deciding a case uses the authoritative rulings of her predecessors to make a true judgment of her own, thus simultaneously learning from and contributing to the tradition. But is she not stuck between two undesirable options—either arbitrarily to pick the precedents that suit her tastes, or to rely slavishly on authorities to dictate her answer for her? Either way she will fall short of what Simon calls the "victory of objectivity [that] is the perfection of knowledge" (46). According to Simon, while we need leaders in social authority, epistemologically we need only a witness, who will point at the thing and then stand back and let us see for ourselves. Any answer that relies finally on authority is ultimately a failure truly to understand the thing.

Austin turns to Polanyi's theory of tacit knowledge to rectify Simon's misunderstanding of epistemic authority. Knowledge is acquired artfully—even in the natural sciences—by apprentices from their masters, and much of this knowledge is transmitted subsidiarily, so that—as every reader of *TAD* is well aware—"we know more than we can say." But apprentices are not the only ones who must rely on authority. Rather, "[b]ecause there is no knowledge that is independent of all other knowledge, there is no epistemic authority who stands apart from other epistemic authorities" (53). An expert in a particular field is just that—an expert in *a field*, who must rely on innumerable experts in other fields to accurately inform his own. Here Austin makes reference to Polanyi's

notion of "conviviality," or as Martin Moleski (whom Austin cites approvingly) puts it, "the social dimension of personal knowledge" (53). Since conviviality, the communal interchange of ideas and reliance upon one another's expertise, is never outgrown but is rather something into which one grows, the need for authority increases the more we know.

The next chapter (political authority) begins with a critique of the political philosophy of Eugene Kennedy and Sara Charles, who identify the proper role of political authority as the "augmentation" of the individual, while any use of coercive force is a resort to power, which inherently diminishes a human being. Austin sees this unquestioning distrust of power as essentially consistent with the modern depoliticized imagination, and posits instead that the role of political authority, in this fallen world, includes the proper use of coercive force to achieve the common good. Indeed, "[w]e cannot speak of politics without speaking of power" (74). This statement is informed by the political theology of Oliver O'Donovan, who distinguishes authority from both persuasion and undue coercion as transcending the former (it does not merely reason with individuals, but also compels), and legitimizing appropriate coercion (since it coerces only when its citizens fail to obey its commands). The coercive function falls to political authority because it is the most encompassing social authority, and the one that takes action when the punitive functions of mini-societies cease to be effective. A string quartet can expel a member for his poor attendance, but what can it do when someone runs him over? That is outside its, and every other social authority's, purview. And so it falls to political authority to cope with the problem— in this case, a court, which looks to and perpetuates tradition in rendering both its verdict and punishment. Important to note here is the coercive function is not the *only* role of political authority. As the authority for a society as a whole, political authority serves to coordinate and achieve the common good: "[w]ere there no sin, political authority *would still exist* but would not need in any way to coerce the support or cooperation of citizens" (71).

The performance of an aria from Bach's *Saint Matthew Passion* serves to illustrate the nature of authority within the church. Like the conductor and score that authorize the vocalist to sing, the priest and liturgy authorize a Christian to speak—while at the same time remaining dependent upon her actualizing her authority in professing her belief in Christ. In an ecclesiastical community, the individual exercises the authority she has received through incorporation into Christ's body, which only comes through the preexistence of the community. Austin highlights this dynamic relationship: "*The community is prior to the individual…And yet the community exists only in the individual to which it gives rise*" (103). The paper and ink of a Roman missal (or Book of Common prayer— Austin is an Anglican) does not contain the authority exercised by the church. Rather—as Austin stresses throughout the book—authority is a *performative* concept; it requires the enaction of an individual or individuals to become a reality.

This chapter, Austin notes, differs from the previous three in that the church does not fit into any given categorical scheme, but is rather a congregation or synagogue, a bringing to together of those who are dedicated to the Truth (capital T) and who acknowledge God as the source of all authority. Authority in the church is legitimate insofar as the Christian *shares in* the authority granted by Christ through His Holy Spirit in His church:

> To be under authority, to receive authority, to exercise authority—from none of these angles does authority have to do with willful command. From every angle, authority is a sharing. An aspect of communion, shall we say?
> For, in point of fact, in what manner do we speak of the authorized individual, within the congregation of the faithful, as having authority? We do so by means of the Holy Spirit…The individual who arises from the congregation of the faithful, having been conformed to a life itself formed by the unmediated yet communal reading of

Scripture: she is under authority because by the Holy Spirit she has made a faithful response to God in Christ. (120)

Chapter six examines submission to errant authority, using Polanyi's rejected theory of adsorption (which was eventually vindicated as a possible explanation) as a case study in what to do when authority makes the wrong call. Polanyi, rather than resenting the judgment of his peers, accepted their decision, recognizing that "[f]rustration with authority's errors is not license to subversion" (129). To acknowledge that authorities err is to note—rightly— that there is no perfect authority on this earth; but to reject authority on that count is to reject what it means to be human: that is, to be a social animal living in a community that jointly (and imperfectly!) strives to achieve its ideals. Though it will always fall short of this goal, its progress depends inexorably on social, epistemic, political, and religious authority.

Austin closes the book by looking forward to authority in paradise. Contrary to the modern notion that absolute equality is necessary to true happiness, Austin uses Dante's *Divine Comedy* to illustrate the notion that "happiness is found in our accepting our rank and place in a hierarchical world" (152). The inhabitants of Dante's heaven do not resent the superior positions of others in heaven, but rather derive joy from the well-ordered society: "[t]he intrinsic differences in paradise are had by persons who are in close solidarity, so much so that the joy of each is the joy of all" (154). This difference-without-inferiority is grounded ultimately in the relational unity of the Trinity, in which the Son and Holy Spirit are subordinate to the Father, and yet not any "less God" than is the Father.

Polanyi's thought, even when not explicitly cited, pervades the book—Austin's treatment of political authority, for example, bears a strong resemblance to Polanyi's thoughts in PK 222-233 on "Administration of Civic Culture." Polanyi's analysis of this issue may satisfy some who are looking for a philosophical supplement to Austin's more overtly theological treatment.

Austin's writing style is thoroughly engaging. His arguments are cogent and persuasive; taking his cue from Aquinas, he concludes chapters two through five with the statement and refutation of objections to his positions, and does not dodge difficult questions. His tone is genial, not imposing or doctrinaire—appropriate for one who hopes to persuade his reader, not enforce existing stereotypes of "that sort of person who would advocate authority." In short, he accomplishes admirably his goal of presenting a thoroughly enjoyable and intellectually compelling vindication of authority for a world lacking in both due respect for authority and the intellectual ground for giving it.

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