Extended Abstract

INFORMATION SCIENCE, TRANSDISCIPLINARITY AND LOGIC

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1. INTRODUCTION. TRANSDISCIPLINARITY AND INFORMATION SCIENCE AND PHILOSOPHY

The emergence of the concept of transdisciplinarity, and the field of transdisciplinary studies has come in response not only to the proliferation of disciplines and the need to manage their practical applications, but to the post-modernist crisis in the related philosophies of science and knowledge in general. Transdisciplinarity is not a new discipline but a philosophical movement which, through its non-standard logic of human experience and human intelligence, can provide a new approach to on-going problems and paradoxes of human thought, science and philosophy.

In parallel to the development of transdisciplinarity, the last decade has also seen major developments not only in the information and communications technologies, but in the science and philosophy of information. As I will show, recent theories of information science and philosophy have a close relation to transdisciplinarity.

2. THE PHILOSOPHY OF INFORMATION AS METAPHILOSOPHY

Starting in 1980 from philosophical considerations of the essence of information, Wu Kun, working at the Jiaotong University in Xi'an, China, developed a Philosophy of Information (PI) that included an informational ontology, epistemology and theory of social evolution. For Wu, information is a critical component of all disciplines, beyond the formal content specific to each. A small fraction of this work became available in English in 2010 in a monograph presented at an International Conference on the Foundations of Information Science in Xi'An ("The Basic Theory of the Philosophy of Information" (BTPI) [1]).

In the conception of Wu Kun, the presence of information throughout existence converts the philosophy of information to a metaphilosophy. The comprehensive nature of such a metaphilosophy establishes a role of those involved in the social and ethical aspects of informational activities. The metaphilosophy of information requires attention to the informational aspects of complex processes as a methodological necessity, in a process that Wu calls Informational Thinking. Informational Thinking *(IT)*, as conceived of by Wu, refers to a way of grasping and describing the essential characteristics and attributes of things by reference to the structure and dynamics of the information involved in their evolution, from their historical origins to future possibilities and probabilities. A summary of his views in English can be found in [2]. At the heart of Wu's theory is a necessarily alternative worldview that emphasizes its relational and process aspects. Information and informational processes, in the conception of Wu Kun, are transdisciplinary and can also be seen to evolve according to the principles of Logic in Reality (see below). This work was completely independent of the concomitant development of a Philosophy of Information by Luciano Floridi [3], working at the University of Hertfordshire in the U.K. The differences in the two approaches are philosophical: Floridi's theory is basically epistemological, seeing the operation of information from the perspective of the human observer-reasoner.

The philosophy of information has thus transcended its origins in information and computation science and technology. We move from a quantitative, "technological" conception of information to what may fairly be called a transdisciplinary one. It is not only that the philosophy and metaphilosophy of information refer to the standard disciplines that makes them transdisciplinary but that they contain, like transdisciplinarity in general, what lies in, between and beyond the different conceptions of information – an attitude, a stance and an ethics. The 2nd International Conference on the Philosophy of Information is taking place as a major Stream within this Summit.

3. THE LOGIC OF TRANSDISCIPLINARITY

I consider that a more scientific description of the grounding of ethical human ethical behavior is not just an intellectual exercise but a moral obligation. Two related tools now available for this task are thus transdisciplinarity and informational science and philosophy or metaphilosophy as indicated above. A necessary component of both is the non-standard logic of transdisciplinarity originally proposed by Lupasco [4] and up-dated by me and made available to English-language readers as Logic in Reality (LIR) [5].

In the acceptation of Basarab Nicolescu [6], the three 'pillars' of transdisciplinarity are complexity, levels of reality and this logic of the included middle or third. In previous papers, I have also discussed in some detail my interpretation of the Lupasco system as a non-truth-functional, non-linguistic extension of logic to real systems. A key axiom defines the energetic logical relations between the opposing or contradictory elements of real processes.

I emphasize that both approaches include the emergence of new states through the principle of dynamic opposition, the dialectic and interactive relation between the dual elements of all real processes. The difference, very briefly, is the following: Nicolescu looks 'upward' toward the transcendental aspects of existence, extending the Lupasco logic to cover the relations between epistemological Subjects and Objects, designated as Transdisciplinary, at higher levels of cognitive reality. LIR focuses on the explication of the evolution of complex real systems, their ontological

subjects and objects, and the information processes directly associated with them. This point is critical for the discussion of transdisciplinarity in relation to information science.

My view of transdisciplinarity and its relation to a logic is similar to the discussion by Roderick Lawrence in his paper "Transgression of Disciplinary Frontiers" [7]. In particular, he cites the statement by Thierry Ramadier that "the specificity of transdisciplinarity consists in simultaneously integrating *two contradictory movements* (emphasis mine) of disciplinary logic, that is, the fragmentation of knowledge and the relation between the "fragments", in order to do research into the connections possible between the (forms of) knowledge produced". These are the kinds of movements, including their connections to the fundamental physics of our world, which Logic in Reality can describe.

4. APPLICATIONS IN THE REAL WORLD

4.1 The Global Sustainable Information Society

The concept of Wolfgang Hofkirchner and his associates in Salzburg and (now) Vienna is that the study of the emerging theory of the information society is transdisciplinary. In particular the new field of research in the Information and Communication Technologies (ICTs) and Society is a transdiscipline, as proposed in 2007 [8]. The key aspects of a transdiscipline for Hofkirchner *et al.* are its scientific status and its potential societal function. As regards the scientific status of the field, a transdiscipline is not a mere combination of existing disciplines but a transgression of their traditional borders and their transformation into something new with its own identity. Its terminology should overarch the terminologies of the single disciplines it departs from. A transdiscipline therefore is expected to bridge several gaps: the gap between the two cultures of (natural) science and social and human sciences as well as the gap between specialists and generalists as well as the gap between applied research and basic research. It is the result of a process that departs from mono- or multidisciplinarity and transcends interdisciplinarity.

In this view, it is the role of a transdisciplinary information science [8] to help in bringing about a Global Sustainable Information Society (GSIS) [9]. A GSIS can be defined in a normative way and technology (the ICTs) can be assessed according to how they facilitate society to achieve the GSIS. This is in sharp contrast to either undertaking research solely for reasons of curiosity or being instrumental to whatever is demanded by parts of society. In contrast to the ideology of value-free science, the normative criteria are laid down to which ICTs as well as society should be subject.

Hofkirchner argues that transdisciplinary features must inhere to the newly established field of ICTs-and-Society research if it is to 1) be critical of current socio-economic developments; 2) aim for the establishment of a GSIS; 3) tackle the complex problems of society and technology; and 4) use social-scientific and technological, empirical and theoretical methods in a proper way. Logic in Reality (LIR) supports this transdisciplinary view as it involves integrative ICT assessment and design approaches that incorporate a normative view of technology and society. There is no place in LIR for value-free science; the practitioner is *always* involved logically with the material substrate of his science, whose dynamics and properties he partly shares. As clearly stated by Hofkirchner *et al*., a normative approach requires "doing justice" to what is normative and factual, actual and potential. The term "transdiscipline" should be adopted in discussions of transdisciplinarity where it brings out better the issues under discussion. Whether the use of the term conflicts with a definition of

transdisciplinarity which is also supposed to be beyond *all* disciplines is for me a secondary question, perhaps best answered pragmatically by reference to transdisciplinary openness itself.

4.2 The Ethical Dimension and the Environment

As discussed above, the link between informational philosophy and transdisciplinarity is the logic of and in reality (LIR), which is, also, the logic of transdisciplinarity. A basic tenet of this logic is a respect for the other, as stated by Nicolescu in his Manifesto [10]. The other in the broadest sense is not only female vs. male in a male-dominated society and racial and ethic minorities in general but human and non-human, that is, the total physical environment. In the LIR view of ethical behavior, the same metaphysical but also physical principle of dynamic opposition provides the basis for both 1) a generally applicable antagonistic psychological typology of responsible and irresponsible behavior; and 2) the origin of environmental responsibility and in fact moral responsibility in general. Morality in the generally accepted sense of responsibility toward others as well as oneself and the environment is thus logically and ontologically grounded, as are other universal aspects of human behavior and not dependent on transcendental assumptions that serve only to weaken its purport.

Strategies to strengthen awareness of and positive response to environmental threats should thus emphasize common humanity and a common psychological structure across cultures as well as enlightened self-interest. This area is being currently addressed by Zong-Rong Li and his associates [11]. Li has suggested the term 'Informationalism' to capture the controlling function of informational existence in which information science and material science explain individual and social phenomena. This approach permits, among other things, a reformulation and interpretation of psychology and its history into a specifically informational psychology.

4.3 Toward a New Democratic System

In the applications suggested by Wu Kun for his theory and philosophy of information, no specific comprehensive economic-political model is suggested, but he does call for a "new democratic system" that would permit maximization of the benefits from the new ICTs. A proper model would include an informational perspective for studying social phenomena, a social information theory based on his concept of the essence of information in a social evolutionary context.

As shown in Wu [1], forms of human civilization can be differentiated according to their different ways of creating, processing, dissemination and development of information. Only human beings can create information. Human production and productivity are essentially only information production and information productivity, and models of the economy and market activity are informational models. The expanded social role of information should be accompanied by the development of networks for its dissemination resulting in the (slow) atrophy of centralized national and global hegemony. However, any theory or model of social change cannot ignore (see my interpretation of the Lupasco logic above) the inevitable fundamental embodiment of contrary, anti-social and anti-civilizational forces in the society. These will always make the struggle for the common good and implementation of human values a struggle indeed.

5. SUMMARY AND CONCLUSIONS

In summary, one of the most important aspects of the concept of transdisciplinarity is its relation to the field of information and information science. The role and function of the Logic in

Reality as the logic of transdisciplinarity is to support, philosophically and scientifically, the transdisciplinary approach or attitude toward current issues in philosophy and science and to provide new insights into the *qualitative, ethical* aspects of the informational evolution of science and society. I believe that a new way of looking at thought and the traditional disciplines can make a contribution to the establishment of an informational commons.

Following Wu Kun, I have shown that the philosophy of information is a metaphilosophy that also makes possible a new conception of nature, understanding, society and values and actively promotes the development of human information society, and a more civilized and democratic social polity, economic and cultural new order. Wu's informational philosophy and LIR constitute part of a new transdisciplinary paradigm, in which information science has a central role in the transformation of society.

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