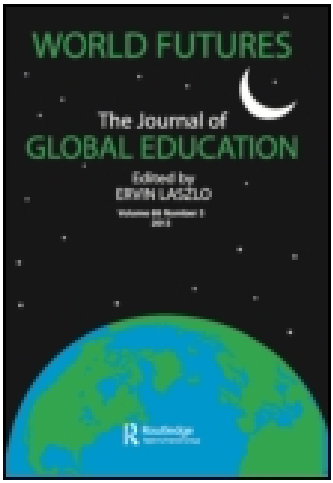

World Futures: The Journal of New Paradigm Research
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gwof20

Transleadership for Transdisciplinary Initiatives

Sue L. T. McGregor[a] & Gabrielle Donnelly[b]
[a] Mount Saint Vincent University, Halifax, Nova Scotia, Canada
[b] Wolfville, Nova Scotia, Canada
Published online: 15 Aug 2014.

To cite this article: Sue L. T. McGregor & Gabrielle Donnelly (2014) Transleadership for Transdisciplinary Initiatives, World Futures: The Journal of New Paradigm Research, 70:3-4, 164-185

To link to this article: http://dx.doi.org/10.1080/02604027.2014.934625

World Futures, 70: 164–185, 2014

ISSN: 0260-4027 print / 1556-1844 online
DOI: 10.1080/02604027.2014.934625

Routledge
Taylor & Francis Group

TRANSLEADERSHIP FOR TRANSDISCIPLINARY INITIATIVES

SUE L. T. MCGREGOR
Mount Saint Vincent University, Halifax, Nova Scotia, Canada

GABRIELLE DONNELLY
Wolfville, Nova Scotia, Canada

This article shares the genesis of a new idea we called transleadership, as it is informed by Nicolescuian transdisciplinarity. While aligned with several leading edge approaches to leadership, we propose that transleadership stands out because it emerges at the convergence of seven transconcepts: complexity (emergence), logic and reality, intersubjectivity, sensemaking, tensions, power and influence, leverage, and the creation of in vivo, hybrid knowledge. Transleadership accommodates the intricate and complex process of leading a diverse collection of (often contradictory) people, ideas, and consciousness to a new space and place where transdisciplinary knowledge can be created to address wicked problems facing humanity, using transdisciplinary thinking.

KEYWORDS: Complexity, intersubjectivity, leverage, Nicolescu, sensemaking transdisciplinarity, transdisciplinary leadership, transleadership.

INTRODUCTION

World Futures focuses on new paradigms emerging at the cutting edge of contemporary sciences, and serves as a venue for leading edge, creative transdisciplinary contributions to paradigmatic evolution. The evolution of new paradigms requires leadership, generally understood to mean the process of guiding or directing people or an initiative into the future. Transdisciplinary contributions to paradigmatic evolution require *transdisciplinary leadership*. *Trans* is Latin for beyond and across. Transdisciplinary means *beyond* disciplines, involving more than just academics to solve problems facing humanity. Transdisciplinarity refers to iteratively *crossing* the boundaries long established around higher education and problem solving with the rest of the world (Nicolescu 1985).

A concept originating in the early seventies, transdisciplinarity (TD) has two predominate definitions. Some define it as joint problem-solving of problems pertaining to the science–technology–society triad (Gibbons et al. 1994; Klein

Address correspondence to Sue L. T. McGregor, Faculty of Education, Mount Saint Vincent University, Seton Academic Centre Room 535, 166 Bedford Highway, Halifax, NS B3M 2J6, Canada. E-mail: sue.mcgregor@msvu.ca

et al. 2001; Nowotny 2003). Others view transdisciplinarity as striving to remove the boundaries between higher education *and* the rest of the world, to solve the problems of the world (most notably Nicolescu 1985, 2002). Klein (2004) referred to these approaches as "two currents of definition [that have] gained wide attention" (516). Common to both approaches is the understanding that complex, wicked problems (i.e., no apparent solution and no right or wrong answer) are at the center of transdisciplinary practice, not the disciplines (Lawrence and Després 2004; Leavy 2011; Pearce 2010).

Consequently, siloed, disciplinary knowledge and problem solving that ignores civil society is no longer sufficient to solve wicked problems (e.g., global environmental issues [climate change], unsustainability, health pandemics, water resource management, poverty, and energy issues) (McGregor 2012). Transdisciplinarity does not disregard disciplines but complements them. It involves dialogue and reconciliation between all sciences and civil society and is an invitation to open up to what lies beyond siloed disciplinary boundaries (de Freitas, Morin, and Nicolescu 1994).

Leavy (2011) claimed that the cumulative impact of transdisciplinary perspectives and innovations over the last 40 years *is* a new paradigm in its own right. Transdisciplinarity recognizes that the subject at hand extends far beyond the subject-matter of respective academic disciplines, and promotes theoretical, conceptual, and methodological reorientations (paradigm shifts). Transdisciplinarity enables us to ask different, unorthodox questions, the answers to which impact the future of humanity (McMichael 2002). Yet, in spite of its perceived status as a new paradigm (and potential to facilitate paradigm shifts), there is no established definition of transdisciplinary leadership.

The literature is rife with ideas about the challenges inherent in managing and leading transdisciplinary initiatives and endeavors, be they collaborative teams, research, and/or projects (as evident in these edited collections: Burns and Weaver 2008; Hirsch Hadorn et al. 2008; Klein et al. 2001; Nicolescu 2008; Somerville and Rapport 2002). These initiatives collectively "provide a wealth of concrete hints and recommendations" (Wiesmann et al. 2008, 434) about leading transdisciplinary initiatives. Yet, the lack of conceptualization of transdisciplinary leadership persists despite that Wiesmann et al. (2008) identified management and leadership as one of the most common stumbling blocks in transdisciplinary practice.

The absence of a clear understanding of "what is transdisciplinary leadership" poses a problem because addressing wicked problems requires a new kind of knowledge, necessitating (a) complex partnerships at the interface between and among the academy and society and (b) a new methodology for generating that knowledge. The complex and intricate *process* of creating this new knowledge, at the interface between higher education and the rest of the world, has to be *led* (influenced, guided, directed). The orthodox approaches to leadership, which view leadership as a person or a role rather than an integral process shaped by worldviews and context, will not be effective (Volckmann 2010). Leading such complex partnerships to solve wicked problems requires a new concept that pushes the boundaries of conventional approaches to *leadership*, an idea itself that seems to defy definition. Volckmann (2013) asserted there are nearly 50 different theories

of leadership, and countless definitions of leadership. Stogdill (1974) famously declared there are "almost as many definitions of leadership as there are persons who have attempted to define the concept" (259). To accommodate this conceptual lacuna, this paper tendered the new concept of *translead* and applied it to creatively engage with transdisciplinary, wicked problems.

As a caveat, the idea of transleadership developed in this article is very much inspired by Basarab Nicolescu's notion of transdisciplinarity (see his article in this issue). He posited that transdisciplinarity is a methodology for creating new knowledge, replete with its own ontology (multiple levels of reality mediated by the Hidden Third), inclusive logic, and epistemology (knowledge is complex, emergent, and embodied). These ideas are woven into the ensuing discussion of the elements of transleadership.

TRANSLEAD

From an etymological perspective, *trans* is Latin for across: to cross over, go beyond, to move back-and-forth, to move into another state or to another place. *Lead* is Old English *lædan*, to guide, to cause to go with, to bring forth (Harper 2013). Inspired by their root meanings, the *translead* concept conveys the idea of *guiding* someone or something during the *process* of bringing forth something, by crossing over, *going beyond*, moving back-and-forth and/or moving into another state or to another place. The notion of iterative interactions leading to *a new state* is key to the process of transleading. Paradigm shifts and paradigmatic evolution (the emergence of new ideas and insights) require ideological and intellectual movements from one state to another. "Very often, the threads of a new concept, theory or approach emerge concurrently with different people in different locales. This is true with the concept of transdisciplinarity" (Somerville and Rapport 2002, xiv). Transleadership is concerned with bringing these minds together, to better ensure the emergence and evolution of powerful, innovative approaches to wicked problems.

To begin the process of conceptualizing *transleadership*, anticipating that others will also have opinions about this new concept, this article shares the results of a thematic analysis of literature pursuant to the challenges inherent in managing and leading transdisciplinary initiatives and endeavors. A theme is a concept, trend, or distinction that emerges from reiterative readings of written documents. More to the point, a theme represents components or fragments of ideas or experiences that may be meaningless when viewed alone but have meaning when brought together (Aronson 1994; Owen 1984; Spradley 1979). As with any thematic analysis, data collection entailed iterative readings of pertinent documents (journal articles, books, book chapters, conference papers, website postings) until patterns began to emerge. This process generated eight themes (Figure 1) or ideas found to be inherent in addressing complex problems at the interface of disciplines and society. For this article, they are prefaced with the word *transleading*, intending to provoke and stimulate further dialogue about the merit of the concept we have called transleadership, which entails crisscrossing and going *beyond* traditional approaches to leading, taking people to *new* places and new states of understanding

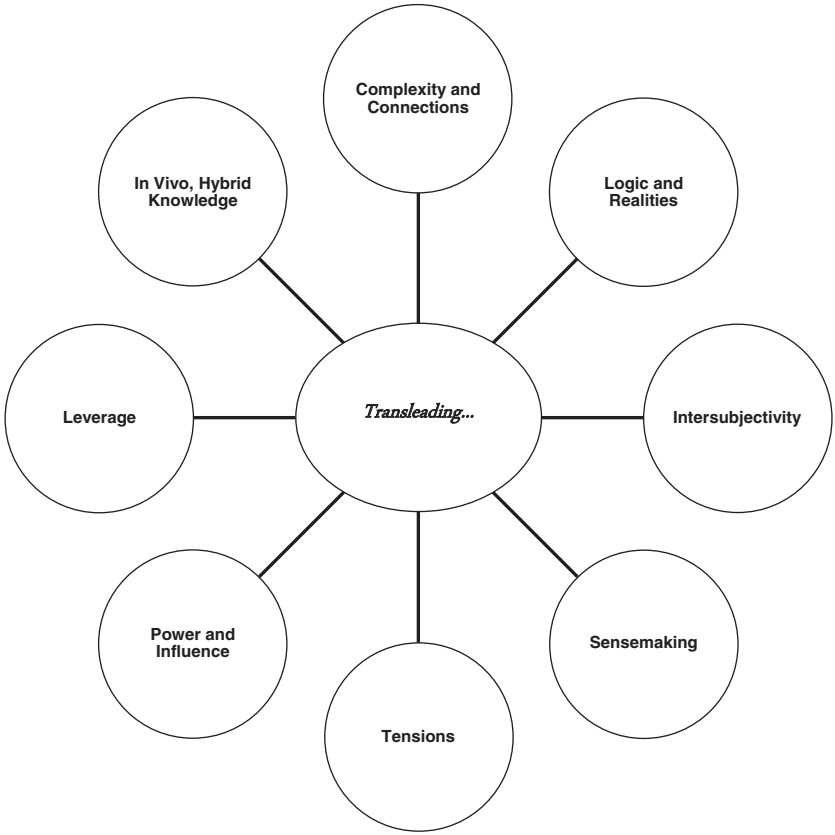

Figure 1. Proposed elements of transleadership.

and insights, transcending their former positions to new transdisciplinary positions (Latin *transcendere* "climb over or beyond, to surmount," Harper 2013).

LEADERSHIP FOR WHAT?

The concept of transleadership raises a key question that is often assumed or overlooked by leadership scholars and practitioners: *Leadership for what?* Jackson and Parry (2011) posited that this question of purpose is probably the most important question; yet, the most difficult to answer. The purpose of transleadership is explicit however; namely, to traverse transdisciplinary spaces comprising a diverse collection of (often contradictory) issues, people, ideas, and consciousness to collectively address complex, wicked problems facing humanity, using transdisciplinary thinking.

Why lead this way? As mentioned above, today's ecological, social, political, and cultural crises are not isolated but interrelated, creating an increasingly

layered and complex global *polycrisis* (McGregor and Volckmann 2011; Sardar 2010). The assumptions that have undergirded modernity are disintegrating and daily reality is visibly more fluid and changing. The image of a predictable, clockwork universe fails us (Morin 1999a; Korten 1999). Modernity has become liquid (Bauman 2008) and the current era has been described as "postnormal times" (Sardar 2010). Recognizing that science and the world were "no longer functioning in the 'normal' way" (Sardar 2010, 436), Ravetz and Funtowicz (1999) coined the term postnormal to account for the uncertainty, complexity, high stakes, value disputes, and the real risk of danger inherent in the wicked problems facing humanity.

In this era of postnormal transition and change, the lack of clarity and agreement around what leadership is (could and should be) may reflect how the definitions, conceptualizations and metaphors associated with leadership are also undergoing a transformation induced by the throes of late modernity (Montuori and Fahim 2010). The transition from *solid* to *liquid* modernity (Bauman 2008), and from a clockwork universe metaphor to one of emergent, living systems (Korten 1999) throws the old views of leadership into question, namely the heroic images of the past or the predictable hierarchies of command-and-control, that, while stifling to many, were also comforting and normal. Indeed, long-held myths about control, knowability, and progress are now visible and clearly inadequate, highlighting just how much people do not accurately perceive or understand (Wells 2013).

Not surprisingly, the study of leadership, as well as the way leadership is conventionally understood by the general public, is in a dynamic and emergent state. For most of the twentieth century (normal science), the study of leadership was centered on the individual, charismatic leader. Trait theory and behavioral theory suggested that leaders were born, not made (a view that still informs the implicit assumptions many individuals hold about what constitutes leadership). The characteristics and abilities of leaders were studied without considering the context or environmental conditions that supported the development of leaders (Bryman et al. 2011; Northouse 2013).

This lopsided, leader-centric perspective was challenged by the "new leadership" theories of the 1980s and 1990s, most notably principled, authentic, servant, and transformational leadership, which signaled a new way of conceptualizing leadership that broadened to include *followers* (Northouse 2013). Transformational leaders transform the attitudes, motivations, and behaviors of their followers (Bryman 1992). More recently, attention has been directed toward a continuum of *shared leadership*, from co-leadership on one end to distributed, leaderless leadership on the other. Through this lens, leadership is not seen as a role but as a creative process that can be shared among members of a group or an organization (Jackson and Parry 2011; Volckmann 2010, 2013).

As discussed in this article, transleadership reflects this shift from leadership as solely an individual activity to a co-creative act. Given the influence of complexity concepts on the authors' thinking, we offer something akin to a post-heroic conceptualization of leadership wherein leadership is viewed as a "collective construction process with several people involved ... in interactive learning processes" (Cervani, Lindgren, and Packendorff 2007, 50). This approach blends hierarchy

and collaboration with an awareness of relational power (Foucault 1980) and its influence on sense-making (Pye 2005).

Transleadership acknowledges that leadership is not just something one is born with; instead, leadership capacities and skills can be developed in concert with others (Avolio 2005). The complexity principle of emergence exhibits the striking feature of leading (Wells 2013), whether in natural or social systems, and with that, adaptation and the potential for transformation and transcendence. As people look to develop successful strategies around wicked challenges, an array of transleadership capacities needed is also emerging and can be cultivated, a number of which are proposed here (Figure 1).

OVERVIEW OF PROPOSED ELEMENTS OF TRANSLEADERSHIP

Per Figure 1, the rest of the article tenders an inaugural attempt to conceptualize the new idea of transleadership. Transleading entails grappling with the complex intricacies of problem solving amongst a collection of diverse entities all focused on addressing wicked, messy social, political, economic, and environmental problems facing humanity (the aforementioned polycrisis). "Making this work" is a human and ecological imperative because not solving these issues means the future of humanity and the planet are at stake. A special form of leadership is required, one that respects complexity, emergence, inclusiveness, rigor, and pragmatism—transleadership is suggested as a concept to scaffold future philosophical, intellectual and pragmatic debate, dialogue, discourse, and deliberations.

Recognizing that these transconcepts are interconnected (Figure 1), we wrestled with which one to start with, in order to develop our argumentation for this idea. We decided to start with complexity (emergence), move to logic, and then follow with intersubjectivity, sensemaking, tensions, power and influence, leverage and, finally, the creation of in vivo, hybrid knowledge. We reasoned that the notions of complexity, emergence, logic, and realties needed to be introduced early in the discussion since they are fundamental to the invisible challenges around ensuring healthy, multi-stakeholder engagement to address wicked problems.

Transleading Complexity and Connections

Using science as an example, Mitchell (2013) explained that disciplinary work can feel like a lone activity, something undertaken by individuals and small groups working far apart from each other. "But underneath that illusion lies a reality: [people] are deeply interconnected—just like the natural world they study. In fact, they are ultimately guided by its invisible patterns and paths. Their connections mirror what we know about the natural world and, more importantly, where we have found the greatest questions. The challenge is our ability to perceive the answers" (18). Mitchell's analogy serves as a segue to a discussion of the role of complexity and connections in transdisciplinary problem solving and the intricacies of transleading this process.

Creating transdisciplinary knowledge is all about complexity, emergence, and the intellectual fusion of disparate worldviews into new integral knowledge (McGregor 2004). Nicolescu recently recognized the need for a "future detailed study of *transcomplexity*" (2010, 8), but he did not define the term. Since *trans* means crisscrossing back and forth, going beyond, over, through, traversing even transcending (surpassing), transcomplexity likely means going beyond traditional notions of complexity. In the meantime, Nicolescu (2010) draws on Morin's (1999b, 2005) notion of complexity, claiming it comes the closest to what is needed to deal with transdisciplinary problems.

Unlike complicated problems (messy and entangled), complex problems have the additional property of emergence. First observed in the natural sciences, biology in particular, emergence refers to novel qualities, properties, patterns, and structures that appear from relatively simple interactions among people, qualities that did not exist when presented in isolation. These new qualities are layered in arrangements of increased complexity (Morin 2005; Nicolescu 2008). Transleaders would recognize that trandisciplinarity assumes that everything is *complexus*; that is, woven into a web, where the focus is on the relationships (Nicolescu 2005). Knowledge can be viewed "as a spider web of connections across nodal points of meaning. The task of transdisciplinarity is to create meaningful *webs of meaning* across forms of knowledge and action that are characterized by *complexity*, diffusion, permeation, and heterogeneity" (Klein 2002, 59, emphases added). The resultant knowledge is embodied, a part of everyone who co-created it within this intricate, integrated, deeply complex web of relationships and diverse knowledge (McGregor 2009).

The entire process of transleading complexity is dependent on transcendence, defined as "giving up of sovereignty on the part of any one of the contributing disciplines [and sectors], and the formation, out of the diverse mix, of new insight by way of emergent properties" (Somerville and Rapport 2002, xv). Gray (2008) recognized the challenges inherent in this approach: "Transcending the well-established and familiar boundaries of disciplinary silos poses challenges for even the most interpersonally competent" person (S124). Imagine the challenges presented when the boundaries between the university and the rest of the world are being transcended to address complex, messy problems. "The needs of stakeholders outside academia, rather than just the needs with scientific potential, must be integrated with- even drive- scientific [or disciplinary] activity" (Gray 2008, S124). At the same time, specific disciplinary insights and contributions cannot be disregarded in this quest for integration and emergence. This integration requires both distinguishing each contribution as well as connecting to the whole, without falling into the comfort of atomism or holism (Morin 1996).

Thus, people's resultant confidence in any decisions that emerge from the transdisciplinary problem solving process is enhanced through inviting multiple views on the issue, deliberating these views, and keeping options opens. Transleaders would have to respect the necessity of making decisions in context, and of acknowledging relationships and dependencies (van Huyssteen and Oranje 2008). Desbois (2012) shared a deep and engaging discussion of the essence of relationships during the solution of transdisciplinary problems. He urged people to

"get the best out of the *relational potential* [emphasis added]" (87), appreciating that the ability to realize potential in a relationship is compromised if each person enters the relationship "deprived of his [sic] external voiceprint, more or less conscious of the impact of his presence, of his contributions to the creation of reality" (88). Transdisciplinary work depends heavily on "the emergence of continually connected beings, who are able to adapt themselves to the changing exigencies of ... life, and who are endowed with a permanent flexibility which is always oriented towards the actualization of their interior potentialities" (Nicolescu 2012, 11).

Transleading Logic and Realities

Given the rich complexity of wicked problems and the inherent dynamics within multi-sector interactions, it stands to reason that when stakeholders from different disciplines and sectors come together to address wicked problems, there will be instances when they do not agree because others' ideas are *contradictory* to their *consistent* way of viewing the world. To illustrate, it is difficult for academics to view the world the same way as those living the problems. It is hard for scientists (who need proof) to value narratives, spirituality, mysticism, or supranatural ideas. It is challenging for artists or those concerned with the ecosystem to accept the dictates of corporate thinking. Yet, each of these perspectives, every single one, is needed to address wicked problems. Nicolescu (1985, 2011b) referred to these perspectives as *Multiple Levels of Reality*, pushing people's acceptance of reality beyond the conventional scientific, economic, and corporate realities.

These disagreements among stakeholders likely stem from different ideological positions, namely positivism (shaped by Classical Newtonian thinking) and post-positivism (other ways of knowing aside from scientism). Newtonian thinking uses exclusive logic, based on dualism, fragmentation, linear thinking, and determinism (McGregor 2011). Transleaders would appreciate that addressing complex, transdisciplinary problems requires a more *inclusive* logic than that provided by exclusive linear logic. Inclusive logic permits each of empty domains, worlds that do not exist, and worlds that might eventually exist (Nolt 2010). This logic accommodates the eventual, possible, creation of new, integrative knowledge that does not yet exist. Nicolescu (1985) called this the *Logic of the Included Middle* and Desbois (2012) coined the term *transconsistent logic*.

In more detail, classic linear logic (Newtonian exclusive logic) is based on three fundamental axioms (i.e., self-evident truths, not susceptible to proof or disproof): (a) the axiom of identity: A is A; (b) the axiom of non contradiction: A is not non-A; and (c) the axiom of the excluded middle, meaning there is no third term **T** (Latin *tiers*), which is simultaneously A and non-A. Classical logic says A and non-A cannot exist at the same time; classical scholars call this idea *consistency*. In classical logic, a *contradiction* exists when people try to say A (he is brave) and non-A (he is not brave) exist at the same time. In simple language, if something is true (A), it cannot be false (non-A), and vice versa. There is no **T**hird possibility, that of being true and false, brave and not brave, at the same time (Nicolescu 1985). Suggesting such a thing is illogical; he is either brave or he is not.

Realizing that in order to address the complex problems facing humanity, there *had* to be a way to reconcile the co-existing (a) certainty of consistencies and (b) possibilities opened up with contradictions, Nicolescu (1985, 2011b) proposed a change to the third classical linear logic axiom, submitting that a third term **T** *can* exist, which is simultaneously A and non-A. The Logic of the Included Middle informs the third "**T,**" which stands for *tiers inclus*, the included third (Nicolescu 1985). In these instances (for example, in the contentious social, economic, and political spheres), topics, ideas, and people that should logically be excluded or antagonistic *can* be connected (Brenner 2008). Transdisciplinary quantum logic assumes that when A and non-A *do* co-exist at the same time, when a third state *does* emerge, a *contradiction* is resolved. This new state represents the result of two contradictory things interacting and coming to a temporary resolution (Ramadier 2004) (e.g., the scientist accepting insights gained from a narrative reflecting an indigenous wisdom tradition).

When A is *actualized* (exists in fact), non-A is *potentialized* (has the capacity to exist in the future) and vice versa, alternately, without either ever disappearing completely (Brenner 2005, 2008). Both the scientist and the indigenous elder retain their identity while a new insight is gained from their interaction. "[T]hat which appears to be disunited is united, and that which appears to be contradictory is perceived as noncontradictory" (Nicolescu 2008, 7). Brenner used the term *transconsistent logic* to refer to the "realm beyond the consistent" (2008, 161), where new knowledge can emerge because potential was released and acted on.

Non-A can be potentialized (gain the capacity to develop in the future) and a third **T** state (e.g., new insights) can emerge *because* quantum logic *assumes* the space between things (the vacuum) is not empty. If it were empty, the realization of anything is impossible because there is no energy. Quantum physics assumes the vacuum is at its lowest possible energy state without being empty. This vacuum contains fleeting waves and particles that pop in and out of existence, making this space full of potential (Dittrich and Gies 2000). The dawning of a temporary new **T** state represents the emergence of new insights and perceptions in this vacuum, made possible because of the temporary reconciliation of any contradictions or antagonism between A and non-A (Cole 2006; Ramadier 2004).

The new **T** state denotes temporary unification of contradictions and antagonism among various points of view thereby increasing the generation of transdisciplinary (TD) knowledge about a complex problem (personal communication, Basarab Nicolescu, January 14, 2011). Nicolescu (2011b) claimed that without the temporary **T** state, problem solvers would not be able to integrate perspectives from different realities (e.g., economics with environmental, spiritual with scientific), let alone integrate TD-Subject (consciousness and perceptions) with TD-Object (information and facts). Such dualistic thinking is not acceptable in transdisciplinary initiatives.

Nicolescu (1985, 2011a) further believed the vacuum (shaped by transconsistent logic) is ripe for chances to move around and connect with other realities *if* people can move past their urge to hold onto their own point of view. This potentiality means transleaders would assume the Hidden Third (temporary **T**-state of non-resistence) is a quantum way to represent people coping with their resistance

to shifting perspectives and worldviews. If people can overcome their resistance to differences or contradictions, it frees them to cross into the zone of non-resistance, the vacuum, to other points of view. The Hidden Third (informed by transconsistent logic) is a way to conceive of people *moving to a new place* (complements of transleadership) where they become open to others' perspectives, ideologies, value premises, and belief systems, inherently letting go of aspects of how they currently *know* the world. Desbois (2012, 94) actually used the term "the logic of conciliation" to accommodate this mediated process.

With a deep respect for transconsistent logic, transleaders would value doubt and resistance to new ideas, viewing them as a resource. They would see merit in vagueness, uncertainty and unpredictability because these states serve as prompts for potentialities. Transleaders would use the gap (the latent energy in the vacuum) as a support system for constant adaptation and resiliency, while choosing their responsibility to the enterprise and being future- and solutions-oriented. They would iteratively deconstruct, de-frame, re-frame, provoke, and calm down communications as a way to make complementary what presents as contradictory. Transleaders would focus on the interlocutors (people questioning and taking issue with things), seeking to understand and respect their logic and worldviews to stimulate dialogue and deliberations. Finally, they would capitalize on the energy (the tensions) that emerge from the antagonisms, using this tension to prompt movement (to be discussed shortly) (comments were informed by Desbois' [2012] discussion of transdisciplinary logic and how this translates into professional practice).

Transleading Intersubjectivity

In addition to a new respect for inclusive logic and the necessity of accommodating contradictions, transleaders would have to appreciate that the process of creating new TD knowledge involves not only *what people know* but *how they communicate what they know* during collaborative processes and how they come to some common understanding (or not) (i.e., intersubjectivity). As an illustration, consider this example of four stakeholders trying to address a wicked problem. "Capable of argumentation, [four] stakeholders enter the process of negotiation, confronting different types of knowledge through a series of encounters. During the process, a fifth type of knowledge emerges, which is more than the sum of the four others, a kind of hybrid product resulting from 'making sense together"' (Després, Brais, and Avellan 2004, 477). The formation of this new knowledge, via transdisciplinary collaborations, involves the intricate process of intersubjectivity (Després et al. 2004; Leavy 2011).

The concept of intersubjectivity has varied meanings; see Després et al. (2004) for a detailed accounting of this concept. Basically, intersubjectivity comprises *inter*, which means between, and *subjectivity,* which means judgements based on individual personal impressions, feelings and opinions rather than external facts. If something is subjective, it exists in someone's mind. If something is *inter*subjective, "it" exists or occurs *between* conscious minds and people are capable of sharing "it" or holding it in common. There is intersubjectivity between

people if they can agree on a given set of meanings or definitions of a situation (Gillespie and Cornish 2009).

In regards to transdisciplinarity, "the process by which spokesperson for different types of knowledge learn to listen and understand each other is called *intersubjectivity*" (Després et al. 2004, 477). Intersubjectivity is a major achievement in transdisciplinary initiatives. It implies that the various perspectives came together to move beyond their individual capabilities. It especially involves people spending a lot of time "coming to shared definitions of concepts ... that work across highly diverse cultural contexts" (Leavy 2011, 77, see also McGregor and Volckmann 2011). Després et al. (2004) agreed, observing that "participants should meet many times to forget whom they are representing or talking for, and concentrate on the best understanding of the issues at stake. Progressively, shared meanings, diagnoses, and objectives emerge where individual interests and views are seen [and appreciated] from different perspectives" (477). Gillespie and Cornish (2009) concluded that "intersubjectivity [is] the variety of possible relations between people's perspectives" (19). "Those perspectives can belong to individuals, groups, or traditions and discourses, and they can manifest as both implicit (or taken for granted) and explicit (or reflected upon)" (Gillespie and Cornish 2009, 19–20).

It is a given that contemporary societies are characterized by a great diversity of interacting perspectives, each operating from distinctive view points (Gillespie and Cornish 2009). As well, those involved with addressing wicked problems bring their respective view points to bear on the problem. Transleaders would appreciate that achieving intersubjectivity "involves a difficult mediation process and a ceaseless effort of mutual understanding between [diverse] stakeholders for learning and acting" (Després et al. 2004, 477). Transdisciplinary initiatives often struggle with collaboratively trying to find a common language so disciplinary concepts can be fused with community perspectives (McGregor and Volckmann 2011). Intersubjectivity is all about confronting, assembling and putting to work all of these different perspectives (called *guardians* of knowledge), and entails an ongoing, mediated effort to find mutual understanding, an enterprise that is best informed by transdisciplinary leadership (Brown, Harris, and Russell 2010; Després et al. 2004; Klein 2004).

Transleaders leading intersubjectivity would also need tools for (a) capturing different forms of knowledge and knowing, (b) integrating and communicating this new knowledge, and (c) creating vibrant dialogue (van Huyssteen and Oranje 2008). They asserted that creating a "language" for dialogue has the effect of infiltrating, invigorating and connecting participating stakeholders. Desbois (2012) tendered intriguing insights into the complexity of leading these sorts of dialogues. He believed the way things are worded and heard in a conversation really influence the tenor of the dialogue. He identified an array of factors that influence these exchanges: "the meaning of the words, the temporal interval, the memorizing of a frozen snapshot dragged away from the continuous and permanent actualization of the world, the person's interpretation via their various characters [roles] and their contextual logics, the various levels of reality [viewpoints] that are used" (Desbois 2012, 90). Language (words and their meanings) have the potential to "encrypt

and distort" (Desbois 2012, 87) unless respected and accounted for during the process of achieving intersubjectivity.

Transleading Sensemaking

The process of fostering intersubjectivity (coming to common understandings) involves people *making sense* of a dynamic, divergent situation and constructively dealing with the aforementioned contradictions. Consider that the essence of transdisciplinarity is crossing the boundaries or borders created by single disciplines or societal sectors (private, public, university, civil) in order to create understandings, insights and complex new knowledge (Pearce 2010). These many stakeholders each have their own values, belief systems, attitudes, experiences and mental models (McGregor 2011). Their ideological and value-based approaches to life anchor them and give them stability. When they encounter opposing views during the process of addressing complex, wicked problems, they may experience interruptions in their continuity, their longstanding connections to people and ideas. This interruption may lead to feelings of unfamiliarity (Ojha 2005), creating discontinuity, which evokes a real need to *make sense* of the situation (Mandler 1984). "Sensemaking is a motivated, continuous effort to understand *connections* (which can be among people, places, and events) in order to anticipate their trajectories and act effectively" (Klein, Moon, and Hoffman 2006, 71, emphasis added).

Transleaders would need to understand how different people ascribe meaning to and interpret wicked problems and the variety of different solutions proposed by stakeholders. Misunderstandings, confusions, and misinterpretations abound when multiple view points come into contact (Pearce 2010). Indeed, Weick (1995) defined sensemaking as understanding how different stakeholders and agents construct meaning as data are converted into useable information and then knowledge. People embark on sensemaking processes when they recognize the inadequacy of their current understanding of events and issues, especially when compounded with many different viewpoints (Klein et al. 2006). Dervin (1983) explained that people's "reality is neither complete nor constant but rather filled with fundamental and pervasive discontinuities or gaps" (4). This gap is even more pronounced when stakeholders engage with complex, wicked problems.

Transleaders would gain an appreciation for the dynamics and processes inherent in sensemaking in instances of discontinuity. Fortunately, transdisciplinarity accommodates discontinuity, described as "the dark light of the unknown" (personal communication, Basarab Nicolescu, January 10, 2011). When people encounter the unknown, they struggle to make sense of things that are unfamiliar so they can face unpredictable environments (Ojha 2005). Being aware of a situation and the role of sensemaking would help transleaders investigate and improve the interactions among people and their flow of information and consciousness (perceptions). They would better appreciate the cognitive gap (Dervin 1983) that arises during discontinuity. In respect to this gap, Pearce (2010) posited that sensemaking helps people to understand (a) how the system is currently attempting to respond to the wicked problem, (b) how the wicked problem arose because of the

mental models (thinking) used by those within the system, and (c) sensemaking helps people understand issues from many perspectives.

Taking lessons from Klein et al. (2006), transleaders would further appreciate that sensemaking satisfies the human drive to understand and comprehend their changing world. It helps diverse groups of people test and (dis)approve the plausibility of their ideas and explain any anomalies. Interestingly, biases inherent in any joint problem process are presumed to be escapable, especially when the interactions among stakeholders happen in the natural settings of those experiencing the wicked problem. Transleaders would realize that people's involvement in sensemaking anticipates possible future-making actions, although they are uncertain. They would appreciate that, contrary to common presumptions, the most successful approach to sensemaking is to deliberately jump to an early conclusion and then think hard about it, deliberately testing it as people make sense of the myriad of ideas floating around, while at the same time working with the urge to find a tidy solution early on. Not surprisingly, sensemaking is very much a social activity (not just an individual undertaking), meaning it promotes the achievement of common ground and common language needed to address complex, wicked problems. This process is rife with tension.

Transleading Tensions

The task of transdisciplinary leadership is to create and foster synergy and emergence among people that allows for the free exchange and integration of diverse ideas, worldviews and perspectives (Gehlert 2012). Those leading transdisciplinary initiatives are challenged as they try to balance (a) intense periods of meetings of the minds and (b) deep periods where disciplinary and sectoral contributions need to be elaborated and respected, leading to (c) intense periods of meetings of the minds. All the while, these recursive (turning back in on itself) processes, as well as mutual learning, integration, and reflexivity, have to be managed and led (Wiesmann et al. 2008). Desbois (2012) agreed that tensions need to be led during transdisciplinary initiatives. de Mello (2008) talked about people's "yearning ... to transpose the installed tension by dialogue, insight and creativity" (89). Pearce (2010, 159) actually challenged transdisciplinary leaders to "maintain the tension created by the paradoxes present [when addressing wicked problems]."

Tension is Latin *tensionem,* "a stretching" (Harper 2013). Tension is usually viewed as an intense situation or set of circumstances that pushes, draws, or holds things apart, caused by conflict or strain from differing views or aims. In tense situations, relationships can be characterized as strained, perhaps stretched to the breaking point. When the tension is reduced, things slack off because they are no longer taut or held tightly in a strained position. Conventional leadership theory assumes that tensions have to be *managed* so they do not become barriers to development, growth, and goal achievement (Lotrecchiano 2010). Transdisciplinary approaches to leadership respect this stance but go further, assuming that tensions can be used to generate new knowledge, to bring disparate things together (Desbois 2012). Based on the quantum concept of emergence, transdisciplinarity accepts

that tensions hold things together *as* they emerge; therefore, tensions need to be respected and transled to a new state or another place. Transleaders would focus on "converting the energy of resistance into the energy of action and realization" (Desbois 2012, 114).

Lotrecchiano (2010) believed embedded tensions and emergent innovations and knowledge are intrinsic components of most social systems shaping the human condition. Transdisciplinarity is concerned with the human condition (Leavy 2011), which is in constant flux (dissolving and coming back into wholeness again). Constant movement leads to tension, the interplay among conflicting elements where forces are being exerted on someone or something. Transdisciplinary leadership assumes tension is evidence of order emerging from shifting energies (i.e., chaos is order emerging, just not predictably). When people and ideas come in contact with each other and get motivated (move about during problem solving), an energizing force is generated from the tension (called fusion). The strength and potentialities that emerge from working through tensions are transforming and transcending (McGregor 2004).

Leading transdisciplinary initiatives entails a deep respect for the emergent tension among agents moving from a current state *to* future possibilities (McGregor 2004, 2010). Somerville and Rapport (2002) observed that "[t]he tension between perspectives, which is commonly found in transdisciplinary endeavors, [is] fruitful in producing new insights and furthering old ones" (xiv). As emergent tensions and exchanges arise during transdisciplinary endeavors, transleaders would harness the informal dynamics from interactive agents to better ensure the creation of new transdisciplinary knowledge, what Uhl-Bien, Marion, and McKelvey (2007) called leading the "adaptive tension" (309). Note as well that leading this adaptive tension during emergent thinking (so characteristic of transdisciplinary work) could lead to *adaptative truth*, co-created in self-organizing living systems (Davis and Sumara 2006). The latter represents *transtruth* because the truth emerges as people transcend borders and worldviews, as they co-create new TD knowledge. This dynamic process is deeply shaped by the interplay of power and influence, which has to be transled in a productive and respective manner.

Transleading Power and Influence

Transleaders can learn from van Huyssteen and Oranje (2008), who recognized the profoundly influential role that power plays in the process of transdisciplinary problem solving and decision making. Their research revealed the importance of individual and blocks of power as either enabling or constraining dialogue, relationship building and consensus in decision making. Managing and leading power within a complex transdisciplinary situation shapes the *resilience* of the system of decision makers. Resilience refers to the ability to bounce back after being stretched, bent, or compressed. Since the intent of transdisciplinarity is transcendence (climbing over something to get to a new place), those involved have to be resilient, able to respond to and shape power dynamics as they encounter resistance when moving from one place to another.

Nicolescu (2012) posited that power plays out in different forms during transdisciplinary knowledge creation. He held that people's realities (worldviews, perceptions, beliefs) change and move as people co-create knowledge, claiming "reality is plastic" (16). When people choose to enter into this dynamic space, they can respond to it or they can impose their will and dominate the situation, perturb it. This dynamic has to be transled, or else groupthink can emerge in transdisciplinary work. Groupthink occurs when group members try to minimize conflict and reach a consensus decision *without* critical evaluation of alternative ideas or viewpoints. Differences between participants are suppressed usually because the group does not know how to bridge power differences (Gray 2008). Transdisciplinary knowledge cannot be created if different points of view are not heard and integrated.

Davis and Sumara (2006) addressed this issue with the concept of *level jumping* wherein transleaders would enable people to acknowledge the profound similarities across a diversity of phenomena, helping them depart from radically entrenched sensibilities of seeing only the differences, not their common ground. People addressing complex issues need to embrace the *vibrancy* inherent in diverse elements, ideas, and agents, while appreciating that the *redundancy* (commonalities) inherent in mixing diverse elements serves as a source of stability, innovation, resilience, and creativity.

As noted earlier, transleaders would have to deal with groupthink (suppressing one's ideas so a decision can be made), which is a real possibility while addressing wicked problems, especially when the needs of all stakeholders must be integrated yet squabbles emerge about the validity of each others' positions, arguments and worldviews (Gray 2008). People leading from a transdisciplinary perspective would see the role of "leader" as flexible, situating themselves as one of many voices. Their notion of power would shift, even from the transformative notion of power-with or -through people. A transleader would strive for the creation of *emergent group power* created through a fusion of knowledge. When people and their energies and ideas bounce off each other, new energy is created, more so than when these ideas and people remain unconnected (McGregor 2004). Transdisciplinary thinking would benefit leaders tasked with leading the power dynamics inherent in dealing with wicked problems. It offers an effective approach to co-building and co-creating knowledge, consensus, making sense of the complexity of the issues at hand, and co-creating solutions that deliver results with wider support and agreement (Pearce 2010).

Transleading Leverage

Strategizing to address wicked problems is a real challenge because these problems reflect a network of many stakeholders with respective interests and power agendas (often contradictory). Transleading the process of creatively engaging wicked problems would entail a deep appreciation for how to leverage people, ideas, perspectives, and concepts to find an integrated and strategic way forward. Indeed, when McGregor and Volckmann (2011) interviewed leaders who are trying to bring transdisciplinarity to higher education, it emerged that these people depended

heavily on leverage. Senge (1990) defined leverage as small, well-focused actions that can sometimes produce significant, enduring improvements, *if* they are in the right place, at the right time. The principle of leverage holds that the best results come from these small, well-focused actions (imagine using a pry bar to move a very large rock) rather than from large-scale efforts.

McGregor and Volckmann (2011) concluded that transdisciplinary leaders must believe that systems and institutions *can* be leveraged for more holistic and integrated approaches to learning, research and community engagement; the latter leads to deeper and more socially robust knowledge. Complex change requires that leaders be *allowed to emerge* in many parts of the system, people who have the wherewithal and knowledge to leverage small parts of the system to effect far-reaching, systemic change. Unfortunately, the areas of highest leverage are often the least obvious (Senge 1990), creating true challenges for transleaders. Entire systems (and issues arising from the dynamics of these systems) work on the principle of leverage; yet, any system's functioning is totally unobvious unless the transleader understands the forces at play in the system, revealing the most opportune leverage points for large change (Senge used the trim tab on a boat as an example).

Senge (1990) concluded, "[t]here are no simple rules for finding high-leverage changes, but there are ways of thinking that make it more likely. Learning to *see* underlying [patterns and] 'structures' rather than 'events' is a starting point" (65, emphasis added). This insight means transleaders would become adept at seeing patterns that shape the whole picture whereas others would just see singular events. The underlying essence of the whole issue would be evident to a transleader, providing insights into where to place leverage within the "pressures and crosscurrents of real-life ... situations" (Senge 1990, 115). He explained that when things go wrong, people tend to point at specific events to explain the causes instead of examining the deeper systemic patterns of complex relationships among these events and other contextual circumstances. Focusing on just events and not patterns creates opportunities for the overall health of the issue and the system to decline, leading to or exacerbating a wicked problem.

As well, superficial solutions that apply pressure to a low leverage point (an event) do not work in the long term because the pressure (leverage) cannot be sustained (Harich, Bangerter, and Durlacher 2012). In order to find high leverage points (strategic places to apply small but effective pressure), transleaders need to see through complexity to the underlying structures and the repetitive patterns that generate the rhythm and trajectory of the system (Senge 1990). Harich et al. (2012) agreed, claiming that high leverage points are found by calm, prolonged true analysis of a situation, not just by intuitive hard thinking. Highly strategic actions can help a system shift into a totally new mode (i.e., translead to a new space), like using a tug boat to reposition a tanker.

Another interesting dimension of leverage and transleadership is that "different leaders will be required at different stages to address the wicked problem" (Pearce 2010, 159). As well, there by may different configurations of shared leadership and of leadership capabilities and sensitivities. This reality means transleaders would remain open to recognizing and approaching as yet unengaged stakeholders

who have the power to either enhance or derail the work already invested in addressing the problem, giving them the opportunity to become engaged and involved. Knowing who to leverage and when "has proven successful in building and sustaining long term relationships and trust, which have unexpected benefits over the course of the relationship" (Pearce 2010, 159). Pearce (2009) asserted that how a leader engages with the total system and those within the system is critical, recommending divergent instead of convergent thinking. Divergent thinking involves exploring, inquiring, examining, explaining and enticing as many points of view at hand as possible, including leveraging naysayers and skeptics.

Transleading In Vivo*, Hybrid Knowledge*

On a final note, the ultimate goal of transleadership is the creation of new knowledge to address wicked problems, knowledge that did not exist before it was integrated from disparate perspectives into an integral whole. Transdisciplinary endeavors involve an interplay of knowledge created through reciprocal relationships amongst agents addressing a wicked problem. These transdisciplinary initiatives are sustained by knowledge feedback loops reflecting situations where people are invested in achieving both the requirements of individual agents and the requirements of whole systems. In effect, the outputs of this knowledge interplay become inputs into addressing the wicked problem (Lotrecchiano 2010).

This reciprocity is why Nicolescu (2005) described transdisciplinary knowledge as *in vivo* knowledge, alive and emergent. *In vivo* is Latin for "within the living" (Harper 2013). TD knowledge has to be alive because the problems the knowledge addresses are alive, emerging from the life world; moreover, these problems change as people engage with them, as do the people themselves (McGregor 2009). Transleaders would appreciate that transdisciplinary endeavors and initiatives that create open, *in vivo* knowledge are characterized by: complex problem solving; the interpenetration of epistemologies (dissolution of disciplinary boundaries); methodological pluralism (solve problems in context); collaborative deconstruction and joint redevelopment; stakeholder involvement and embeddedness; praxis perspective (putting theoretical knowledge into practice); information exchanges across boundaries (open systems); and, the shifting of different levels of reality (Lotrecchiano 2010).

Somerville and Rapport (2002) explained that when *in vivo* TD knowledge is formed, it stems from the combination of disciplinary and sectoral knowledge, creating something new from each and every constituent stakeholder, sufficing the whole. The participant stakeholders' knowledge can be said to be deeply embedded in each other (embodied), made possible because "transdisciplinarity dissolves the boundaries ... and creates a hybrid which is different from each constituent part [yet inclusive of them as well]" (xiv). A hybrid is an offspring resulting from cross-breeding, cross fertilization and fusion.

The hybridization of knowledge creation refers to the combination of knowledge and ideas from different areas to build new, integrative, integral knowledge,

which both distinguishes and connects: multiple stakeholders and sectors, disciplines, ways of knowing, perspectives, and different forms of knowledge (Wals 2010). During this hybrid knowledge creation process, people learn to *mentally disassemble* a complex, routine system and draw on other ideas to reassemble in a different way. This cognitive process leads to a desired "loss of psychological inertia [or resistance to change]" (Zlotin and Zusman 2005, 2). The TD stakeholders would use the new mental energy (the aforementioned intellectual fusion) to critically analyze existing situations, compare them to what is needed, and come up with new integrated knowledge to address the wicked problem (Zlotin and Zusman 2005). TD knowledge emerges through this process of complex integration, understood to mean opening things up to all disciplines and to civil society-knowing so that something new can be created in a new space (the quantum vacuum) via synthesis and the harmonization of contradictory ideas and perspectives (Nicolescu 1997).

Not surprisingly, the rigors of transleading a process focused on creating knowledge that is *alive* are profound. Leadership must become entangled with the multiplicity of factors shaping a wicked problem, and this entanglement produces a chaotic relationship or space free to generate new channels for emergent knowledge (Nonanka and Konno 1998). McMichael (2002, 218) went so far to describe transdisciplinarity as "a relationship, perhaps an affair, that transports participants to new planes of insights and fulfillment." Indeed, transleadership is focused on leading people to new spaces full of potential and possibilities, where contradictory and complementary ideas can find a home together.

CONCLUSION

The premise of this article was that a new concept is needed to accommodate the intricate and complex process of leading a diverse collection of (often contradictory) people, ideas, and consciousness to a new space and place where transdisciplinary knowledge can be created to address wicked problems facing humanity, using transdisciplinary thinking. While aligned with several emergent approaches to leadership, transleading stands apart because of its deep consideration for the nuances of *trans*leading (*beyond* conventional approaches to leading) several elements inherent to addressing wicked problems: complexity, logic and realities, intersubjectivity, sensemaking, tensions, power and influence, leverage, and in vivo knowledge.

Transleaders would ask what is *beyond* the dividing line between disciplines and societal sectors. They would take a quantum leap *over* the highest peaks of business, governments, humanism, and ecological integrity, requiring, leading to, an opening of new TD spaces for research, reflection, and paradigmatic change (inspired by Gil Otaiza and Toba Igualada 2009). These quantum leaps would produce exponential synergy and transdisciplinary insights and strategies based on (a) the mediated integration of multiple perspectives (realities); (b) the employment of transconsistent, inclusive logic; and, (c) the creation of emergent, complex, embodied, in vivo knowledge to address the wicked problems facing humanity.

REFERENCES

Aronson, J. 1994. A pragmatic view of thematic analysis. *The Qualitative Report* 2(1). http://www.nova.edu/ssss/QR/BackIssues/QR2–1/aronson.html. Accessed December 2, 2013.

Avolio, B. J. 2005. *Leadership development in balance: Made/born*. Mahwah, NJ: LEA.

Bauman, Z. 2008. *Liquid times: Living in an age of uncertainty*. Malden, MA: Polity Press.

Brenner, J. E. 2005. *Knowledge as system: A logic of epistemology*. Paper presented at the 6th European Congress on System Sciences. Paris, France. http://www.res-systemica.org/afscet/resSystemica/Paris05/brenner.pdf. Accessed December 2, 2013.

————. 2008. The logic of transdisciplinarity. In *Transdisciplinary—Theory and practice*, ed. B. Nicolescu, 155–163. Cresskill, NJ: Hampton Press.

Brown, V., J. Harris, and J. Russell, eds. 2010. *Tackling wicked problems: Through the transdisciplinary imagination*. London: Earthscan.

Bryman, A. 1992. *Charisma and leadership in organizations*. London: Sage.

Bryman, A., D. Collinson, K. Grint, B. Jackson, and M. Uhl-Bien, eds. 2011. *Sage handbook of leadership*. London: Sage.

Burns, M., and A. Weaver, eds. 2008. *Exploring sustainability science: A Southern African perspective*. Stellenbosch, South Africa: African SUN Media.

Cervani, L., M. Lindgren, M., and J. Packendorff. 2007. Shared leadership: A postheroic perspective on leadership as a collective construction. *International Journal of Leadership Studies* 3 (1): 40–67.

Cole, A. 2006. *Motueka Catchment futures, trandisciplinarity, a local sustainability problématique and the Achilles-heel of Western science*. Paper presented at the 5th Australasian Conference on Social and Environmental Accounting Research. Wellington. NZ. http://icm.landcareresearch.co.nz/knowledgebase/publications/public/cole_anthony_17rfc_v2.pdf. Accessed December 2, 2013.

Davis, B., and D. Sumara. 2006. *Complexity and education*. Mahwah, NJ: Routledge.

de Freitas, L., E. Morin, and B. Nicolescu. 1994. *Charter of transdisciplinarity*. http://www.inters.org/Freitas-Morin-Nicolescu-Transdisciplinarity. Accessed December 2, 2013.

de Mello, M. 2008. Towards an all-embracing optimism in the realm of being and doing. In *Transdisciplinarity—Theory and practice*, ed. B. Nicolescu, 85–97. Cresskill, NJ: Hampton Press.

Dervin, B. 1983. *An overview of sense-making research: Concepts, methods, and results to date.* Paper presented at the annual meeting of the International Communications Association. Dallas, TX, May. http://faculty.washington.edu/wpratt/MEBI598/Methods/An%20Overview%20of%20Sense-Making%20Research%201983a.htm. Accessed December 2, 2013.

Desbois, L. 2012. Deal with complexity and risk in professional relationship: The transdisciplinary logic. *Transdisciplinary Journal of Engineering and Sciences* 3:87–117.

Després, C., N. Brais, and S. Avellan. 2004. Collaborative planning for retrofitting suburbs: Transdisciplinarity and intersubjectivity in action. *Futures* 36 (4): 471–486.

Dittrich, E., and H. Gies. 2000. *Probing the quantum vacuum*. Berlin, Germany: Springer.

Foucault, M. 1980. *Power/knowledge: Selected interviews and other writings 1972–1977*. Brighton, England: Harvester Books.

Gehlert, S. 2012. Shaping education and training to advance transdisciplinary health research. *Transdisciplinary Journal of Engineering and Sciences* 3:1–10.

Gibbons, M., C. Limoges, H. Nowotny, S. Schwartzman, P. Scott, and M. Trow. 1994. *The new production of knowledge*. London, England: Sage.

Gil Otaiza, R., and C. Toba Igualada. 2009. Hacia una Teoría de los modelos organizativos transcomplejos como aspiración socio-eco-planetaria. *Visión Gerencial* 8 (1): 63–73.

Gillespie, A., and F. Cornish. 2009. Intersubjectivity: Towards a dialogical analysis. *Journal for the Theory of Social Behaviour* 40 (1): 19–46.

Gray, B. 2008. Enhancing transdisciplinary research through collaborative leadership. *American Journal of Preventative Medicine* 35 (2 Suppl): S124–S132.

Harich, J., P. Bangerter, and S. Durlacher. 2012. *Solving the sustainability problem with root cause analysis*. Paper presented at the Ecosystem Services Partnership Conference. Portland, OR. http://www.thwink.org/sustain/publications/papers/Harich_2012_SolvingSusProblemWithRCA.pdf. Accessed December 2, 2013.

Harper, D. 2013. *Online etymology dictionary*. Lancaster, PA. http://www.etymonline.com/

Hirsch Hadorn, G., H. Hoffmann-Riem, S. Biber-Klemm, W. Grossenbacher-Mansuy, D. Joye, C. Pohl, E. Wiesmann, and E. Zemp, eds. 2008. *Handbook on transdisciplinary research.* Rotterdam, the Netherlands: Springer.

Jackson, B., and K. Parry. 2011. *A very short, fairly interesting and reasonably cheap book about studying leadership* (2nd ed.). Thousand Oaks, CA: Sage.

Klein, G., B. Moon, and R. Hoffman. 2006. Making sense of sensemaking I: Alternative perspectives. *IEEE Intelligence Systems* 21 (4): 70–73.

Klein, J. T. 2002. Integration, evaluation and disciplinarity. In *Transdisciplinarity*, ed. M. Somerville and D. Rapport, 49–60. Oxford, England: EOLSS Publishing.

————. 2004. Prospects for transdisciplinarity. *Futures* 36 (4): 515–526.

Klein, J. T., W. Grossenbacher-Mansuy, R. Häberli, A. Bill, R. Scholz, and M. Welti, eds. 2001. *Transdisciplinarity: Joint problem solving among science, technology, and society*. Berlin: Birkhäuser Verlag.

Korten, D. C. 1999. *The post-corporate world*. San Francisco, CA: Berrett-Koehler.

Lawrence, R. J., and C. Després. 2004. Introduction: Futures of transdisciplinarity. *Futures* 36 (4): 397–405.

Leavy, P. 2011. *Essentials of transdisciplinary research*. Walnut Creek, CA: Left Coast Press.

Lotrecchiano, G. R. 2010. Complexity leadership in transdisciplinarity (TD) learning environments: A knowledge feedback loop. *International Journal of Transdisciplinary Research* 5 (1): 29–63.

Mandler, G. 1984. *Mind and body*. New York: Norton.

McGregor, S. L. T. 2004. The nature of transdisciplinary research and practice. *Kappa Omicron Nu Human Sciences Working Paper Series*. http://www.kon.org/hswp/archive/transdiscipl.html. Accessed December 2, 2013.

————. 2009. Integral leadership's potential to position poverty within transdisciplinarity. *Integral Leadership Review* 9(2). http://www.archive-ilr.com/archives-2009/2009–03/2009–03-article-mcgregor.php. Accessed December 2, 2013.

————. 2010. Integral leadership and practice: Beyond holistic integration in FCS. *Journal of Family and Consumer Sciences* 102 (1): 49–57.

————. 2011. Transdisciplinary axiology: To be or not to be. *Integral Leadership Review* 11 (3). http://integralleadershipreview.com/2011/08/transdisciplinary-axiology-to-be-or-not-to-be/. Accessed December 2, 2013.

————. 2012. Complexity economics, wicked problems and consumer education. *International Journal of Consumer Studies* 36 (1): 61–69.

McGregor, S. L. T., and R. Volckmann. 2011. *Transversity*. Tuscan, AZ: Integral Publishing.

McMichael, A. 2002. What makes transdisciplinarity succeed and fail? In *Transdisciplinarity*, ed. M. Somerville and D. Rapport, 218–222. Oxford, England: EOLSS Publishing.

Mitchell, A. 2013. The ties that bind. *Canadian Wildlife* 19 (1): 17–18.
Montuori, A., and U. Fahim. 2010. Transformative leadership. *Revision: A Journal of Consciousness and Transformation* 30 (3 & 4): 1–3.
Morin, E. 1996. A new way of thinking. *UNESCO Courier* 49 (2): 10–14.
————. 1999a. *Homeland earth: A manifesto for the new millennium.* Cresskill, NJ: Hampton Press.
————. 1999b. *Seven complex lessons in education for the future*. Paris, France: UNESCO. http://unesdoc.unesco.org/images/0011/001177/117740eo.pdf. Accessed December 2, 2013.
————. 2005. Restricted complexity, general complexity. In *Worldviews, science and us: Philosophy and complexity*, ed. C. Gershenson, D. Aerts, and B. Edmonds, 5–29. London: World Scientific Publishing. E-chapter: http://www.worldscibooks.com/chaos/etextbook/6372/6372_chap01.pdf. Accessed December 2, 2013.
Nicolescu, B. 1985. *Nous, la particule et le monde [We, the particle and the world].* Paris, France: Le Mail.
————. 1997. *The transdisciplinary evolution of the university condition for sustainable development*. Paper presented at the International Congress of the International Association of Universities. Bangkok, Thailand: Chulalongkorn University. http://basarab.nicolescu.perso.sfr.fr/ciret/bulletin/b12/b12c8.htm. Accessed December 2, 2013.
————. 2002. *Manifesto of transdisciplinarity* (Trans. Karen-Claire Voss). Albany: State University of New York Press.
————. 2005. Towards transdisciplinary education. *TD: The Journal for Transdisciplinary Research in Southern Africa* 1 (1): 5–16.
————. ed. 2008. *Transdisciplinary—Theory and practice.* Cresskill, NJ: Hampton Press.
————. 2011a. Methodology of transdisciplinarity—Levels of reality, logic of the included middle and complexity. In *Transdisciplinarity: Bridging science, social sciences, humanities and engineering*, ed. A. Ertas, 22–45. Austin, TX: TheAtlas Publishing.
————. 2011b. Transdisciplinarity: The Hidden Third, between the subject and the object. In *Şatiinţă, Spiritualitate, Societate [Science, Spirituality, Society]*, ed. I. Chirilă and P. Bud, 11–34. Cluj-Napoca, Romania: Eikon.
————. 2012. The need for transdisciplinarity in higher education in a globalized world. *Transdisciplinary Journal of Engineering and Sciences* 3:11–18.
Nolt, J. 2010. Free logic. In *Stanford encyclopedia of philosophy*, ed. E. N. Zalta. Stanford, CA: Stanford University. http://plato.stanford.edu/entries/logic-free/#incl. Accessed December 2, 2013.
Nonanka, I., and N. Konno. 1998. The concept of "ba": Building a foundation for knowledge creation. *California Management Review* 40 (3): 40–54.
Northouse, P. 2013. *Leadership* (6th ed.). Thousand Oaks, CA: Sage.
Nowotny, H. 2003. The potential of transdisciplinarity. In *Rethinking interdisciplinarity*, Moderators C. Heintz, G. Origgi, and D. Sperber, 48–53. Paris, France: Interdisciplines Project. http://www.interdisciplines.org/medias/confs/archives/archive_3.pdf. Accessed December 2, 2013.
Ojha, A. K. 2005. Sensemaking and identity development. *Journal of Intercultural Communication* 10 (December). http://www.immi.se/intercultural/nr10/ojha.htm. Accessed December 2, 2013.
Owen, W. F. 1984. Interpretive themes in relational communication. *Quarterly Journal of Speech* 70:274–287.

Pearce, G. 2009. *Transdisciplinary leadership: Leadership thinking and strategies for leading "wicked" and "messy" problems*. Paper presented at the 14th International Conference on Thinking. Kula Lumpur, Malaysia.

————. 2010. Transdisciplinary leadership: Dealing with wicked problems, a case study from Australia. *Pertanika Journal of Social Sciences and Humanities* 18 (Special Issue): 151–163.

Pye, A. 2005. Leadership and organizing: Sensemaking in action. *Leadership* 1 (1): 31–50.

Ramadier, T. 2004. Transdisciplinarity and its challenges: The case of urban studies. *Futures* 36 (4): 423–439.

Ravetz, J. R., and S. O. Funtowicz. 1999. Post-normal science—An insight now maturing. Editorial. *Futures* 31:641–646.

Sardar, Z. 2010. Welcome to postnormal times. *Futures* 42 (5): 435–444.

Senge, P. 1990. *The fifth discipline*. New York: Doubleday.

Somerville, M. A., and D. Rapport. 2002. *Transdisciplinarity: reCreating integrated knowledge*. Montreal, QC: McGill-Queens University Press.

Spradley, J. P. 1979. *The ethnographic interview.* New York: Holt, Rinehart and Winston.

Stogdill, R. M. 1974. *Handbook of leadership*. New York: The Free Press.

Uhl-Bien, N., R. Marion, and B. McKelvey. 2007. Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly* 18: 298–318.

van Huyssteen, E., and M. Oranje. 2008. From promising preaching to piloting the promise and teaching what is promising in planning practice. In *Exploring sustainability science: A Southern African perspective*, eds. M. Burns and A. Weaver, 507–536. Stellenbosch, South Africa: African SUN Media.

Volckmann, R. 2010. Integral leadership theory. In *Political and civil leadership (Volume 1)*, ed. R. Couto, 121–127. Thousand Oaks, CA: Sage

————. 2013, March 13. *Generativity, transdisciplinarity and integral leadership* [Video]. http://integralleadershipreview.com/ilr_videos/generativity-transdisciplinarity-and-integral-leadership/. Accessed December 2, 2013.

Wals, A. 2010. *Message in a bottle: Learning our way out of unsustainability*. Inaugural lecture presented as UNESCO ESD Chair at Wageningen University. Wageningen, the Netherlands. http://groundswellinternational.files.wordpress.com/2010/12/learning-our-way-out-of-unsustainability.pdf. Accessed December 2, 2013.

Weick, K. E. 1995. *Sensemaking in organizations*. Thousand Oaks, CA: Sage.

Wells, J. 2013. *Complexity and sustainability*. New York: Routledge.

Wiesmann, U., S. Biber-Klemm, W. Grossenbacher-Mansuy, G. Hirsch Hadorn, H. Hoffmann-Riem, D. Joye, C. Pohl, and E. Zemp. 2008. Enhancing transdisciplinary research: A synthesis in fifteen propositions. In *Handbook on transdisciplinary research*, ed. G. Hirsch Hadon, 433–441. Dordrect, The Netherlands: Springer.

Zlotin, B. and A. Zusman. 2005. *TRIZ based tools for knowledge creation*. Retrieved from Ideation International Inc. website, http://www.ideationtriz.com/new/materials/toolsknowledgecreation.pdf. Accessed December 2, 2013.