(TRANS)DISCIPLINARY RESEARCH (RE)CONSIDERED

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ABSTRACT

In this article I review the emergence of transdisciplinary research and in particular the integrative approach to this category of research. I examine the potential of the integrative approach to achieve cognitive justice – whether it decentres Western science and gives equitable treatment to other ways of knowing such as indigenous knowledge. I aver that transformations that have occurred within discourses on transdisciplinary research have not changed the Western cultural archive itself and that Western science continues to dominate other ways of knowing in the integrative approach in transdisciplinary research. I draw on insights from Deleuze and Guattari to open up ways of reimagining transdisciplinary research as a decolonising process.

Key words: decolonisation, integration, new knowledge, mode 2 knowledge, societal problems, transdisciplinary research

INTRODUCTION

Much has been written about transdisciplinary research in recent times and we have seen the establishment of transdisciplinary research journals such as the *International Journal of Transdisciplinary Research* and the *Journal for Transdisciplinary Research in Southern Africa*. Across the globe we are witnessing the growth of transdisciplinary institutes and academics leaving their traditional departmental offices/laboratories (on certain days or full-time) to work in such institutes such as those working at the Harvard Transdisciplinary Research in Energetics and Cancer Center in the USA and the Centre for Complex Systems in Transition (CST) at Stellenbosch University, South Africa. The emergence of transdisciplinary research might be understood as the consequence of at least three separate but related developments:

- the rupturing of disciplines due to forces internal to disciplines
- the massification of higher education and the emergence of a socially distributed knowledge system
- the inadequacy of disciplinary knowledge to address the complex problems of our times

The emergence of transdisciplinarity is one aspect of the changing landscape of the contemporary university. This particular change has some association with democracy. The massification of higher education and its upshot, a socially distributed knowledge system, means that universities no longer have the monopoly over the production of knowledge – that there is wider societal participation in knowledge production. This participation, however, remains largely confined to those who are products of the university (located elsewhere after graduating). Therefore, in this article, I shall argue for an expanded notion of a socially distributed knowledge system, which includes citizens and their local knowledges. I shall do so, by critically discussing the transdisciplinary trajectory espoused by Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow (1994) and the integrative approach in transdisciplinary research elucidated by Bergmann, Jahn, Knobloch, Krohn, Pohl and Schramm (2012). Such a discussion might be important if transdisciplinary research is to have transformative effects in the global south. Moreover, I shall briefly explore how Deleuzo-Guattarian thought might open up ways of (re)imagining transdisciplinary research that could have decolonizing effects.

THE EMERGENCE OF A TRANSDISCIPLINARY RESEARCH TRAJECTORY

Gibbons et al. (1994, 11) point out that the massification of higher education after the Second World War is a key contributor to the emergence of mode 2 knowledge. In this instance mode 2 knowledge is understood as a system of knowledge that is socially distributed, organizationally diverse, application-oriented, and trans-disciplinary. Masssification of higher education has led to increases in the number of graduates, whom universities could no longer employ. This resulted in people with research skills and specialized knowledge being widely distributed in society. Consequently, knowledge production is not only pursued in universities, but also 'in industry and government laboratories, in think-tanks, research institutions and consultancies, etc.' (Gibbons et al. 1994, 11). We now have what is called a socially distributed knowledge system and as Gibbons et al. (1994, 11) suggest, the more graduates the university produces, the more it undermines its monopoly as knowledge producer.

Gibbons et al. (1994) identify some of the key characteristics of mode 2 knowledge. Firstly, mode 2 knowledge is *produced in the context of its application*. In the case of mode 1 knowledge, the context is defined in relation to the cognitive and social norms that govern basic research or academic science – the pursuit of knowledge is mainly carried out in the absence of a practical goal. In contrast, mode 2 knowledge is intended to be useful, whether to government, industry or society more generally. The imperative to produce knowledge that is useful is

determined at the inception of the project and knowledge is produced through a process of continual negotiation until the interests of all actors are included. Secondly, mode 2 knowledge is *transdisciplinary*, which entails the use of a variety of theoretical perspectives and practical methodologies to solve problems. In contrast to interdisciplinary knowledge, transdisciplinary knowledge does not derive from pre-existing disciplines, nor does it contribute to the formation of new disciplines. Thirdly, mode 2 knowledge production is *heterogeneous* in terms of the skills and the experience people bring and the composition of the research team can change over time as the requirements evolve. Knowledge is also produced in a variety of sites and in new environments, producing new ways of organizing knowledge. In this regard, Notwotny, Scott and Gibbons (2001) introduce the term *agora* which means, a 'heterogeneous arena populated by all kinds of organizations, as well as the public at large. These include activists, pressure groups, protestors of all kinds, as well as State agencies and multi-national corporations' (Scott 2003, 80). Fourthly, mode 2 knowledge is characterized by heightened *social accountability and reflexivity*. Because knowledge is produced in the context of application, researchers' sensitivity to the implications of what they are doing is heightened. Also, the problem-solving environments influence both research topics and designs. Fifthly, mode 2 knowledge is characterized by *new forms of quality control*. These involve wider criteria than those used in disciplinary knowledge, because scientific peers can no longer be reliably identified and reductionist forms of quality control can in any case not be applied easily to more broadly framed questions.

The theoretical intervention of Gibbons et al. (1994) has, however, not gone unchallenged. Peters (2007, 9) argues that Gibbons adopts a neoclassical economic perspective on knowledge, that his position is theoretically skewed and that the nature of his evidence is both limited and debatable – that Gibbons puts forward little by way of empirical studies or analysis of data. Peters (2007, 9) argues that Gibbons's theory functions like a neoliberal World Bank policy prescription in the sense that it advocates for a particular kind of partnership in the knowledge production process that functions to advance the interests of the knowledge economy rather than the public good. Furthermore, Peters quotes Fuller (2000, xii) who writes:

> The most pernicious feature of the 'Myth of the Modes' is that the two modes are seen as not merely mutually exclusive, but jointly exhaustive – that is, not admitting of other possibilities.

To support his scepticism about the exhaustiveness of mode 1 knowledge, Peters (2007, 9) points to the emerging economy of disciplines in cultural studies – new disciplines are still emerging. I go along with Peters that the emergence of the modes debate should not be understood in isolation from the ascendancy of neoliberal politics, an emerging knowledge

society (driven by a knowledge economy) and the capitalization of knowledge. However, there might be insights gained from Gibbons's work, if we were to rethink some of his ideas through eliciting the conceptual vocabulary that Deleuze and Guattari (1987) provide. I shall pick up on this later.

There are two other aspects in Gibbons's work that I wish to touch on: his notion of a socially distributed knowledge system and his point about new forms of quality control. Gibbons (2000, 41) points out that in a socially distributed knowledge system higher education institutions are no longer the only role players in knowledge production processes. The future survival of universities is therefore dependent on research done in partnership with government and industry (the so called triple helix). Nevertheless, I would argue that Gibbons's notion of a socially distributed knowledge system might be reconceptualised to include ordinary citizens (including indigenous communities), who are in the best position to know and understand the complexity of the socio-ecological problems that they face daily. Instead of a socially distributed knowledge system that serves the interest of the global knowledge economy driven by a neoliberal agenda, we might think of a socially distributed knowledge system that invigorates lines of escape from dominant neoliberal discourses, where the role players might be disparate but connect in various ways in opposition to the homogenizing and normalization effects of globalisation, or what Guattari (2001) called Integrated World Capitalism (IWC). As Irwin (2008, 329) writes:

> Contemporary anti-globalisation protest is a remarkable 'rhizome' of radical groups, upstanding citizens, charities, long standing emancipatory organizations, environmental groups, right wing organizations, anarchists, communists and so forth, who have all found a common thread which weaves together their disgust as the solidified locus of financial, discursive and policy flows which have coagulated in supra-national organization such as the WTO, World Bank, IMF, and various events such as the recent United Nations Earth Summit at Johannesburg.

This brings to me to the aspect of quality control. Gibbons et al. (1994) argue that as problems become more complex it is increasingly difficult to find suitable scientific peers (because existing ones are discipline based) and that new ways of validating knowledge should be explored. Processes of peer review will of course still play a role, but will be augmented by other ways of legitimizing knowledge. Gibbons et al. (1994) suggest that alternative ways of legitimizing knowledge might serve the interest of bureaucrats or those in industry – those who own the means of production. However, in the alternative distribution system that I argue for, processes of quality control might be decentred to include not only processes of peer review by academics, but might also include the interests of local communities/ordinary citizens, indigenous peoples, non-governmental organisations, and so forth – that quality control

processes will be the outcome of partnerships between universities and various civil society groups, giving rise to research that is authentically 'multicultural'. In Foucault's (1972) terms, this would imply that the mechanisms for regulating the production meaning would also change. But, let me turn to a discussion on the integrative approach to transdisciplinary research.

THE INTEGRATIVE APPROACH IN TRANSDISCIPLINARY RESEARCH

In their important contribution to thinking on transdisciplinary research, Bergmann et al. (2012) expound on the integrative approach in transdisciplinary research. They aver that integration is: a distinctive process to that of progressive differentiation in science; that the concept of integration is not new to science; that the impetus for integration could be internal or external; that there are different dimensions of integration (communicative, social and cognitive); that computer modelling is increasingly used in integration processes; that there are different types of integration (symmetric and asymmetric); and so forth. For the purposes of my discussion in this article, I shall focus on the three different approaches to integration in transdisciplinary research that Bergmann et al. (2012) identify. But before doing so, it is necessary for me to discuss how Bergmann et al. (2012, 41) distinguish between disciplinary, interdisciplinary, multidisciplinary and transdisciplinary forms of problem-oriented integration of knowledge and methods.

For, Bergmann et al. (2012) in disciplinary research the context of integration happens at the level of a discipline where research questions are internally defined; in the case of interdisciplinary research, integration happens at the interface between disciplines; in the case of multidisciplinary research, the context of integration is at the level of goals and problems; and in transdisciplinary research, the context of integration happens at the interface between scientific issues and social problems. Put differently, for Bergmann et al. (2012) in transdisciplinary research, social issues are interpreted in terms of real-world problems that are treated scientifically. This brings me to a discussion of Bergmann et al.'s (2012) three approaches to transdisciplinary research that will serve as the basis for my critique of their idea of the integrative approach in transdisciplinary research.

The first approach in transdisciplinary research that they identify is called the *real-world-focused* approach. What this approach briefly entails is the production of knowledge that can be used to solve a practical problem. The process involves stakeholder participants who work alongside scientists to jointly define and articulate a societal problem of public interest. The next step is that the real-world problem is translated into a research object by the research team (scientists/stakeholders) that can be worked through by scientific means. The research questions, which flow from the process are investigated by the transdisciplinary team to produce

solution strategies for the problem under appraisal. These strategies are then disseminated to practice partners to be implemented (Bergmann et al. 2012, 33). The second approach is the *science-focused* approach. This approach is applicable when complex internal scientific issues arise, but does not necessarily exclude attention to real-world problems. These issues may arise when dealing with a research problem, and when assessments concerning the problem are done within different disciplines, and found to be inadequate. The outcomes of the process are aimed at improving scientific research and its results. Participants are usually university graduates who conduct research within universities, non-university institutes and industry. The third approach, the *integrative approach*, is concerned with the simultaneous pursuit of two epistemic paths that present both practically oriented challenges and a scientific stimulus (Bergmann et al. 2012, 35). The one path is driven by societal problems, has societal actors and the results of the inquiry informs societal practices. The other path identifies scientific issues, is performed within a scientific discourse by graduates of the university (not all located within the university) and produces results for scientific practice. Integration happens at all three levels: 1) societal and scientific problems are integrated to construct as common research object; 2) societal actors and scientist come together in a team building exercise; 3) results of the two epistemic paths are integrated in a transdisciplinary process combining interdisciplinary scientific research with the research of practitioners/societal actors. Importantly, the integration approach involves processes of negotiation between societal actors and scientists, and requires both groups to bracket (in the phenomenological sense) their beliefs at various stages of the research process. Evidently, the integrative approach opens up greater possibilities for producing new knowledge than the other two approaches. However, I suggest that the integrative approach it is not sufficiently transformative and is not sufficiently reflexive to align with the project of decolonization. Decolonization in this instance concerns the decentering of Western Science so that it can be compared equitably with other ways of knowing.

In all three approaches outlined, at some point (step) in the process, real-world problems are translated into a scientific entity (Bergmann et al. 2012, 38). Even in the most radical approach to transdisciplinary research (the integrative approach), Western science (Euroscience) occupies a privileged place in relation to other ways of knowing. In other words, when cognitive integration happens, then cognitive justice is not achieved, that is, a history of unequal exchanges of cultures, which continue to play out in knowledge production processes in the twenty-first century goes unrecognised. As Santos (2014, 92) writes:

> Unequal exchanges among cultures have always implied the death of the knowledge of the subordinated culture, hence the death of the social groups that possessed it. In most extreme cases, such as that of European expansion, epistemicide was one of the conditions of genocide. The loss

of epistemological confidence that currently afflicts modern science has facilitated the identification of the scope and gravity of the epistemicides perpetrated by hegemonic Eurocentric modernity.

Put differently, in the integrative approach, Western science is not decentred to the point where it can be equitably compared with other ways of knowing. Although the integrative approach might lead to the transformation of Western science, it does not mean that the Western cultural archive itself is transformed (Foucault 1972). What is likely to occur in the integrative approach is that local knowledge or the knowledge of social actors is simply absorbed into a Western archive and represented in Western terms back to Western(ised) researchers and local communities or social actors. Put differently, when the research problem is translated into a scientific object, then Harding's (1991) provocative question in the title of her book, 'Whose science? whose knowledge?', is not asked. But, how might insights from Deleuze and Guattari provide us with more nuanced and decolonizing insights on transdisciplinary research?

DELEUZO-GUATTARIAN INSIGHTS

Drawing on the work of Deleuze and Guattari, Smith (2005) notes that the assemblage of disciplinary knowledge may be understood as movements that constitute them as territories and fields of interiority, but also as having points of deterritorialization and lines of flight along which the assemblages of disciplinary knowledge are fragmenting and losing coherence, giving rise to transdisciplinary knowledge networks. Where Gibbons is right (and I am sure Peters and Fuller would agree) is that we are witnessing the deterritorialization of disciplinary knowledge and the emergence of transdisciplinary networks in the light of the complex problems facing contemporary society that disciplines are unable to capture – problems such as climate change, HIV and AIDS, etc. Where Gibbons is wrong is his view that mode 1 knowledge and mode 2 knowledge are mutually exclusive and jointly exhaustive. Again Deleuze and Guattari are helpful. In juxtaposing their notions of the arborescent and the rhizomatic, they identify six key principles. One of these principles is 'assigning rupture' (Deleuze and Guattari 1987, 9). They argue that a rhizome might become broken, shattered at a given place, but it will again grow along one of its old lines, or on new lines. They write:

> You can never get rid of ants because they form an animal rhizome that can rebound time and again after most of it has been destroyed. Every rhizome contains lines of segmentarity according to which it is stratified, territorialized, organized, signified, attributed, etc., as well as lines of deterritorialization down which it constantly flees. There is a rupture in a rhizome whenever segmentary lines explode into a line of flight, but the line of flight is part of the rhizome (Deleuze and Guattari 1987, 9)

Deleuze and Guattari (1987, 10) use the example of the orchid and the wasp to describe movements of deterritorialization and processes of reterritorialization to show how the two species are always connected, that is, caught up in one another. They write:

> The orchid deterritorializes by forming an image, a tracing of a wasp; but the wasp reterritorializes on that image. The wasp is nevertheless deterritorialized, becoming a piece in the orchid's reproductive apparatus. But it deterritorializes the orchid by transporting its pollen. Wasp and orchid, as heterogeneous elements, form a rhizome (Deleuze and Guattari 1987, 10).

In the same way we might think of mode 1 and mode 2 knowledge (by association disciplinarity and transdisciplinarity) as connected and caught up with one another – yet with propensities of deterritorializing and reterritorializing. Briefly, the insight that we gain from Deleuze and Guattari (1987) in that a mode of life always has the potential to become something other than what it is – colonizing could become decolonizing and vice-versa. In other words, vectors of escape from disciplinarity do not only lie outside of disciplines, but is immanently present within disciplines, and become actualized when lines of flight are invigorated. This explains my use of parenthesis in the title of the article – (trans)disciplinarity. Deleuze and Guattari's rhizome also provides insights into issues of 'trustworthiness' in research. The idea of repeatability, which is one of the elements of trustworthiness in disciplinary research is challenged by the rhizome figuration of transdisciplinary research. The rhizome proliferates rather than replicates; for Deleuze and Guattari (1987) the rhizome is a map and not a tracing. Therefore, one way of determining validity in (trans)disciplinary research is to map the many productive connections made among different knowledge actors.

Furthermore, the plane of immanence is an idea developed by Deleuze in his individual works but also in his collaborative work with Guattari (see Deleuze and Guattari 1987). Following Spinoza, Deleuze (1988; 1992) holds that no mode of life enjoys ontological privilege in the cosmos. For Spinoza a mode is anything that derives from substance (God or Nature) (Spinoza 2001). For example, scientists (the people), physical entities, the objects of science and science (the enterprise) are all modes. Immanence is the opposite of transcendence, and implies that no mode transcends any other mode. Therefore, if research is to be authentically transdisciplinary then Western science (or any other knowledge) needs to be placed on an immanent plane and stripped of its ontological and epistemological privilege. When this happens then transdisciplinary research will be decolonizing. A flattened ontology does not deny the distinctive of knowledge systems with regard to their performative modes of knowledge production, but lines of flight from different knowledge systems can connect to create new knowledge spaces that are decolonizing (Le Grange 2007). Nietzsche's (1998) caution that transcendence is one of the great errors of Western thought is worth noting.

SOME PARTING THOUGHTS

In this article I briefly review the emergence of transdisciplinary research as one of the key characteristics of mode 2 knowledge and as an approach to address complex problems facing society in the twenty-first century such as socio-ecological problems. In particular I discuss the integrative approach in transdisciplinary research and to what extent it opens up possibilities for decolonizing Western science. I point out that the integrative approach marks a shift from other approaches to transdisciplinary research in that it takes more seriously the role of societal actors in working through societal problems and in generating potential solutions to such problems. However, articulation of this approach by Bergmann et al. (2012) does not address the historical marginalization of indigenous knowledges and therefore cognitive integration in this approach is unlikely to achieve cognitive justice. The transformation within discourses on transdisciplinary represented by the integrative approach is unlikely to change the Western cultural archive itself, in other words, changes occur within the archive without changing the archive itself. I explore how insights from Deleuze and Guattari could open up ways of (re)imagining transdisciplinary research as a decolonizing project.

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