Coda

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In this personal review of the important and independent contributions to this book, I want to consider the timing of their development and how it might be possible to draw some of the main ideas together. To do so, I have chosen the ideas of periodicity and rhizomes. A recognition of the real world as a place in which we live and flourish is not new in the ontological literature. How we deal with our being in this world, both personally and as members of communities, has been a central issue for thinkers from ancient times to the present. Many paradigms have been used to create understanding and have worked well in their time—from the seven days of creation to evolution—and given both structure and meaning to our existence. They have forged what we value into part of the way in which humanity regards itself through the advocacy of rights and obligations. The periodization of our self-knowledge and that of our existence in a world of other entities is represented in the practical applications and artefacts that flow from these separate identifiable epochs of time, epochs that are not universal but culturally constructed. I will speak of the Enlightenment and the Renaissance, which have resonance in Europe but little in China or Africa, countries that have their own equally compelling periodization.

The very nature of time is historical and developmental. In contemporary society, commentators refer to a shifting landscape of knowledge production; but what is new is not the shift but the rapidity and busy-ness of change and the temptation to conflate this change with a notion of progress. Changes include different roles for knowledge institutions in a global 'knowledge economy'; increasing demands for knowledge production to address growing national, international and global perspectives that both connect and alienate communities, with some enjoying unimaginable abundance while many people still starve.

Time might be in flux, but how it is temporalized has differed in its flow. Historians have recognized this through discussions of the periodization of time, and we want briefly to locate our discussions of time and the role of our current universities and

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professionals in changing and challenging epochs. The temporality of the history of the university can be found in the interlocking notion of this historical time and our intellectual history. Each shapes higher education institutions and professions by sustaining, permitting, changing and organizing them within it.

Tracing a periodization of intellectual life and time emerging from the Middle Ages, a new type of present could be detected, distinct from that of the ancients, one not determined by past ways but beginning to see a discontinuity between the past and the present. This discontinuity was more evident in the Renaissance, when modern ideas were seen in opposition to those of the Middle Ages. Yet time remained tied to a past, to a tradition not of the immediate past but to the achievement of the Ancients. Aristotelian physics, politics and metaphysics were the benchmarks of Western cultural development. They formed the basis for the power of the Catholic religion and social structures.

The Enlightenment that followed changed this in two major related respects. First came the idea that time was abstract and not God-given, and second, as a consequence of escaping from the eschatology of Church teaching, the idea was entertained that there was a future, empty to be shaped (rather than predestined) that could be intended and filled by humanity for its own purpose. The appearance of time and temporality in opposition to tradition was the beginning of what might be termed modernity and the growth of secular self-determination. It saw not just the understanding of given phenomena but the realization of a power to change things—all things—through acquired knowledge. The threads to understanding the natural world through perceiving what can be taken to be existence was central to the views of thinkers such as Descartes, Kant, Bacon and Hume. These positivists argued that verification can only be through experience or through reasoning. Their most celebrated engagement with the social sciences is found, perhaps, in Hempel's discussion in Logical Positivism and the Social Science (2001). In this essay, Hempel (2001) contended that 'there is no fundamental difference in subject matter between the natural sciences and the psychological and sociological disciplines' (2001, p. 255), a view echoed by fellow logical positivist, Carnap, who claimed that 'all laws of nature, including those that hold for organisms, human beings, and human societies, are logical consequences of the physical laws' (cited in Hempel 2001, p. 267). This position sets itself the task of transposing knowledge that is imperfect and pre-scientific in respect of its scope and constancy into perfect knowledge, perfect to the extent is it causally understandable. It ignores both 'big pictures' and complexity to find ways of unravelling of complexity through the manipulation of variables. It creates sterile, deterministic spaces for humanity and sections knowledge into disciplines to 'aid' understanding, but also to make knowledge that the powerful in society control—academics, scientists and engineers, and those for whom it will bring benefit.

The post-Enlightenment period, that of modernity, nurtured social change and revolution. In addition, time itself became reflexive and broke from the ever-recurring present and now offered new ways of being. It is this epoch of difference, when change occurs and then continues to contribute to change with its own moving vortex, that concerns us here. It valorizes the present over the past and opens up an

indeterminate future. It creates a desire for the new and leads to the idea of progress and development. It recognizes, mainly thanks to the work of Husserl (1983), the essence of an experience in a wide range of forms, either indirectly, as others might perceive it, or directly, to uncover the intent behind the experience. Intent is what we intend, or perceive, as a purpose. It is an ordered relationship where we perceive things: a knife for cutting; a code of conduct for reference to acceptable professional conduct; an exciting read for a train journey. It is a world where the messiness of the world cannot easily, if at all, be resolved through Aristotelian categories and prescribed Baconain methodologies; it is a world where problems are highly complex and where contingency is meaningless because of uncertainty. It is a place of encounters, where practices will need to dominate, and are structured around a complexity that has no definable beginning nor end, where our understanding is local, at best, and where the unforeseeable future ought to dominate ways of being. This is the world of the 'rhizome', as developed by Deleuze and Guattari (1987) in *A Thousand Plateaus,* mentioned by a number of authors in this book and used later in this chapter to assist in bringing collective meaning to the contribution of this book.

However, before turning to a discussion of how transdisciplinary research into the practice of professionals is rhizomatic in nature, I offer here a brief outline of what this might mean then make suggestions for how this idea is evident in almost all the chapters in the book, moving to argue that transdisciplinarity is rhizomatic and of 'our time' in nature and period. I finally conclude with the direction of travel that the content of this book has indicated.

Deleuze and Guattari, in their attempt to offer a metaphor for the way in which meaning might be constructed of our world, select the subterranean idea of 'rhizomes' to provide metaphor. This has an ideal imagery of connectivity, albeit potentially accidental to the way we exist and function in the real world. Deleuze and Guattari (1987) summarize the principal characteristics of a rhizome in this important and extensive quote:

> unlike trees or their roots, the rhizome connects any point to any other point, and its traits are not necessarily linked to traits of the same nature; it brings into play very different regimes of signs, and even nonsign states. The rhizome is reducible neither to the One nor the multiple. . . . The rhizome operates by variation, expansion, conquest, capture, offshoots. Unlike the graphic arts, drawing, or photography, unlike tracings, the rhizome pertains to a map that must be produced, constructed, a map that is always detachable, connectable, reversible, modifiable, and has multiple entryways and exits and its own lines of flight. It is tracings that must be put on the map, not the opposite. In contrast to centered (even polycentric) systems with hierarchical modes of communication and pre-established paths, the rhizome is an acentered, non-hierarchical, non-signifying system without a General and without an organizing memory or central automaton, defined solely by a circulation of states. (1987, p. 21)

Moreover, when applied to our social world, a 'rhizome ceaselessly establishes connections between semiotic chains, organizations of power, and circumstances relative to the arts, sciences, and social struggles' (ibid, p. 8).

This metaphor works well in recognizing both the openness of the way in which events are connected and the problems encountered when research attempts to resolve problem in defined, structurally arborescent ways. The interconnectivity of the encounters rather than causal contingencies makes attempts to deconstruct problems

into their constituent parts problematic, as might be found in disciplinary approaches to problems. The metaphor helps us also to discriminate between the notions of the form of multi-, inter- and trans-disciplinarity, commented upon by Gibbs in this volume. To conceive of a problem as an open network, without either a discernible starting place, a time from which a solution may be planned or a point of final resolution, counters the Enlightenment faith in ultimate management. It creates the intellectual space for solutions that employ new, innovative ways of thinking, ways that define our current complex, uncertain and messy epoch.

This book highlights the intellectual debt owed to a small but deeply important group of thinkers who developed the transdisciplinary idea. This includes a number of authors contributing to this book, standing alongside the pioneers who feature in most of the chapters; Nicolescau, Kockelmans and Klein. All have shaped transdisciplinary thinking and all have augmented, illuminated and enhanced the subject. Each has contributed from a different starting point in what might be called rhizomatic transdisciplinarity thinking. Their views and starting places have established the rationale for transdisciplinarity, and benefit from there being no attempt to match them thematically but an acceptance of the different perspectives, often disciplinary and scientific, on solving major issues from the stance of principle. These principles enrich the fertile context of a rhizome of transdisciplinary thinking, nurtured by the values of, and encounters with, those previously excluded from problem solving that dignify the contribution of all stakeholders to solutions.

Rhizomatic Criticality, Learning, Thinking, Networking and Temporality

From these intellectual endeavours the emergent themes appearing within these pages are the different epistemological and ontological stances that the authors take. Perhaps the clearest realization of this is in the recurrent theme of the constraints that disciplinary knowledge places on recognizing problems and what warrants their resolution. In many of the chapters it is not the recognition of wider knowledge networks that is surprising but the difficulty the disciplines have in working together. They need to unshackle themselves of what defined their identify and find a way of being within the problem that satisfies themselves as well as the processes, power and political issues called forth to answer the problem. In the interwoven reality of this book I have identified five significant, if not exclusive, themes. They may not be the most important in terms of attention but they form a way of interpreting a structure to the contributions. I have suggested they might be called; *rhizomatic criticality, learning, thinking, networking* and *temporality*.

Rhizomatic criticality helps explore criteria for decisions, producing an approach that is neither simple nor prescriptive. It threatens the tradition of knowledge creation, the hegemony of those who sanction it and notions of truth that sustain it by replacing certainty with warranted belief. The use of a notion such as rhizomatic criticality would illuminate the super-complexity of encounters rather than engagements and would see an investigator more as a navigator of passages with no firm

basis of contingency to guide her and only temporary local mapping for help (I am thinking here of the short-terming of disciplinary knowledge). Indeed, such guidance might not be of much use in a multiple process of understanding complex problems.

The notion of rhizomatic criticality clearly has encounters with a second theme, that of *rhizomatic learning*. Mentioned in many of the chapters is the role of professional education and the importance of formal education and its application to develop skills and mastery. Most of the focus is on the need for wider-ranging appreciation of situations and an ability to translate, moving from one centre for encounter, from one node to another, to see the semiotic where previously only the literal was envisioned. Rhizomatic learning requires the creation of a context within which the curriculum and knowledge are constructed by contributions made by members of the learning community, and which can be reshaped and reconstructed in a dynamic manner in response to environmental conditions. The learning experience itself may build on formal propositional knowledge and also on social, conversational processes, as well as on a personal knowledge-creation process, through the creation of large, unrestrained personal learning networks that may incorporate formal and informal social media. A leading proponent of rhizomatic learning, Cormier, defines the rhizomatic model of learning as where the:

> curriculum is not driven by predefined inputs from experts; it is constructed and negotiated in real time by the contributions of those engaged in the learning process. This community acts as the curriculum, spontaneously shaping, constructing, and reconstructing itself and the subject of its learning in the same way that the rhizome responds to changing environmental conditions. (2008)

Rhizomatic learning requires *rhizomatic thinking*. Indeed, Le Grange, in Deleuze and Guattari (1987), distinguishes between arborescent and rhizomatic thinking. The former refers to conceptions of knowledge as hierarchically articulated branches of a central stem or trunk rooted in firm foundations; a tree, in their instance, which they treat with the same distain as Sartre with the chestnut tree in his *Nausea* (2000).

A significant feature of the content of this book is networking and a notion of rhizomatic network does, I feel, add substance to this idea. *Rhizomatic networking* recognizes the this totalizing of the network in which we live but offers a new opportunity to revive democracy, potentially bypassing barriers of class and ethnicity, provided access is made available. Yet unlike tradition networks the rhizomatic networking is anarchic, for it recognizes no unifying connectivity principles. As Coyne describes it, a 'rhizomic system is dynamic and unresolved, growing and anarchic, in the manner of a rich and open-ended conversation' (2008, p. 553). To achieve such an account, which has explanatory significance for a wide range of methodological approaches to system networks, it assumes underlying relationships and feedback loops and favours other metaphors. It is, of course, necessary to uncover this organizational relationship and, having this information, an abductive approach that is wisely discursive would be more likely to reveal something worthwhile than the imposition of external framing through an implicit closed system model. It enables creative and imaginative thinking about socio-environmental problems. In this sense the rhizomatic network is more of discursive interpretation of the complexity of our world than a network that adheres to systems theory.

The last of many hidden themes in the engagement is the complexity of our periodicity. This time the theme is revealed in a number of interesting ways and argues against a fixed time and, as a consequence, place for the understanding of complex problems, their research and satisfactory resolution. Linking with the above transdisciplinarity has a temporality of it own: *a rhizomatic temporality*. If the links in time are not linear, if time cannot be considered solely to flow in one directions and validity is no longer always underpinned by rationality and logic, then the sequence that gives time its means is disrupted. Time's unfolding becomes more embodied, less abstract, and becomes the homogenizing temporality of known alternativeness, giving way to new and creative possibilities. The future takes no shape from the present and collective thinking liberating rather than entrapping.

Transdisciplinary Research as Poetic

Transdisciplinary research investigates the relationships of knowledge creation in its pragmatic state of problem solution, and how discipline knowledge can help through an analysis that creatively reconstitutes them, not in terms of the disciplines but in terms of the presenting problem. It is a diffractive response to the 'generalising, decontextualising and reductionist' approach that has traditionally characterized disciplinary approaches to knowledge generation. Wickson et al. (2006) have identified a number of challenges for transdisciplinary researchers and these include 'the different dimensions of integration required, the potential for two levels of reflection and the creative conceptual developments demanded by the presence of paradox' (2006, p. 1055). I should like to go one step further and suggest that, for the transdisciplinary researcher, the structure of the problem lies in terms of agency and the open system form of which the problem has irruption properties. These properties are rhizomatic and cannot be dictated, for the revealing of the relationship itself will offer up approaches to forms of understanding, but it may be sufficient to suggest they may flow from the empirical to the poetic.

Heidegger's (1993) claim that poetry has its own temporality has already been referred to in this book but the techno-poetry of rhizomatic combines encounters with different modes of expression and meaning to produce imaginative ways of knowing. The techno-poetic form facilitates connectivity of any point to any other point of knowledge sets offered by problem solvers, researched through situationally defined navigation. It follows no prescript or plan but the encounters the problem presents. The approach seeks to explore states of meaning via the operative environment or the problem. The non-closed nature of the system means it is not reducible to one solution but to a rich understanding of the issues pre-defined by disciplinary knowledge but revealed in the process of investigation. Its importance does not lie in the identification of specific nodes of revelation alone but in the directions of motion and configuration that give rise to an emergent series of readings and interpretations of the problem.

Deleuze and Guattari's rhizomes and rhizomatic ideas, presented as an interpretation in the pages of this book, offer a radical commentary on institutional structures of the professions and their difficulties in working in a transdisciplinary fashion. The pages have shown that where professions present coherent and authoritative knowledge structures they contain within themselves uncertainties and strange, unaccountable practices, especially at the margins of their domains. Rhizomatic analysis within the rubric of transdisciplinary investigation presents a challenge to many of the principles of professionalism that will need to be resolved if the problems of today render the future of others bereft of options.

Future Considerations

Wickson et al. (2006) suggest that, in our shifting landscape, 'knowledge generation in contemporary societies suggests a bright future for transdisciplinary (TD) research'. Interestingly, however, there is currently no clear consensus on what transdisciplinarity is or how its quality can be evaluated (2006, p. 1046). This is echoed by the position of UNESCO (ISSC 2013), among others. The World Social Science Report 2013, Changing Global Environments, represents a comprehensive overview of the field, gathering the thoughts and expertise of hundreds of social scientists from around the world, where transformation and transdisciplinarity are at the fore in devising ways that the social sciences might help confront climate and broader processes of environmental change. The intertwining within it of the human condition, as well as shaping the environment, is not readily dealt with by categorization derived from abstract rationality. It moves us into a new epoch, that of the Anthropocene (see Brown and Harris, this volume). This will see change in the university and its contribution to the identity of the profession. Universities will need to prepare professionals for a transdisciplinary epoch through developing capacity for transdisciplinarity. This will require facing up to the potential tensions between consolidation and interconnection, and between knowledge commodification and mutual learning (Russell et al. 2008). It will require professions to change and to realign and reinterpret within their supporting societies. This demands new thinking and a wider appreciation of what progress, developing personal dignity and humanity mean. A case for this change has been made, I think, by those who have contributed to this book.

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