Transdisciplinarity and Public Policy: Nicolescuian, Zurich, and Brazilian Approaches

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Abstract:*Public policy is intended to protect the public interest, which is threatened by complex problems such as climate change, global pandemics, unsustainability, violence, and inequality. Policymakers are challenged when dealing with these issues because an array of stakeholders has different perspectives, interests, positions, value sets, resource complements, and so on. Finding common ground to move forward is a complex imperative. To that end, for the first time, this article spells out the Nicolescuian, Zurich, and Brazilian approaches to transdisciplinarity as they pertain to public policy. They each offer a different but viable way for public administrators to find practical, contextual solutions for compelling issues affecting the public interest.*

Keywords:Transdisciplinarity, public interest, public policy, public administration, Brazilian holopraxis, Nicolescuian, Zurich.

1 Introduction

This paper concerns public policy informed by transdisciplinarity (TD). Public policy is intended to protect the public interest; that is, protect the well-being or general welfare of the public or general populace – the common good (Nadel, 1971). "In ordinary political discourse, the 'common good' refers to those facilities—whether material, cultural or institutional—that the members of a community provide to all members ... to fulfill a relational obligation they all have to care for certain interests that they have in common" (Hussain, 2018, para. 1). For example, it is in the public's interest (i.e., their advantage, benefit, or overall welfare) that public safety and policing are in effect; viable transportation and stable telecommunication infrastructures are available; a trustworthy judicial and legal system is in place; and vulnerable citizens, other species, and ecosystems are protected (Hussain, 2018).

Unfortunately, the public interest and the common good are in trouble. The world faces daunting and inexorable complex societal challenges including but not limited to unprecedented climate change, global pandemics, intractable violence and unrest, uneven income and wealth distribution, gendered inequality and disparity, social and ecological injustice, rampant diaspora, unsustainability, and severe loss of diversity.

These complex, wicked problems warrant policy interventions – something must be done... but what, how, and by whom (Rittel & Webber, 1973)? Recognizing that today's "complex societal challenges increasingly demand multiple perspectives to search for workable solutions," van der Waldt (2014, p. 132) anticipated that "transdisciplinarity would increasingly gain prominence [in the public policy arena]." Uwizeyimana and Basheka (2017) viewed transdisciplinarity as a way for public administrators to "find practical [policy] solutions for problems that affect the public" (p. 24). da Costa (2022b) envisioned transdisciplinarity in public administration and management.

Ndaguba and Ijeoma (2017) claimed that "the need for transdisciplinarity in public policy and administration cannot be undermined or overlooked as a result of depleting strategies, theories, models and frameworks in resolving complex societal quagmires" (p. 1). Vargas and Restrepo (2019) valued transdisciplinarity in public administration because it provides a way to "strengthen the disciplinary identity [of law, politics, and economics while concurrently working] in a transversal way to draw bridges [among them] ... to understand more comprehensively public problems and to propose more equitable, efficient and effective solutions and policy recommendations" (p. 101).

Generally speaking, transdisciplinarity takes policy problematization, deliberation, development, recommendations, approval, implementation, and evaluation far beyond one isolated sector (i.e., the public sector – government, justice, legal system) to include the private (business) sector, and civil society. Herein, civil society includes individuals, families, communities, higher education, and any nongovernmental organizations and institutions advocating their interest (Blessinger et al., 2019).

Higher education (universities, colleges, and technical institutions) is considered part of civil society (Blessinger et al., 2019), and that is where transdisciplinarity comes into play. In the early seventies, the neologism *transdisciplinarity* was coined to acknowledge that the mono, multi, and interdisciplinary knowledge created in higher education is useful but not enough to address the world's complex, wicked problems unfolding outside the academy. Compared to *trans* (beyond disciplines), *mono* means one discipline in total isolation. *Multi* means more than one discipline with no intent to merge disciplinary knowledge. *Inter* means coordinated and reciprocal collaboration and integration between or among disciplines, but there is no intent to dismantle disciplinary boundaries, just bridge them (Apostel et al., 1972; Jantsch, 1972).

Trans means between, among, and beyond mono, multi, and interdisciplinary knowledge (higher education) to include civil society actors and the private and public sectors (McGregor, 2014b; Nicolescu, 1985, 2002). These are the multiple perspectives to which van der Waldt (2014) referred. As a caveat, transdisciplinarity does not "completely eschew disciplines, [seeing] as a strong grounding in a single discipline remains a prerequisite for delving outside one's field" (Schneider, 2003, p. 13). The assumption instead is that disciplinary knowledge is simply not enough. Other ways of living with, being in and seeing the world are needed (McGregor & Gibbs, 2020; Nicolescu, 2014).

In the 50 years since*transdisciplinarity* was conceived, three overarching approaches have evolved: Nicolescuian, Zurich, and Brazilian (see Figure 1). Each approach brings a different set of assumptions to the public policy arena. Discussion of the Nicolescuian and Zurich approaches herein relies on McGregor's (2014b, 2015) detailed and thoroughly researched historical and substantive comparison. Key architects are, respectively, Nicolescu (e.g., 1985, 2002, 2014) and Klein et al. (2001). The Brazilian approach reflects da Costa's (2021, 2022 a, b, c) recent scholarship with a special focus on public administration.

2 Public Policy Through a Nicolescuian Lens

The Nicolescuian approach to transdisciplinarity is so named because it was formulated by Professor Dr. Basarab Nicolescu, a Romanian quantum physicist based in Paris, France. To clarify, Nicolescu (2007) intentionally framed his work as a *formulation*, which means (a) methodically creating or preparing something and (b) then expressing it in a concise and systematic way (Stevenson, 2011). Nicolescu published four books and countless articles and conference papers, granted interviews, and spearheaded two international conferences (McGregor, 2015) with a third 2022 event recently postponed (Nicolescu et

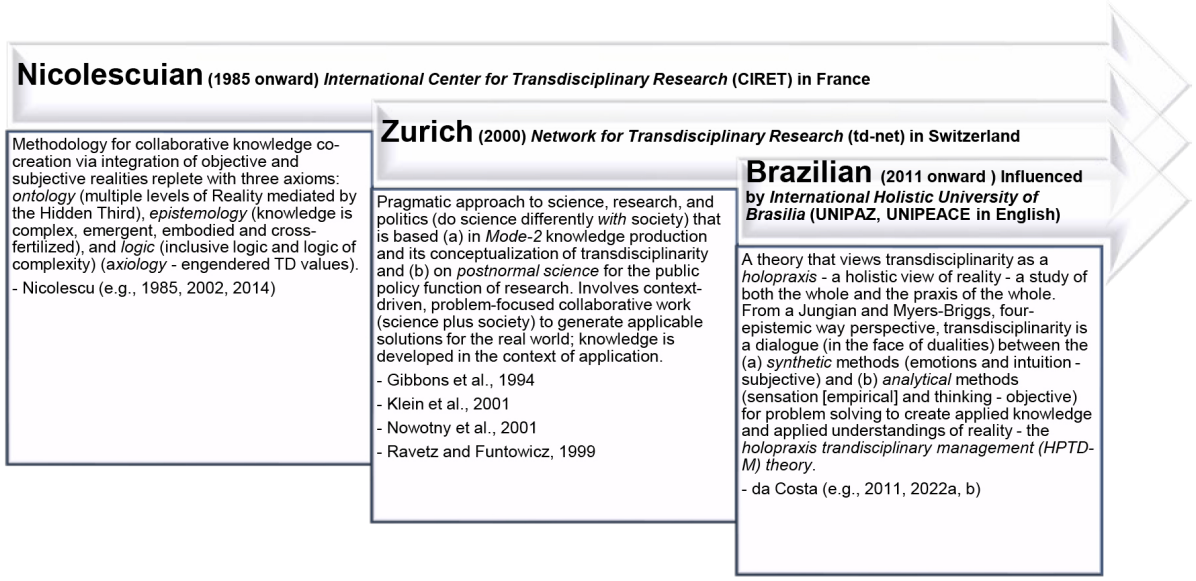

Figure 1: Three main transdisciplinary approaches.

al., 2019).

Nicolescu was and remains deeply concerned about the inexorable rate of disciplinary knowledge propagation with little connection to the real world or each other. He lamented the fragmentation of knowledge, hyperspecialization, and dualism – the disconnect between science (object) and humans (subject) (Nicolescu, 2014). He claimed this situation precludes understanding the world by which he meant "connecting knowledge with being" (Nicolescu, 2007, p. 74) – or connecting science with humanity. For him, because human beings are the center of society, a new approach was needed to create knowledge to address their problems, an approach that focuses on the interaction *between* humans and the sciences (i.e., between Subject and Object).

While respecting the longstanding empirical methodology for producing knowledge, with its specific philosophical axioms (ontology, epistemology, logic, and axiology), Nicolescu (1985, 2002) discerned the need for a different methodology. Given his concerns, he moved away from classical physics, empiricism, and positivism, which assume there is one level of reality (materialism) understood through exclusive logic with attendant knowledge produced using the value-free scientific method. Instead, he embraced (a) metaphysics (things beyond physics such as theology, philosophy, and spirituality) and the new sciences of (b) quantum physics, (c) chaos theory, and (d) complexity science to formulate the co-creation of knowledge (Nicolescu, 1985, 2002, 2014). He shifted from scientific knowledge *production* to collaborative knowledge *co-creation*.

For him, transdisciplinarity is at the same time *between* disciplines, *across* different disciplines, and *beyond* all disciplines. Knowledge creation thus transcends the academy (mono, multi, and interdisciplinarity) and includes the private sector, the public sector, and civil society and communities (Nicolescu, 1985, 2002). With this understanding, he formulated (over many years) a*transdisciplinary methodology* (see Figure 2) that comprises its own ontology (reality), epistemology (knowledge), and logic. He eschewed the need for an axiology axiom (values) claiming transdisciplinary values arise from the interaction among the other three axioms (Nicolescu, 2007).

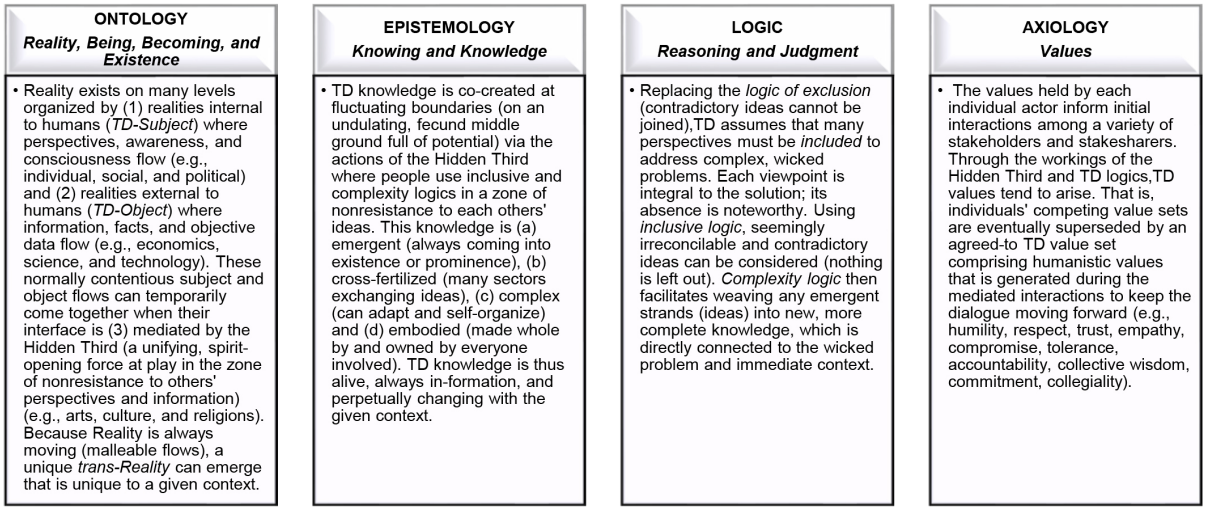

Figure 2: Key elements of Nicolescuian Transdisciplinarity.

2.1 Ontology: Multiple Levels of Reality and the Hidden Third

In more detail, Reality (Nicolescu capitalizes the word) exists along two major dimensions: internal and external. Internal Reality is called the *TD-Subject* and represents the flow of value-laden consciousness, awareness, and perceptions. It includes individual (philosophical and psychological), family and kinship, community and social, political and ideological, historical, and geographical (locale). He called external Reality the *TD-Object.* It represents the flow of value-neutral information, facts, proofs, and statistics. It includes economics (business and law), environment (ecology), technology (also science and medicine), planetary, and cosmic (universe/multiverse) (Nicolescu, 2002, 2011, 2014).

Stakeholders engaged with a complex, wicked problem view it through different perspectives (TD-Subject) and depend on different facts (TD-Subject). Some people may privilege facts over perspectives and vise versa. Nonetheless, each stakeholder holds a stake (interest and concern) in the outcome. Torkar and McGregor (2012) offered the neologism *stakesharers* to accommodate the idea that each actor also shares the stakes and risks. Any engagement and movement between, among, and beyond these many levels of Reality requires mediation by, what Nicolescu (1985, 2002) called, the *Hidden Third* (like a third party moderating contentious negotiations). Informed by different Realities, "peoples' experiences, intuitions, reflections, interpretations, descriptions, representations, images and formulas meet in this mediating zone of no resistance" (McGregor, 2018a, p. 187).

Nicolescu (1985, 2002) formulated that this openness to others is more possible when those engaged in transdisciplinary work draw on ways to lubricate things (minimize friction) to get things started, move things along, and wrap things up. The Hidden Third's meditating role thus depends on the arts (drama, theatre, music, painting), religions and faith, spirituality (inward searching), the sacred (connection with nature), and cultures. These mediating devices help people remain open to each other to facilitate temporary engagement and reconciliation to address a common concern. For Nicolescu, these are *not* Realities; instead, they constitute the invisible unifier, the mind-opening and "spirit-opening modalities" (Eric Reynolds, personal communication, August 15, 2018) that make it possible for people to cross borders, hear each other, and work toward a common goal despite obstacles – because something *must* be done.

On a final note, because Reality is always moving (i.e., malleable flows between TD-Subject and TD-Object), a unique *trans-Reality* can emerge that is specific to a given problem-solving context (Nicolescu, 2002). "If TD-Subject is one circle and TD-Object is another circle, trans-Reality is the point (x marks the spot) where their edges touch. Trans-Reality is beyond all Realities, *yet* it exists at the same time" (McGregor & Gibbs, 2020, p. 146). In plain language, although people addressing climate change come to

the table with their own Realities about this problem (e.g., perceptions, awareness, facts, statistics), they can reconcile their differences and co-create a new Reality that is beyond (*trans*) where they all started. This is*the* trans-Reality they needed to address a particular concern in situ. It is an amalgamation and integration of shared Realities – one that did not exist before their work in the lubricated included middle.

2.2 Inclusive and Complexity Logics

The Hidden Third enables divergent actors to temporarily set aside their positions, so they can reach common, middle ground. This requires a special kind of logic (habits of the mind) – both inclusive logic and the logic of complexity (Nicolescu 2002, 2014). Regarding the former, "all views on the problem must be included and any contradictory positions must be temporarily reconciled so strategic and innovative solutions to the problem can be formulated, agreed to and implemented" (McGregor 2018a, p. 194). Inclusive logic assumes "that which appears to be disunited is united, and that which appears to be contradictory is perceived as noncontradictory" (Nicolescu, 2008, p. 7).

Inclusive logic "deals with reconciling contradictory and antagonist ideas so new facts, thoughts, and insights can emerge. [Complexity logic] helps people weave these new disparate strands of thinking into a complex new whole [to which all agree]" (McGregor 2020b, p. 4). Complex means interwoven. Complexity logic thus "lets people cross and connect different ways of knowing and perceiving in creative and coherent ways" (McGregor, 2020b, p. 5). "The result is new knowledge, layered and layered with complexity, emergent from cross fertilization of so many perspectives" (McGregor, 2015, p. 4).

2.3 Epistemology (Knowledge)

Disciplinary knowledge is siloed. Sectoral knowledge is often proprietary or narrowly sector-specific. In contrast, Nicolescu (1985, 2002) formulated transdisciplinary knowledge as having four characteristics: emergent, embodied, complex, and cross-fertilized. Cross-fertilization stimulates the development of something through an exchange of ideas or information (Stevenson, 2011). This (a) cross-fertilization (mediated by the Hidden Third and enabled with inclusive and complexity logics) engenders knowledge that is (b) embodied (co-created and owned by everyone involved rather than discipline-bound or sector-bound), (c) emergent (always in-formation and becoming) and (d) complex (informed by Morin, 1984)

> because the people and systems that were involved adapted and reorganized. Their behaviour emerged from a few simple rules applied locally with far reaching effect. Order in the knowledge creation process emerged without central control. Small changes were allowed to leverage big effects. And, the people involved trusted that things could emerge from unpredictable events (chaos theory). (McGregor, 2018a, p. 193)

2.4 Axiology: Transdisciplinary Values

Although other methodologies (i.e., empirical, interpretive, and critical) have an axiology axiom (i.e., the role of values in knowledge production) (McGregor, 2011, 2018b), Nicolescu (2007) felt axiology was not necessary to his formulation of a TD methodology. He deduced instead that TD values are engendered in (arise during) the interactions mediated by the Hidden Third.

In effect, at the beginning of the problem-solving enterprise, each individual actor's competing value set informs initial stakeholder interactions. Through the powerful workings of the lubricating Hidden Third, a TD value set arises because people's competing values are eventually superseded by agreed-to humanistic values (e.g., humility, respect, trust, tolerance, compromise, empathy, accountability, collective wisdom, commitment, and collegiality). This engendered TD value set will be specific to each context and serves to keep conversations going, move deliberations forward, and ensure sustained commitment to the exercise.

2.5 Application of Nicolescuian Transdisciplinarity to Policy Making

Foremost, policymakers viewing policy making through a Nicolescuian transdisciplinary lens would accept the premise that there is more than one *material* reality that is understood using knowledge produced with the scientific method. Instead, there are many Realities affecting how people engage with each other over contentious issues. Some people align more with subjective Realities including their individual philosophies or personality, communities, political ideologies, histories, or geography (their locale). Others resonate with objective Realities including economics (also business and law), technology, science, and the external environment. Dualistic thinking says these Realities cannot comingle – they are too different. Policymakers would eschew this assumption while acknowledging that help is required.

To that end, policymakers would keenly appreciate that most stakeholders come to the policy table with widely different interests, needs, positions, resources, expectations, values, and so on. To move them from seeing themselves as disparate stakeholders to affected stakesharers, policymakers would respect the merit of using art, music, drama, theatre, cultural events, religion and faith (collective worship), spirituality, and people's mutual connection with the earth (the Sacred) as*lubricants* to help disparate minds comingle. Whatever it takes to help people feel more comfortable embracing each others' divergent viewpoints on a burning issue. Openness to differences is key to movement between, among, and ultimately beyond Realities (e.g., movement among individual ideologies, economic assumptions, technological imperatives, scientific privilege, or political polarities). A meeting of the minds is necessary to move policy conversations and deliberations forward.

Once people's minds begin to loosen up and open up, policymakers must remain aware of what is involved in people letting go of their reliance on exclusive logic (i.e., either/or, and/or, us/them dualistic thinking). People have been socialized to assume that differences prevent inclusion. Respecting this collective psyche, policymakers would help those engaged in the policy process to learn to apply both inclusive logic and complexity logic, which ensures that all voices are considered legitimate and have a place at the table. One voice might be integral (its absence noticeable) to the ultimate solution or even to just moving things forward. Inclusive logic is also called the *logic of the included middle.* It is employed by divergent minds that come together on the neutral middle ground made possible by policymakers who have respected the Hidden Third, brought different people (Realities) together, and lubricated (mediated) their interactions.

Policymakers would not stop at inculcating inclusive logic. They would also help people use complexity logic, wherein they take the new strands of thinking emergent from the mediated interactions and weave them into something new – the TD knowledge needed to address (maybe solve) the complex, wicked problem. The dynamics inherently created by movement among the flow of subjective and objective Realities helps policymakers appreciate that this new knowledge has key attributes that make it special and unique from what individual actors brought to the table.

To elaborate, policymakers would appreciate that the new co-created knowledge is owned by everyone and arose from the cross-fertilization of ideas and perceptions from many sectors (e.g., government, business, communities, universities). The knowledge is not fixed but is emergent (always becoming, changing, and evolving) – it is alive (*in vivo*). Importantly, this complex knowledge can self-organize and adapt as interactions unfold. Its ultimate creation means those involved were willing to (a) re-evaluate their way of knowing each time they used it and (b) reinvent their truths, knowledge, and models of the world if necessary.

The development of policies to protect the public interest cannot help but engender value loadings and clashes. Different stakeholders value different things. Normally, a focus on value reconciliation would be de rigueur during policy initiatives. Policymakers using the Nicolescuian approach would instead focus their energy on engendering the emergence of TD values such as humility, respect, trust, dignity, accountability, and transparency. These humanistic values appeal to people striving to attain a goal together. This human factor is important given the contentiousness of the policy process for complex problems, and it is apropos, as Nicolescu viewed humans as the key to everything transdisciplinary.

3 Public Policy Through a Zurich Lens

The Zurich (Switzerland) approach to transdisciplinarity is best reflected in an edited book capturing the essence of the founding conference in 2000 themed *Transdisciplinarity: Joint problem solving among science, technology, and society: An effective way for managing complexity* (Klein et al., 2001). To clarify, this triadic interface involves (a) science experts (the academy and disciplines); (b) technology experts; and (c) society experts (i.e., people, practice, and practitioners). Technological experts have a role to play but only as they contribute to joint problem solving on an issue (Klein et al., 2001).

This connexion was deemed necessary because the issues facing humanity "cannot be answered in scientific and technical terms alone. [Also required are] the values and preferences of different individuals and groups that have been seen as traditionally outside the scientific and technological system" (Gibbons et al., 1994, p. 7). Instead of being separate and disconnected entities, "the community of scientific and technical experts and the 'attentive' public are interconnected" (Gibbons et al., 1994, p. 36). The Zurich approach thus re-envisioned the relationship among society, science, and technology as each partakes in knowledge production to address complex problems. Knowledge production must now be grounded in (a) contextuality (knowledge is developed in the context of application), (b) heterogeneity (diverse content and character are creatively used) and (c) social accountability and reflexivity (Gibbons et al., 1994; Jahn, 2012; Smith, 2003).

The Zurich approach to transdisciplinarity is based on two premises that pertain to the role of *science* in solving the world's problems. First, the problems normally addressed by higher education (disciplinary ivory towers) stemmed from science and not the real world. This was deemed problematic because the complex, real-world problems humanity faced no longer emanated from sciences or from the interests of the academic community (Häberli et al., 2001b). They arose instead from the *science-technology-society* interface (triad). It was thus presumed that the world needed science that could manage complexity and a plurality of societal stakeholders (Klein et al., 2001).

In other words, "there is something of a societal value that needs to be integrated into the definition of good science ... to produce better science" (Nowotny, 2003, p. 50). Zurich TD "invites the society to join the world of research as a valuable contributor to the growth of knowledge" (du Plessis, 2012, p. 44). "Society now 'speaks back' to science" (Nowotny et al., 2001, p. 50) in two-way discourse via a new social contract among science, technology, and society.

Second, the Zurich TD approach also ironically assumed that "the science system is the primary knowledge system in society. [Joint problem solving simply helps science] increase its unrealized intellectual potential" (Häberli et al., 2001a, p. 4). In short, science still prevails over society, but science must be done differently. New knowledge to address real-world, practical problems must now be a product of science working *with society* (aka with practice and practitioners). This work would entail "the formation of science and practice co-leadership to allow for collaboration that includes [a] joint problem definition and representation, [b] the construction of socially robust orientations for problem transformation (solutions), and [c] a thorough process of reflection to promote future sustainable action" (Scholtz, 2020, p. 1039).

In short, Zurich conference attendees (500 university scientists [no humanities], 300 practitioners [government and private sector], nearly 40 disciplines, and 50 countries) basically viewed "science as a public good" (Scholtz, 2020, p. 1039) especially "if practitioners and scientists take co-responsibility, co-accountability and co-leadership on equal footing" (Scholtz, 2020, p. 1041). To that end, the Zurich TD approach (a joint problem-solving science-technology-society triad) is a further blend of (a) Mode 2 knowledge production and (b) postnormal science (Klein et al., 2001) (see Figure 3).

3.1 Mode 2 Knowledge Production

Mode 1 knowledge is "discipline-bound areas of specialization, where the scientist/ researcher is often viewed as an independent (and isolated) agent of knowledge, with no need to consult outside the field of his [sic] specialized interest" (du Plessis, 2012, p. 42). In contrast, Mode 2 knowledge is produced in the context where it will be applied (i.e., the context of application). Many different sectors are involved

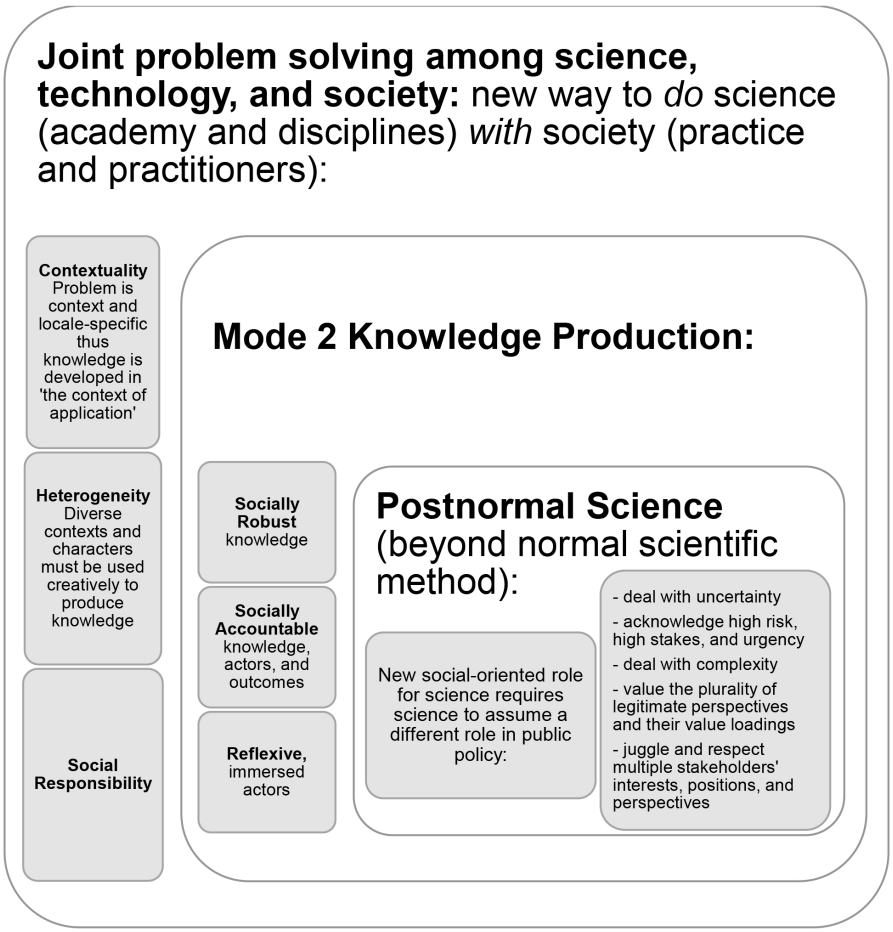

Figure 3: Key elements of Zurich approach to transdisciplinarity.

in its production with their identity and working relationships and arrangements changing over time as the situation requires. Mode 2 knowledge is transdisciplinary in that it is "problem solving on the move [dependent on] communications in ever new configurations" (Gibbons et al., 1994, p. 5). Resultant Mode 2 knowledge is socially robust, socially accountable, and reflexive (Gibbons et al., 1994). This statement is now unpacked.

3.1.1 Socially Robust Knowledge

Mode 1 knowledge must be robust and high quality; it must be scientifically reliable and valid (Gibbons et al., 1994). Similarly, "it is still incumbent on those creating [Mode 2] knowledge to assure that it is of a certain quality. It would not bode well if un-robust knowledge were used to solve deep, human problems, even if the knowledge was jointly created in context" (McGregor, 2007, p. 491). Instead of reliable and valid, however, Mode 2 knowledge must be socially robust. Robust means powerfully built, uncompromising, and resilient (Stevenson, 2011). Knowledge is *socially* robust when it "meets the diverse criteria for a specific situation [or context]" (Smith, 2003, p. 4). McGregor (2007) further offered justice, efficacy, autonomy, effectiveness, and other evidence of success as proper criteria to judge the robustness of Mode 2 knowledge, which will hold firm in a given social context.

Mode 2 knowledge production would further involve participants discerning if the robust knowledge is *socially approved* (Smith, 2003). To that end, everyone involved must let go of their home base and become

joint knowledge practitioners (Gibbons et al., 1994). When socially approved, socially robust knowledge can be *socially distributed* and *socially sustained* through network building (Smith, 2003). Those involved would become comfortable "with roaming this network with meaningful connections at the crossroads. Ongoing communication becomes key in this itinerant [knowledge production] process" (McGregor, 2007, p. 492).

Zurich conference attendees accepted that the social robustness of knowledge depends on how well stakeholders accommodate the "[a] democratic procedures of representation and decision by compromise, on the one hand, and the [b] credibility, reliability, and quality of scientific knowledge claims, on the other" (Weingart, 2019, p. 132).

3.1.2 Socially Accountable Knowledge

Compared to Mode 1, Mode 2 knowledge production "includes a wider, more temporary and heterogenous set of practitioners, collaborating on a problem defined in a specific and localised context" (Gibbons et al., 1994, p. 3). For this context-dependent reason, Mode 2 knowledge must be *socially accountable*. Moreover, science itself must be more socially accountable and reflexive (Gibbons et al., 1994). Mode 2 knowledge is socially accountable when those involved can justify their actions and decisions in its production. Did they take into account societal factors and actors (Gibbons et al., 1994)? They must be answerable to society for their decisions and responsive to any challenges to the process they employed in Mode 2 knowledge production. People must also be accountable to each other and to the outcomes, especially in the long term for the latter (Coghlan & Brydon-Miller, 2014; Scholtz, 2020).

3.1.3 Reflexive Actors

During Mode 2 knowledge production, because all participants are immersed, they must be reflexive actors and change agents (Gibbons et al., 1994). The opposite of detached and neutral, immersed refers to deep involvement, activity, and interest rather than shallow and distanced. Reflexive is different from reflective, which involves looking inward during and after a process to gain self-insight and personal growth. Reflexivity, in contrast, involves being deeply aware of one's positionality (i.e., biases, prejudices, values, ideological predispositions, beliefs, expectations) and how this might influence Mode 2 knowledge production (Berger, 2015; Bolton, 2009; McGregor, 2020a).

Gibbons et al. (1994) cautioned that, when producing Mode 2 knowledge, "all givens must be mistrusted because they represent the treacherous reassurances of tradition which inhibit reflexivity" (p. 103). Conversely, they cautioned "that reflexivity [can] become a vicious rather than virtuous circle, a narcissistic process that owes far more to the internal dynamics of scholarly production and professional formation than to any external forces, whether social critique or economic imperative" (p. 103). Mode 2 knowledge producers must remain cognizant of this fine line when respecting their role as an immersed, reflexive social change agent.

3.2 Postnormal Science

Because the Zurich TD approach envisioned a more social-oriented role for science, it was incumbent upon its founders to acknowledge the inadequacy of *normal* science to address complex, wicked problems; that is, the well-established, long-entrenched production of knowledge using the scientific method. In its stead, they proposed *postnormal* science (Klein et al., 1994) as conceptualized by Funtowicz and Ravetz (1993). Post means after. Postnormal science comes after normal science when the latter is not enough.

Postnormal science is required when problems that appear at face value to be scientific – are not. They cannot be solved using the scientific method because facts are uncertain, values are in dispute, the stakes are inordinately high, yet it is urgent that a decision be made. Problems transcend (go beyond) the ability of normal science experts and technology experts to deal with them thus requiring a more complex, inclusive joint problem-solving approach that respects the role and contribution of society (Funtowicz & Ravetz, 1993).

As a caveat, "postnormal science was developed as a line of inquiry to accommodate a reassessment of the role of scientific research *in public policy*" (McGregor, 2015, p. 6). Because policy issues are so complex, science practitioners must be able to (a) deal with uncertainty; (b) acknowledge the high risk, high stakes, and urgency of decisions; (c) value the plurality of legitimate perspectives and value loadings; and (d) juggle and respect a multitude of stakeholders' interests, positions, and perspectives (Funtowicz & Ravetz, 1993; Hessels & van Lente, 2008; Nowotny et al., 2001). Taking this all into consideration, the following definition of transdisciplinarity emerged from the Zurich conference:

> Transdisciplinarity is a new form of learning and problem solving involving cooperation among different parts of society. Transdisciplinarity research starts from tangible, real-word problems. Solutions are devised in collaboration with multiple stakeholders. A practice-oriented approach, transdisciplinarity is not confined to a close circle of scientific experts, professional journals and academic departments where knowledge is produced. Ideally, everyone who has something to say about a particular problem and is willing to participate can play a role. Through mutual learning, the knowledge of multiple participants is enhanced, including local knowledge, scientific knowledge, and the knowledge of industries, businesses, and non-governmental organizations (NGO's). The sum of this knowledge will be greater than the knowledge of any single partner. In the process, the bias of each perspective will also be minimized. (Häberli et al., 2001b, pp. 18–19)

3.3 Application of Zurich Transdisciplinarity to Public Policy

Per Figure 3, policymakers using Zurich transdisciplinarity would appreciate that science (academy and disciplines), technology experts, and society (practice and practitioners) must work together to create socially robust and socially accountable knowledge. Actually, policymakers might view themselves as bridging agents who respect what is involved in dealing with complex problems at this triadic interface. When making policy, they would no longer turn in-house (homogeneity) or to just university think tanks, research centers, institutes, expert academics, or particular disciplines (e.g., political science, economics, sciences, health, law, education, home economics). They would instinctively know that the best approach includes society — those *living the problem* and living with the implications of actualized solutions. Their voices would become an integral part of policy initiatives.

Indeed, policymakers would know that this *triadic voice* is key to (a) policy problematization, (b) analysis and deliberations, (c) development, (d) implementation, and (e) evaluation. Policy problematization is especially important because the naming and framing of an issue deeply affect any resultant policy initiative. Involving everyone in this problem-identification and problem-naming process is key. Especially, policymakers would appreciate that science now plays a different role in public policy. They can expect science to be more socially oriented than when normal science is at play (i.e., when policy knowledge comes only from the scientific, empirical method, which is value-neutral and exclusive of other ways of knowing).

Policymakers would further appreciate that transient, shifting problems require interim (temporary) heterogeneous policy-making teams whose members change over time as needed to move forward and toward a solution. Dealing with policy thus demands a deep respect for diversity and change in combination with a sense of urgency to reach a solution due to high risks and high stakes. Policymakers would appreciate that a plurality of legitimate voices must be at the policy table, and that managing and leading their various value loadings and premises will be challenging but necessary.

Respect for this array of factors better ensures that resultant Mode 2 knowledge and policy solutions are socially robust and socially accountable. That is, the knowledge produced is just, effective, and achieves efficacy and autonomy. Those involved can fully account for and justify their decisions and thinking that led to the new knowledge or policy. This is further assured through the reflexivity of all engaged actors immersed in the joint problem-solving policy initiative so that biases, prejudices, and so on are brought to the foreground and accounted for.

In short, from a Zurich TD approach, policymakers would embrace the idea that society (practice and practitioners), working with science and technology experts, can better inform policy initiatives.

Policymakers would be keenly sensitive to communication, transparency, issues of governance, and inclusion. The new policy norm would be sustainable policy outcomes achieved through transitory, diverse, and collaborative networks/teams that reflexively and jointly problem solve in context to produce in situ socially robust and socially accountable policy.

4 Public Policy Through a Brazilian Lens

Around the time the International Holistic University of Brasilia was created (UNIPAZ, in English UNI-PEACE), Weil (1988) published *Nova Linguagem Holística* [New holistic language] wherein he conceptualized the concept of "holistic view=hology + holopraxis" (da Costa, 2022a, p. 120). Praxis is Medieval Latin for practice or action as opposed to conceiving something, speculating, or theorizing about it (Harper, 2022). *Hology* is a study of the whole. *Holopraxis* is thus a study of the praxis of the whole (da Costa, 2022c).

Later, UNIPAZ founders published the first book on transdisciplinarity in Brazil (authored by Weil et al., 1993), wherein they conceptualized*holistic transdisciplinarity* comprising hology and holopraxis. Inspired by the UNIPAZ holopraxis and its relevance to open systems of applied knowledge, da Costa (2011, 2021, 2022a, b, c), a Brazilian independent researcher and practitioner (engineer), further conceptualized *transdisciplinary holopraxis* and ultimately created the Holopraxis Transdisciplinary Management Theory (HPTD-M). While his theory applies mainly to public administration management, the overarching UNIPAZ holopraxis pertains to other fields of open knowledge (e.g., peace education, psychology, and anthropology). His background as an engineer, business manager, public servant, and public manager influenced his TD theory (Leonardo da Silva Guimarães Martins da Costa, personal communication, June 20, 2022).

When theorizing this phenomenon, da Costa (2022a, b) combined (a) the UNIPAZ holopraxis with (b) Jungian (1921/1971) and Myers-Briggs (Myers et al., 2009) perspectives and (c) four epistemic ways (technoscience, philosophies, alchemical traditions, and art) (Weil et al., 1993). The Jungian/Myer-Briggs perspective delivers four psychological functions and four types of intelligence. Respectively, these are (a) sensation (technoscience, empirical); (b) feeling (emotional, psyche); (c) thinking (rationale, logical psyche, mental); and (d) intuition (spirit, understandings of essence, humanistic).

da Costa (2022a, c) then conceived TD holopraxis as a dialogue in the face of dualities, opposites, complementarities (working usefully together), and trade-offs. There is a dialogue between the (a) subjective *synthetic methods* (emotions and intuition – soft skills) and (b) objective*analytical methods* (sensation [empirical] and thinking – hard skills) for problem solving that creates applied knowledge and applied understandings of reality.

da Costa (2022a, c) further theorized four requirements for problem solving when engaged in public administration (including policy work): (a) feasibility (empirical) and (b) rationality (reason) (analytical methods) and (c) reasonableness (emotional) and (d) meaning (intuitive) (synthetic methods). He maintained that public management tends to privilege the analytical methods (feasible and rationale – control and accountability) at the expense of the human side (reasonableness, meaning, and sense) (lack of synthetic methods). That is, they "focus on processes and not on results" (da Costa, 2021, p. 57). A TD *holopraxis* (i.e., a focus on the whole *and* the praxis of the whole) shines a spotlight on and can ameliorate this tendency when engaging in policy work (da Costa, 2021).

For da Costa, hology (studying the whole to find a solution to a problem) is not complete until one studies the application of the solution (e.g., policy) in practice (holopraxis). In his theory, *praxis* can thus be (a) a state (an approved policy rather than just speculation); (b) a process (the implementation of said policy); and (c) the unity of the theory put into practice in combination with reflection on the entire enterprise (holopraxis – study the praxis of the whole). To illustrate, knowing rationally that a solution has been found does not mean the problem is solved. As one implements the solution (policy), one must address questions and issues that emerge while putting the theory into practice (Leonardo da Silva Guimarães Martins da Costa, personal communication, June 26, 2022).

As an aside, Du Plessis et al. (2013) also advocated for "the deliberate application of praxis ... during

a transdisciplinary approach" (p. 57). They understood praxis to mean "a unity of knowledge and action [involving] a unity of rational development ... governed... by dialectic laws" (Plessis et al., 2013, p. 55). They said praxis is fashioned from human thinking in the form of action-oriented thought and contemplation. McGregor (2020a) recently recognized "the neologism *transdisciplinary transpraxis* as a new phenomenon" (p. 87).

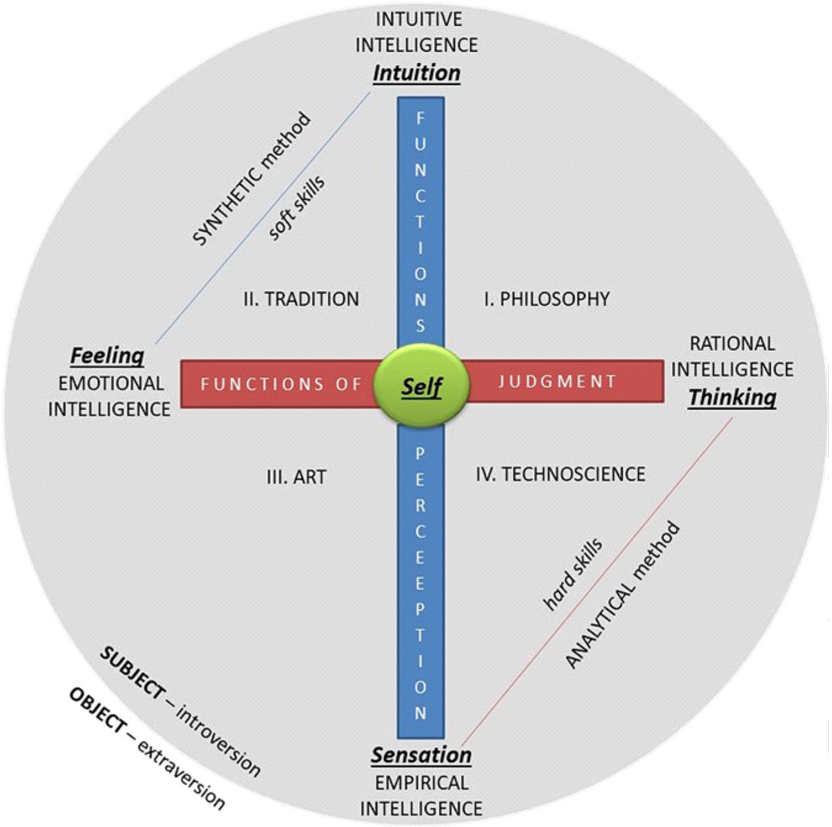

Figure 4: Key elements of Holopraxis Transdisciplinary Management Theory (HPTD-M) (da Costa, 2021, used with permission).

In summary, per Figure 4, da Costa (2021) proposed that "besides the interaction and unification of the four epistemic ways, TD can be also considered the balance and eventual integration of the four functions, as well as of the horizontal judgment and vertical perception" (p. 15). This entails dialectics, which he conceptualized as "the process of dialogue between two poles until the opposites converge to a common idea. It is a full-on discussion until a result is reached" (Leonardo da Silva Guimarães Martins da Costa, personal communication, June 21, 2022) (i.e., Hegel's thesis-antithesis-synthesis dialectic method, Fox, 2005).

4.1 Application of Brazilian Transdisciplinarity to Public Policy

Policymakers using da Costa's Brazilian holistic TD approach would be concerned with how to balance the analytical and synthetic methods, so they can best ensure feasible policy, rationale policy, reasonable policy, and intuitive policy. Policy work would reflect a concerted effort to balance both (a) concrete perceptions of facts and patterns and (b) causal logic and interpretation (hard skills) with both (c) moral and ethical value judgements (reasonableness and wisdom) and (d) gut reactions, insights, and intuition (soft skills)

(da Costa, 2021, 2022c).

Using this combination of soft and hard skills, policymakers would manage and lead the interaction of seemingly dualistic (opposite) elements (i.e., technoscience [empirical], alchemical traditions, philosophies, and art) to ensure their ultimate integration for better policy. This represents holistic TD in that it involves the integration of disciplines with the arts and with the human psyche. For da Costa, "duality involves the dialectics of opposites, the thesis and the antithesis until synthesis is reached, when it comes to human phenomena" (2022c, p. 6). This synthesis is possible because the *alchemical tradition* holds that "there is no separation between the natural sciences, philosophy, psychology and religious traditions" (da Costa, 2022c, p. 8). Their integration is required to deal with complex policy problems. TD holopraxis depends on this integration.

Appreciating that there are as many realities as there are people, professions, disciplines, and cultures (da Costa, 2022a), the crux of policy work would be to "create a comprehensive understanding of reality" (da Costa, 2022c, p. 3). This creation of "a holistic view of reality" (da Costa, 2022c, p, 18) would entail the application of conjecture, beliefs, discursive thinking, and intelligence (higher order thinking). Policymakers would further assume that better policy comes from a melding of their (a) consciousness (perceptions, logics [inductive and deductive], and judgements) and (b) unconsciousness (intuition). Their mantra would be*hand, head, heart, and spirit*. This mantra reflects the three Greek views of human beings that da Costa (2022a, c) drew on to round out his HPTD-M theory: (a) *soma*=body=sensation=hands; (b) *psyche*=soul=thinking + feeling=head + heart; and (c) *nous*=intuition=spirit.

In short, policymakers would strive for "integration between analytical and synthetic methods, between rational-sensitive and emotional-intuitive intelligences, hard skills and soft skills" (da Costa, 2011, p. 58) (see Figure 4). The core of his TD holopraxis theory is "the dialogue of opposites, between specialists and generalists, between the analytical and synthetic method, to create a unit of applied knowledge, the understanding of the reality to solve problems effectively, not only in an intellectual and mechanistic view [but also an emotional and intuitive view]" (da Costa, 2011, p. 53). The HPTD-M theory was designed to help public administrators accommodate (a) holistic realities and holistic understandings and (b) the dialectics involved when dealing with the complexity of human phenomena (da Costa, 2020, 2022a), so new knowledge can be created to address policy issues.

5 Conclusion

This paper shared an inaugural discussion of the Nicolescuian, Zurich, and Brazilian approaches to transdisciplinarity as they pertain to public policy. All three approaches "want to address complex problems facing humanity that cannot be solved from separate disciplinary or sectoral approaches" (McGregor, 2014a, p. 3; see also Jahn et al., 2012). Whichever approach is used, transdisciplinarity enhances communication amongst differences because it leads to "a common conceptualization of reality" (Colpaert, 2004, p. 470) thereby creating a way to collectively move forward. Ndaguba and Ijeoma (2017) concurred that "transdisciplinarity is needed to unify the existing and emerging knowledge across trenches... to establish a common premise" (p. 4).

Reality is the state of things as they exist, are seen, or are experienced. The commonality (shared elements) required for TD work temporarily eschews individuality (i.e., separate of notions of reality) thereby making space for collaboration and integration leading to new transrealities. Each TD approach herein strove to "form a logical metaframework through which [to integrate insights from different realities] to a higher level of abstraction" (Judge, 1994, para. 1).*Meta* refers to more comprehensiveness that leads to a change of position or condition that is of a higher order; hence a "logical metaframework" would replace one that is illogical in its expectations of privileging fragmentation and isolation rather than integration and solidarity.

Public policy is intended to protect the public interest, which is threatened by seemingly intractable complex, wicked problems. Policymakers are challenged therein because an array of stakeholders has different perspectives, interests, positions, resource complements, and so on. Finding common ground to

move forward is imperative. To that end, each of the Nicolescuian, Zurich, and Brazilian approaches to transdisciplinarity was explained followed with an illustration of its application to public policy. Each offers a different but viable way for public administrators to find practical solutions for compelling issues affecting the public interest.

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References

Apostel, L., Berger, S., Briggs, A., & Machaud, G. (Eds). (1972). *Interdisciplinarity, problems of teaching and research in universities.* OECD, CERI.

Berger, R. (2015). Now I see it, now I don't: Researcher's position and reflexivity in qualitative research. *Qualitative Research,* 15(2), 219–235. doi:10.1177/1468794112468475

Blessinger, P., Sengupta, E., & Mahoney, C. (2019, December 7). Towards higher education for a better civil society. *University World News, Global Edition.* https://www.universityworldnews.com/post.php?story=20191202120655146

Bolton, G. (2009). *Reflective practice.* SAGE.

Coghlan, D., & Brydon-Miller, M. (2014). Mode 1 and mode 2 knowledge production. In D. Coghlan & M. Brydon-Miller (Eds.), *The SAGE encyclopedia of action research* (pp. 540–542). SAGE.

Colpaert, J. (2004). Editorial: Transdisciplinarity. *Computer Assisted Language Learning,* 17(5), 459–472. doi:10.1080/0958822042000319665

da Costa, L. S. G. M. (2011). *Federal funds: A diagnosis* [Monograph]. Https://repositorio.enap.gov.br/handle/1/4690

da Costa, L. S. G. M. (2020). Gasto publico: Uma Perspectiva ampliada [Public expenditure: An amplified perspective]. Clube de Autores.

da Costa, L. S. G. M. (2021). Transdisciplinarity of physics, philosophy, economics, law, psychology and politics applied to public administration. *African Journal of Governance and Public Leadership,* 1(2), 53–66. https://ajogpl.kab.ac.ug/index.php/1/article/view/28

da Costa, L. S. G. M. (2022a). HPTD-M: The holopraxis transdisciplinary management theory. *Transdisciplinary Journal of Engineering & Science,* 13,119–141. https://doi.org/10.22545/2022/00175

da Costa, L. S. G. M. (2002b, June 12). The holopraxis transdisciplinary management (HPTD-M) summary of the 12th year: Research and theory. *ResearchGate.* https://www.researchgate.net/publication/359982498_Summary_of_the_Holopraxis_Transdisciplinary_Management_Theory_HPTD-M

da Costa, L. S. G. M. (2022c). Transdisciplinarity theory through Plato philosophy, Taoism, alchemical tradition and Jungian psychology. *Transdisciplinary Journal of Engineering & Science,* 13,1–21. https://doi.org/10.22545/2022/00162

du Plessis, H. (2012, January 10–12). Communicating science in Africa: Shifting boundaries of perceptions. In *Pre-Conference Proceedings of the International Conference on Science Communication for Scientific Temper* (pp. 34–46). NISCAIR and Vigyan Praser.

du Plessis, H., Sehume, J., & Martin, L. (2013). *The concept and application of transdisciplinarity in intellectual discourse and research.* Real African Publishers.

Fox, M. A. (2005). *The accessible Hegel.* Prometheus Books.

Funtowicz, S., & Ravetz, J. (1993). Science for the post-normal age. *Futures,* 25(7), 739–755. https://doi.org/10.1016/0016-3287(93)90022-L

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The new production of knowledge.* SAGE.

Häberli, R., Bill, A., Grossenbacher-Mansuy, W., & Klein, J. T. (2001a). Summary. In J. T. Klein, W. Grossenbacher-Mansuy, R. Häberli, A. Bill, R. Scholz, & M. Welti (Eds.), *Transdisciplinarity: Joint problem solving among science, technology, and society* (pp. 3–5). Birkhäuser Verlag.

Häberli, R., Bill, A., Grossenbacher-Mansuy, W., Klein, J. T., Scholz, R., & Welti, M. (2001b). Synthesis. In J. T. Klein, W. Grossenbacher-Mansuy, R. Häberli, A. Bill, R. Scholz, & M. Welti (Eds.), *Transdisciplinarity: Joint problem solving among science, technology, and society* (pp. 6–22). Birkhäuser Verlag.

Harper, D. (2022). *Online etymology dictionary.* http://www.etymonline.com/

Hessels, L. K., & van Lente, H. (2008). Re-thinking new knowledge production: A literature review and a research agenda. *Research Policy,* 37(4), 740–760. https://doi.org/10.1016/j.respol.2008.01.008

Hussain, W. (2018). The common good. In E. N. Zalta (Ed.), *Stanford encyclopedia of philosophy.* Stanford University. https://plato.stanford.edu/entries/common-good/

Jahn, T. (2012, Feb 28–Mar 3). *Transdisciplinarity as a research practice to approach sustainability challenges: A social-ecological perspective*[Paper presentation]. Leuphana Sustainability Summit, Lunenburg.

Jahn, T., Bergmann, N., & Keil, F. (2012). Transdisciplinarity: Between mainstreaming and marginalization. *Ecological Economics,* 79, 1–10. https://doi.org/10.1016/j.ecolecon.2012.04.017

Jantsch, E. (1972). Towards interdisciplinarity and transdisciplinarity in education and innovation. In L. Apostel, S. Berger, A. Briggs, & G. Machaud (Eds.), *Interdisciplinarity problems of teaching and research in universities* (pp. 97–121). OECD, CERI.

Judge, A. (1994). Transdisplinarity-3 [sic] as the emergence of patterned experience [Paper presentation].*First World Congress of Transdisciplinarity.* Arrabida, Portugal. http://www.laetusinpraesens.org/docs/tranpat1.php

Jung, C. G. (1921/1971). *Psychological types: Collected works 6* (R. F. C. Hull, Trans.). Princeton.

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

McGregor, S. L. T. (2007). Consumer scholarship and transdisciplinarity. *International Journal of Consumer Studies,* 31(5), 487–495. doi:10.1111/j.1470-6431.2007.00599.x

McGregor, S. L. T. (2011). Transdisciplinary axiology: To be or not to be. *Integral Leadership Review,* 11(3), http://integralleadershipreview.com/3388-transdisciplinary-axiology-to-be-or-not-to-be/

McGregor, S. L. T. (2014a). TDMeme: A transdisciplinary meme. *Integral Leadership Review,* 14(2), http://integralleadershipreview.com/11271-331-transdisciplinary-meme/

McGregor, S. L. T. (2014b). Transdisciplinarity and conceptual change. *World Futures,* 70(3/4), 200–232. doi:10.1080/02604027.2014.934635

McGregor, S. L. T. (2015). The Nicolescuian and Zurich approaches to transdisciplinarity. *Integral Leadership Review,* 15(3), http://integralleadershipreview.com/13135-616-the-nicolescuian-and-zurich-approaches-to-transdisciplinarity/

McGregor, S. L. T. (2018a). Philosophical underpinnings of the transdisciplinary research methodology. *Transdisciplinary Journal of Engineering & Science,* 9, 182–198. https://doi.org/10.22545/2018/00109

McGregor, S. L. T. (2018b). *Understanding and evaluating research.* SAGE.

McGregor, S. L. T. (2020a). Transdisciplinarity and transpraxis. *Transdisciplinary Journal of Engineering & Science,* 11, 74–89. https://doi.org/10.22545/2020/00134

McGregor, S. L. T. (2020b). Transdisciplinary logics of complexity. *Integral Leadership Review,* 20(1), http://integralleadershipreview.com/17501-7-31-transdisciplinary-logics-of-complexity/

McGregor, S. L. T., & Gibbs, P. (2020). Being in the Hidden Third: Insights into transdisciplinary ontology. *Transdisciplinary Journal of Engineering and Science,* 11, 142–157. https://doi.org/10.22545/2020/00139

Morin, E. (1984). On the definition of complexity. In S. Aida (Ed.), *The science and praxis of complexity* (pp. 62–68). United Nations University.

Myers, I. B., McCaulley, M. H., Quenk, N. L., Hammer, A. L., & Mitchell, W. D. (2009). *MBTI Step III manual: Exploring personality development using the Myers-Briggs Type Indicator Instrument.* CPP.

Nadel, M. V. (1971). *The politics of consumer protection.* Bobbs-Merrill.

Ndaguba, E. A., & Ijeoma, E. O.C. (2017). Exploring the epistemology of transdisciplinarity in public policy and administration in South Africa. *Journal for Transdisciplinary Research in Southern Africa,* 13(1), Article 406. https://doi.org/10.4102/td.v13i1.406

Nicolescu, B. (1985). *Nous, la particule et le monde* [We, the particle and the world]. Le Mail.

Nicolescu, B. (2002). *Manifesto of transdisciplinarity* (K-C. Voss, Trans.). SUNY Press.

Nicolescu, B. (2007). Transdisciplinarity: Basarab Nicolescu talks with Russ Volckmann. *Integral Review,* 4, 73–90. https://integral-review.org/issues/issue_4_volckmann_nicolescu_interview.pdf

Nicolescu, B. (2008). International congresses of transdisciplinarity: Their importance for the emergence of a transdisciplinarity [Interview given to Professor Augusta Theresz Dealvarenga]. *Transdisciplinarity in Science and Religion,* 3, 193–202.

Nicolescu, B. (2011). Methodology of transdisciplinarity-levels of Reality, logic of the included middle and complexity. In A. Ertas (Ed.), *Transdisciplinarity: Bridging Science, social sciences, humanities and engineering* (pp. 22– 45). The Atlas Publishing.

Nicolescu, B. (2014). *From modernity to cosmodernity.* SUNY Press.

Nicolescu, B., Haidar, J., Orefice, P., & de Mello, M. F. (2019). *III world congress of transdisciplinarity 2022 Mexico City, October 31st- November 7th.* https://www.tercercongresomundialtransdisciplinariedad.mx/en/

Nowotny, H. (2003). The potential of transdisciplinarity. In G. Origgi (Moderator), *Rethinking interdisciplinarity: Online seminar supportive texts* (pp. 48–53). Interdisciplines Project. https://www.academia.edu/1161664/Rethinking_Interdisciplinarity?auto=download

Nowonty, H., Scott, P., & Gibbons, M. (2001). *Re-thinking science.* Polity.

Rittel, H. & Webber, M. (1973). Dilemmas in a general theory of planning. *Policy Sciences,* 4, 155–169. https://doi.org/10.1007/BF01405730

Schneider, B. (2003). Knowledge beyond disciplines. *The Flame: Claremont Graduate University Magazine,* 4(3), 12–17. https://www.cgu.edu/wp-content/uploads/2017/01/The_Flame_WINTER_2003.pdf

Scholz, R. W. (2020). Transdisciplinarity: Science for and with society in light of the university's roles and functions. *Sustainability Science,* 15, 1033–1049. https://doi.org/10.1007/s11625-020-00794-x

Smith, M. J. (2003). *Producing and consuming knowledge: The relevance of the "new production of knowledge debate" for disciplinary and transdisciplinary social science* [working draft]. Lancaster University. Retrieved June 5, 2015 from http://www.lancaster.ac.uk/ias/events/general07/docs/interdisc/interdisc-Smith-Knowledge.pdf

Stevenson, A. (Ed.). (2011). *Concise Oxford English dictionary* (12th ed.). Oxford University Press.

Torkar, G., & McGregor, S. L. T. (2012). Reframing the conception of nature conservation management by transdisciplinary methodology: From stakeholders to stakesharers. *Journal for Nature Conservation,* 20(2), 65–71. https://doi.org/10.1016/j.jnc.2011.10.002

Uwizeyimana, D. E., & Basheka, B. C. (2017). The multidisciplinary, interdisciplinary and trans-disciplinary nature of public administration: A methodological challenge? *African Journal of Public Affairs,* 9(1), https://hdl.handle.net/10520/EJC-c13a0cbc0

van der Waldt, G. (2014). Public administration and transdisciplinarity: A modalistic approach toward knowledge co-construction. *International Journal of Humanities and Social Science,* 4(6), 120–134. http://hdl.handle.net/10394/13415

Vargas, M. H. F., & Restrepo, D. R. (2019). The instruments of public policy: A transdisciplinary look. *Cuadernos de Administración,* 35(63), 101–113. https://doi.org/10.25100/cdea.v35i63.6893

Weil, P. (1988).*Nova linguagem holística* [New holistic language]. Space and Time.

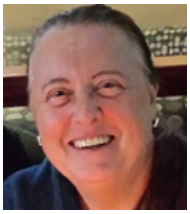
Weil, P., D'Ambrosio, U., & Crema, R. (1993). *Rumo à nova transdisciplinaridade: Sistemas abertos de conhecimento* [Toward the new transdisciplinarity: Open knowledge systems]. Summus.

Weingart, P. (2019). How robust is "socially robust knowledge"? In M. Carrier, D. Howard, & J. Kourany (Eds.), *Knowledge and democracy* (pp. 131–145). Routledge.

6 Introduction

The introduction should briefly place the study in a broad context and highlight why it is important. It should define the purpose of the work and its significance. The current state of the research field should be reviewed carefully and key publications cited. Please highlight controversial and diverging hypotheses when necessary. Finally, briefly mention the main aim of the work and highlight the principal conclusions. As far as possible, please keep the introduction comprehensible to scientists outside your particular field of research. Citing a journal paper [**ref-journal**]. And now citing a book reference [**ref-book**]. Please use the command [**ref-journal**] for the following MDPI journals, which use author-date citation: Administrative Sciences, Arts, Econometrics, Economies, Genealogy, Humanities, IJFS, JRFM, Languages, Laws, Religions, Risks, Social Sciences.

About the Author



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