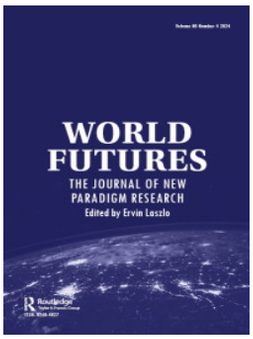

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The Politics of Transdisciplinarity

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ABSTRACT

This paper aims to theorize the role of transdisciplinarity in politics. I do this by arguing for an ontological pluralism, using the ideas of Basarab Nicolescu, suggesting a political view can equate to a layer of reality. Nicolescu's thought indicates that we should think beyond and transcend the political spectrum- a political view is not just a view but an actual part of reality. Next, I use 'Mode 2' Science to suggest we should adopt a distributed epistemology which sees everyone as bearers of knowledge, I suggest that politics should take this into consideration. This fits with the pluralism indicated by Nicolescu. Furthermore, I suggest 'Mode 2' Science also says that institutions should be permeable- the difference between state, science and society should not be seen as solid. Institutions should also be seen as transitory in nature. Next, I argue Edgar Morin's *complex thinking* indicates how we should gather knowledge and how society should be governed. Particularly, it shows that governance should consist of teams, in which the state acts as a catalyst for bringing a wide group of people together. These 'teams' and the state can be activated or deactivated depending on the situation, therefore preventing an accumulation of power, while also allowing effective governance if required. Finally, I use complex network theory to characterize how the pertinent temporary configurations of relations would work and the factors that might affect them. Using network theory allows us to conceptualize these relations as dynamic, connected, vulnerable, clustered and yet also having a few figures (in this case the state)

KEYWORDS

Complexity; epistemology; network; ontology; transdisciplinarity

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that can connect people. Following all of this, we come to a new pluralistic, egalitarian, transitory, but most of all transdisciplinary view of governance.

Transdisciplinarity offers an innovative approach to understanding the world and for tackling complex problems. However, the politics of it has only been partially theorized, despite directly engaging with issues that fall under its jurisdiction. In this article, I introduce transdisciplinarity to a political audience, before examining its potential to inspire political modes of thought. I look at its ontological (on the nature of existence) dimensions and how these suggest we should take a radical pluralistic approach to politics- every political viw equates to a layer of reality. I then tackle 'Mode 2' Science which suggests we should adopt a distributed epistemology which sees everyone as a producer of knowledge. 'Mode 2' Science also highlights the need for institutions to be permeable and transitory in a transdisciplinary politics. Next, I use the thought of the French intellectual Edgar Morin, to rethink the nature of governance and our way of thinking about the running of the state. I suggest that the governance should be done by teams with the state acting as a temporary, yet reoccurring, apparatus that enables this. The state and teams can be activated or deactivated depending on the context. Finally, I use complex network theory to discuss, in more practical yet still theoretical, terms, how political and social relations would function in a transdisciplinary politics. Topics discussed include network vulnerability, connectivity and dynamism. To summarize, this paper is based on a review of the transdisciplinary literature, particularly its theoretical side. The decision to focus on multiple theorists was to ensure that the politics in this paper could offer a synthesis of different streams of thought, therefore making the mobilization of most of the facets of transdisciplinarity possible in order to give a more complete account.

Transdisciplinarity: An Introduction

The best way to introduce transdisciplinarity is to compare it to the other forms of disciplinarity. A type of disciplinarity is a way of researching and studying different academic subjects. Nicolescu (2014a) describes three of them in the following way:

> Multidisciplinarity- Work goes across boundaries but remains in the home of one discipline.
>
> Interdisciplinarity- The transfer of methods from one discipline to another.

Transdisciplinarity- Goes beyond disciplines, looks at our understanding of the world, through the unity of knowledge.

Nicolescu does not mention monodisciplinarity, which is remaining in the bounds of one discipline. He also misses out cross-disciplinarity which aims to examine a discipline in the context of another. Of course, these definitions are not exhaustive, Bernini and Woods (2014), for example, describe interdisciplinarity as integrative, which is sometimes seen as characteristic of transdisciplinarity. The definitions of terms meant to make the boundaries of subjects fuzzier are fuzzy themselves. Nicolescu (2006) also advocates for a pluralism, in which reality is layered- whether this is 'natural' like physics or a social idea like a political view. Nicolescu (2014) can be politicized, any statement about our understanding of the world inevitably has political dimensions, a view on how the way the world works affects how we act in the world. Furthermore, his focus on the unity of knowledge means the political arena is inescapable, even if it has not been theorized. The choice to use Nicolescu was driven by the need to find a paradigm that explains the diversity of the world, individuals with different political views experience the world differently, therefore ontologically speaking it is imperative to adopt a pluralistic framework to understand these views. The world cannot be explained or exhausted by a single ideology.

'Mode 2' Science is a compatible form of transdisciplinarity which examines the relationship between science and society. Nowotny et al. (2003) describe it in the following five ways:

1. It goes beyond single disciplines to tackle complicated problems.
2. It believes knowledge can be situated outside the academic community and that it is distributed across society.
3. It is application-orientated, it focuses on the practical outcomes of the research.
4. It is reflexive (there is a dialogic process between subject and object).
5. Quality control is not just determined by the peer-review process (other stakeholders can assess the research)

Gibbons, Nowotny, Limoges and their coauthors (1994) were not just offering a manifesto, they believed they were describing academia and society as it actually was, affected by processes such as the massification of education, globalization and increased permeability between institutions. Thus, transdisciplinarity is not just a fantasy ideation, it resembles trends in the contemporary world, therefore to not theorize or politicize it would be a fallacy. The decision to use 'Mode 2' science was not only

based on its relevance to contemporary trends, but also because it fits with the ontological pluralism advocated by Nicolescu due to its distributed epistemology (2006).

Both of the forms of transdisciplinarity described can be utilized, as will become clear, to tackle complex problems. The focus of transdisciplinarity on tackling complex problems is well-documented in the literature (Bernstein, 2015; Klein, 2004; Knapp et al., 2019; Mittelstrass, 2011), with the frequent suggestion that a single discipline cannot tackle issues like climate change, poverty and social inequalities. Max-Neef (2005) develops a hierarchy which aims to highlight the different roles disciplines can play in tackling problems and understanding our world. It is discussed in four layers. The first and lowest level is what *exists*, this includes areas like physics, biology and even social sciences like sociology. The second level is what we are *capable of* and includes actions such as agriculture and architecture. The third is what *we want* to do and involves design, politics and law. The final and top layer is what *we must do* such as philosophy, ethics and values. Therefore, it is clear that different disciplines can play different roles in understanding the world and tackling complex problems but they can also be integrated into a single framework.

Another form of transdisciplinarity is Edgar Morin's *complex thought* (e.g., Morin, 2008), this provides a way of thinking that should affect how we govern. Morin is inspired by systems theory and complexity theory.[1] He deals with ambiguity, particularly he is against holism (focusing on the whole) versus reductionism (reducing to the parts) and organization versus disorganization. Morin (2014) also suggests he is amazed by researchers who 'study complex systems with uncertainty, randomness, chaos theory, but they don't change their mind, they don't change the structure of their worldview, but in fact they need to undergo a paradigmatic change.' My aim in mentioning this is to highlight the change we need to go under, especially politically, the world is complex and as will become clear we need to think *complex* rather than simple. Particularly, Morin's critique of holism and reductionism and organization and disorganization allows us to conceptualise a politics that allows the possibility of governance, while also preventing the accumulation of power that could be abused and also be used to prevent political pluralism. It does this by suggesting the state and 'teams' can be activated or deactivated depending on the scenario. Morin, out of the transdisciplinary thinkers discussed, has contributed the most to political discussion and in the section on him I shall draw on this.

Complex network theory identifies several features of networks found in nature and society. These include a 'small world' effect, clustering, power laws and variability in tolerance against attacks. Popularized by Barabasi (2003), it offers a way of thinking about the world and relational

patterns found within it. Its inclusion in this essay was to offer a more pragmatic view on the potentialities and challenges the other ideas present in this paper may face. This will not go against an ontological pluralism, as I will discuss under Morin's complex thought, which includes the idea that one can be part of a whole and still have independent characteristics. To summarize, I will discuss four main forms of transdisciplinarity in this article, Nicolescu's ontological transdisciplinarity, 'Mode 2′ science, complex thinking and finally complex networks.

Initial practical questions about the theory I am proposing might be; how do we govern ontological pluralism? What governance models would work in such a scenario and how might they be applied? This will be explored throughout, but firstly I make some suggestions. Firstly, that the state can act as an 'included middle' (a third term, as explained below), which catalyzes connections between people and their different ontologies. The state can act as a bridge between teams of people. It would also follow the principle of *metastability* which means that the state is neither fully activated or deactivated but can be switched quickly on or off if required. The 'teams' of people which the state brings together to solve a particular issue would be *agile*, they would be transitory but also permeable in the sense that they would derive from a diverse and pluralistic grouping of pertinent people, in which the difference between state and society is not as clear as traditionally conceived. Governance in such a fashion, I argue, would allow a pluralistic society that can function well.

Basarab Nicolescu- Ontological Pluralism

The first dimension of politicizing transdisciplinarity is to consider its ontological pluralism. Nicolescu (2006) presents three axioms that make statements of reality:

i. The ontological axiom: There are, in Nature and in our knowledge of Nature, different levels of Reality and, correspondingly, different levels of perception.
ii. The logical axiom: The passage from one level of Reality to another is insured by the logic of the included middle.
iii. The complexity axiom: The structure of the totality of levels of Reality or perception is a complex structure: every level is what it is because all the levels exist at the same time.

I shall explain these in more detail and theorize a politics from them. The idea that there are multiple layers of reality can be understood in a disciplinary sense such as physics and sociology (or alternatively Max-Neef's schema), but also in a belief sense such as religion or culture. However, it

can also be understood in a political sense. A left-wing view can equate to one level of reality and a right-wing view to another, the center would also occupy another level. Socialism, liberalism, neo-liberalism, etc all occupy a level of stratified reality. The *complexity axiom* suggests all these levels of reality exist at the same time in a structure. The included middle is essentially a third term, in the sense that it says a question or answer does not necessarily need a yes or no answer, contradictions can exist and it is anti-binary- a point that shall be explored throughout this essay (such as in Morin's thought). Now anti-binary does not mean one should hold the center (the center can be as dogmatic and binary thinking as any other ideology) nor does it mean we should think of politics as a compass.[2] Instead, it suggests that *all* political ideologies and realities exist at the same time and that their contradictions can be accommodated by the third term which connects different layers of reality. This is more radical than pluralism in the traditional sense, which suggests there are different beliefs/institutions, (Bellamy, 2004; Galston, 2009), it is an ontological pluralism, all political ideologies and their worldviews correspond to an actual layer of reality. The politics of an average citizen is an equally valid view on reality, when compared to a politician, similarly a political expert's view is only just as a valid as other agents participating in the world.

To elaborate this point, I shall draw on the work of Greg Anderson (2015, 2018) and his call for an ontological turn in history. He argues that past realities operated according to different laws than our own. Anderson discusses the *oikoi* or family unit of ancient Athens and how these were the building block of society, then there were larger household units and finally the *demos* (the unitary body), the nature or being of an individual was distributed throughout these levels of reality and in this sense a political ideology also distributes (or does not) an individual. A communitarian may focus on the social level of existence, whereas a neo-liberal may only exist on an individual level of existence (though most ideologies have a social component). I want to emphasize here that a transdisciplinary political theory is more than relativism or traditional pluralism, all views about reality are not just equally valid, they are a reality.

The question could be asked; how can multiple layers of reality coexist in the same temporal and spatial realm? In other words, how can they co-exist in the same universe? This may appear even more problematic if I take the position that a layer is *more* than a worldview, it has an actual form of existence. In some instances, this could be explained by the strata of reality, consider how Quantum Physics has a role in Chemistry and Chemistry has a role in Biology. We would all agree that they affect each other, but no one would claim that the Quantum level of existence is the same as the biological realm (in which Newtonian physics plays a greater

role) (Lloyd, 2011). Thus, reality can be taken to be stratified in some senses, yet this does not explain how a certain political world can coexist in the same time and space. I argue layers of reality do not necessarily have to be hierarchal- by this I mean they can exist together in the same space and time.[3] Consider an individualist, their temporal and spatial existence is pivoted around the person, when they *see* the world they see a different reality to a collectivist. For example, the relational configuration between subjects and objects might disappear. Meanwhile, for a collectivist, they may see the entities in the world as a social ecosystem. They may also have a different causal view of the world. Consider disagreements over state-intervention or privatization- these all represent an ontological reality, in terms of how the world is and how it is experienced, yet no one would argue that these two worlds occupy a different space and time, despite being contradictory. There is no reason to dismiss the presence of multiple political layers and realities, when it seems evident our diverse array of politics fits this description. Pluralism is the best way to describe our experiences of the complex totality of the world. I shall return to how we shape reality when I discuss Nicolescu's idea of 'The Hidden Third'.

What about the totalitarian ruler is his reality as equally valid as a democratic reality? Are their potentially prejudiced views correct? How can extremist views be as equally as valid as mainstream politics? The answer is that if we embrace ontological pluralism, then it is impossible to have a totalizing reality. Nicolescu (2012, 2015a) suggests an ontology (or reality) does not exhaust the complex totality of realities. Thus, a single reality could never be universal because it cannot capture or describe the whole of reality. Only in a society where we seek a universal dogma, such as the one we live in, can fascistic and totalitarian realities gain wider acceptance and dominance.

A transdisciplinary politics is therefore transcendental. In the sense, that it looks at the unity of knowledge and understands the totality of existence through all its layers/realities. But also in the sense that it suggests we should go beyond the political spectrum and/or compass which cannot capture the complexity of the totality.

Some questions remain however, how is an ontological pluralism governable? How can actions manage contradictions? The answers to these shall become clear later, but I will reinforce the role of the included middle which offers an alternative to 'yes' and 'no' statements about the world. In terms of causation, a 'yes' or 'no' answer may not necessarily be desirable due to it not representing multiple facets of the totality. In this sense, ambiguity and a mixture of viewpoints might be more suited to managing the totality, this will become clearer as I discuss Mode 2 'Science' and complex thinking.

Transdisciplinarity might be ontologically pluralistic, but it also has insights on the subject-object interaction. Nicolescu (2012; Cilliers & Nicolescu, 2012) suggests there is a 'hidden third' that encapsulates the subject and object, that connects them while also making sure the subject and object retain their independence. It should be noted that despite what it sounds like, the Hidden Third is different to the included middle (Nicolescu, 2015b), the latter term is about the connection between strata of reality, the former about the subject-object interaction. What this suggests (and is important politically) is that an agent can shape reality (Nicolescu, 2014). We are part of reality, while also be separate to it. If we were not part of reality, we could not shape it, if we were wholly in reality, then we would not have the external viewpoint that allows us to reflect and act.

The implications of this ability to shape reality are clear. We are responsible for determining the nature of the universe, especially as it is ontologically plural. This calls for a change in how we think, act and understand, something which 'Mode 2′ science and complex thinking can enable. This is what I shall explore in the rest of the essay by discussing the other ways in which transdisciplinarity can contribute to politics and how transdisciplinarity can be politicized.

'Mode 2 Science': Epistemology

Politics and policy are dependent on knowledge creation, what transdisciplinarity does is reorientate where this knowledge comes from and how it is generated. 'Mode 2′ science, a form of transdisciplinarity first described in *The New Production of Knowledge* (Gibbons et al., 1994) does this. The first thing it does is suggest knowledge can be found outside of academia and also that research is not exclusive to the academic elite, it is conducted in society more broadly. Consider government agencies, think tanks, industrial research, knowledge is evidently distributed across society. This as Nowotny and their coauthors argue is due to the massification of education, globalization and institutional permeability among other factors.

I would highlight what Gibbons, Nowotny, Limoges and their coauthors and other 'Mode 2′ Scientists say by suggesting transdisciplinarity shows that everyone is a producer of knowledge. It is innate to structure of the Nicolescuian ontology and the totality of knowledge. An individual experiences the complex totality and adds their own knowledge of it by their interaction with existence. A viewpoint on reality *is* a layer of reality. Of course, from a much more pragmatic sense, individuals can be called 'experts by experience'. Most individuals through their lives acquire

knowledge of some sort. A farmer is an expert on how to grow their crops, an electrician knows how to wire up a house, an architect knows how to construct a building, expertise is distributed outside of academia. Secondly, there is a vast pool of knowledge already out there which can be accessed, such as the internet, books, but also person-to-person interactions. These points may seem obvious, but if we are to rethink politics, we need to move away from the idea that university lecturers, consultants, think tanks, etc are the only ones who comment on policy. Wynne (1994) discusses how sheep farmers have sophisticated knowledge and how scientists often have misunderstandings of sheep and sheep-farming and its associated ecosystem.[4] To emphasize, the role of distributed knowledge, I want to cite survivor research (Faulkner, 2017; Russo, 2012) and Mad Studies (LeFrançois et al., 2013).[5] These both argue that mental health patients have insights into their own condition which other experts do not, for example they are the only ones who experience the world as they do and they might know which treatments work best for them and understand the context in which their illness emerged. I want to highlight here the point is not to dismiss traditional experts completely, but to have a more egalitarian view of knowledge. Knowledge that can inform policy can be found on all levels of society (and indeed on all levels of reality).

I want to build on the mental health analogy, by suggesting that to truly understand a phenomena you need to examine it from multiple viewpoints at once. The mental health patient has the knowledge highlighted above, but the clinical psychologist has an understanding through their education and also through their therapeutic relationship with the patient. A medicator or someone from the pharmaceutical industry might understand the impact medication has. Associates of the patient (like family) know how an illness affects how the patient acts. Finally, a social scientist or humanities scholar might be able to examine the social and cultural dimension of mental illness (e.g., Woods et al., 2014). Transdisciplinarity not only would view each of these epistemic standpoints as worthy of consideration, but would suggest they correspond to layers of reality.

Other 'Mode 2' scientists have also highlighted the need for a distributed epistemology. Jasanoff et al. (2015, 2019) particularly highlights how scientific decisions are often taken without public consultation, despite being consequential for the whole of society. One example is the CRISPR-Cas9 method of gene editing (Jasanoff et al., 2015), which has the potential to make gene-editing much more prevalent and rapid. Jasanoff suggests that the ethical and political considerations of gene-

editing are rarely taken into account. This could be solved by acknowledging that the public can and should have a say on such issues because they will inevitably be affected by them. The public is often portrayed as ill-advised and as non-experts, yet in a pluralistic ontology and distributed epistemology, it is hard to deny the public a view, which is often done because their views are anti-hegemonic. Jasanoff et al. (2019) lists six ways in which science could engage more with the public and, in my opinion, suit a more transdisciplinary politics.:

1. Make room for greater diversity in posing and framing key questions.
2. Ask about the purposes of research before new steps are taken.
3. Do not champion self-governance by scientists.
4. Reflect the global nature of human values, especially as regards human integrity.
5. Rein in the language of "running ahead" to make room for broader perspectives.
6. Consider researchers' intentions along with their practices.

These fit with the egalitarian, pluralistic vision outlined so far in this paper. Firstly, they suggest we should acknowledge the validity of others' knowledge and ontologies (1, 3, 4, 5), but also the ethical consequences of this position (2, 6). In a pluralistic and distributed politics, ethics is integral- if we do not consider how an action affects someone then it could violate their ontology and epistemology, which is anti-transdisciplinary. Wynne, another 'Mode 2' Scientist, can help us elaborate on this aspect of power and ethics. Wynne (1991, 1992) highlights that nonacademic sources of knowledge are often subtle and complex and contain more credit than is usually given to them. Above, I mentioned Wynne's comments on sheep-farming, I now want to use another example on when farmer's knowledge can often be ignored by experts. Wynne (1991) suggests hill-farmers in Cumbria, United Kingdom, refused for the ground beneath their land to go under radioactivity inspection because they could not change the ground they live and work on, instead they suggested water analysis to check if that was radioactive, but their requests were ignored, despite this being a factor that could be altered unlike the radioactivity of the land. This violated the farmer's knowledges and worlds and consequentially stripped them of their democratic voice, which, in turn, denied them the chance to change their water supply. A transdisciplinary politics, with its pluralism and distributed epistemology, could have prevented this by acknowledging the farmer's ability to have their own understanding and reality. It was the denial of 'non-expert'

opinion that stripped them off their ability to have a democratic voice, which is against transdisciplinary politics, as discussed so far.

Now, I shall discuss a distributed epistemology would inform policy-formation by examining points 3-5 (as mentioned in the introduction) of Nowotny, Scott and Gibbons' (2003) view on 'Mode 2 Science.' Firstly, transdisciplinarity is application-focused, thus a political action would never be applied for ideological reasons, it would be applied because it would solve a problem. This does not contradict with an ontological pluralism, the policy would be a synthesis of multiple strata of reality all which offer a valid viewpoint. Every viewpoint is valid and to create a truly pragmatic response to a problem multiple angles are needed (such as the aforementioned situation of mental health in its various contexts). Next, there is a communicative relationship between subject and object. Again, this connects back to Nicolescu as well, but the subject-object distinction needs to be collapsed. Policy should be informed by those it is going to affect only then can it truly be effective. Finally, quality control would be determined by those who the policy affects, academic peer-review is no longer the sole arbiter of what counts as worthy knowledge, if a policy works for its target, then it is effective (especially if it has their approval.)

'Mode 2 Science': Science and Society

So far, I have discussed 'Mode 2' Science's main statements about knowledge and how these connect to distributed expertise and policy formation, but now I want to examine some of its implications for how we conceive of politics, science and society. Firstly, in the permeability of institutions. Secondly, in terms of the transitory nature of governance. Gibbons (1999) describes a new contract between society and science:

> 'one aspect of this new contract is that it needs to reflect the increasing complexity of modern society. For example, there are no longer clear demarcation lines between university science and industrial science, between basic research, applied research and product development, or even between careers in the academic world and in industry. There is now greater movement across institutional boundaries, a blurring of professional identities and a greater diversity of career patterns.' (Gibbons, 1999, 81)

Institutional blurring has important implications for politics. It suggests we should not see an academy/state/society distinction as remaining important. Knowledge flows across these boundaries, as does action. This sort of argument brings plentiful questions about the running of a society. For example, should the academy and government hold an advantage over the rest of society when it comes to policy-formation? Briefly, the answer, exemplified above, is that they should not. Can the state remain

the primary unit of governance despite knowledge and action being produced across society? A criticism of the state may come across as libertarian, anarchist or another right or left extremism, but transdisciplinarity is essentially pro-democratic by the power it gives to everyone and thus if it can be called extreme it is only in the sense of its appreciation of the complex totality of individuals and society's realities. The state is not seen as irrelevant in transdisciplinarity, but as one of many producers of knowledge. It is a further argument of this article that the state could be seen as a synthesizer (taking the integrative function of transdisciplinarity) and thus its role is to be guided by different actors' knowledge and the different levels of reality they function on. This does not give primacy to the state, rather it suggests it should not be seen as a constitutional institution, but rather as a mechanism for enabling minds and agents to come together. This would only work so long as knowledge is seen as egalitarian, elitism and traditional technocracies have no place in a transdisciplinary politics due to its ontological pluralism and distributed epistemology.

If the state reduces its function to the synthesizer of policy and solutions to complex problems, its components and departments should only be seen as temporary. Gibbons (2000) and Gibbons, Nowotny and Limoges, etc (1994) suggest that transience is a key part of 'Mode 2' Science. Teams are not permanent fixtures, meetings of minds/agents only occur for a specific reason, usually to tackle a complex problem. In this way, the state is seen as a temporary but reoccurring apparatus that holds together the agents. Another way of describing would be to suggest the state is the included middle (Nicolescu, 2006). It is the third term that connects proponents and opposers to make a decision together, it connects their different layers of reality together. The state should be seen as the unity of knowledge for a given circumstance, but only so far as it is epistemically responsible to its knowledge-producers.

The idea that there might be institutional blurring and that the state can be seen as a synthesizer or included middle can be expanded on by considering two transdisciplinary projects in South Africa (Cilliers et al., 2014; Drimie & McLachlan, 2013). Drimie and McLachlan consider the issue of food security in South Africa, arguing for a need for food security across all levels. They suggest the state and its experts do not have the capacity tackle this problem alone. A more pluralistic, epistemically inclusive, group of stakeholders is required to ensure food security across all levels of society and to of course, as discussed above, to ensure 'outside' experts, like farmers as discussed by Wynne, and their knowledge is seen as not only valid but also practically important. The involvement of those outside government and academia will inevitably lead to an institutional blurring, in which the difference between state and society will no longer

be as clear. This is because governance will be informed by a complex totality of pluralities and epistemologies, with the state acting as the 'included middle' or synthesizer. However, as discussed above, this apparatus must remain transient, yet reoccurring. Transience prevents the solidification and dogmatization of knowledge and the growth of totalitarianism.

My second case study on urban ecology adds to this discussion of institutional blurring (Cilliers et al., 2014) and the state as 'the included middle.' Firstly, urban planning in South Africa has generally been integrated since the introduction since the Development Facilitation Act (DFA) in 1995. This made the consideration of economic, population density and location among factors that had to be considered when it came to development. In other words, multiple factors and perspectives have since been taken into consideration. A transdisciplinary politics would ensure that every voice is heard through its pluralism and distributed epistemology. The state, as 'the included middle', would pass through acts like these, but only if they represent the total plurality of views. As institutional blurring becomes apparent due to the synthesizing role of the state, it would be seen less as a representation of the people, but more a democratic voice of the people which sometimes passes *acts* to tackle specific problems. However, such *acts* would have to align with the values of transdisciplinarity, as outlined in this paper- no one should be denied their ability to have an ontology or epistemology. Furthermore, such *acts* would have to be transient, as would the state also be (while also possibly being reoccurring, though almost never permanent.) This is to ensure that no one gains a monopoly of control which could be seen, in a transdisciplinary politics, as a monopoly over individuals and groups worlds and views. It could be argued that synthesis might inevitably weaken the strength of some views in decision-making, I would counter this by suggesting that an *act* should never violate the pluralism and distributed epistemology I have outlined so far, if it did it would be anti-transdisciplinary. I have now discussed how 'Mode 2' Science may affect how we view the state, I will continue my discussion of governance by examining the *complex thinking* of Morin.

Edgar Morin: Complex Governance

Complex thought has many facets, but in its simplest form it is a way of thinking about systems that like Nicolescu does not like binary thinking and challenges simple modes of thinking (see; Morin & Coppay, 1983; Morin, 1992, 2007, 2008, 2014, 2018). If the relevance of it to a transdisciplinary politics could be summarized, it is that politics is too simple, it needs a pluralistic ontology that accommodates the multiplicity of realities

and also a distributed epistemology that appreciates all knowledge-sources and knowledge-producers. Furthermore, it requires a view of the state that is more complicated than 'state is good' or 'state is bad', which sees it as synthesizer, yet also a transient plus reoccurring apparatus. Yet, it is possible to politicize transdisciplinarity even further than done so far and introduce complex thought into the political arena.

Part of Morin's oeuvre is the idea that organization and disorganization are not necessarily contradictory (Morin, 2008). Using the idea of *metastability* in coordination dynamics, I suggest that governance should not be organized or disorganized, it should occupy an intermediary position. By this, I refer to a situation where a unit of governance is neither centralized or decentralized, it is in-between and can be activated or deactivated at any time. This, in nature and in society, is not only possible but also quite common. Kelso (2009) indicates that *metastability* is:

> 'the simultaneous realization of two competing tendencies: the tendency of the components to couple together and the tendency of the components to express their intrinsic independent behaviour'.

This tendency can be found in the brain (Kelso, 2009) or alternatively phenomena ranging as far from fireflies to ballet dancing (Tognoli et al., 2018; Fuchs & Kelso, 2017) In practical terms, this suggests the unit of governance should be ready to come together at any moment, but for the most part remain in a position where it is neither fully organized nor disorganized. In this way, it is transient and an apparatus. Knowledge-agents should be willing to come together in coordination at any moment, but this does not indicate permanent association or coordination, rather a state which can be activated and deactivated at any time. Accusations of centrism could be thrown against this point, but this is not about balancing collectivism and individualism or anything of that sort, it is about a plurality of realities and knowledge sources coming together to find a solution to a defined complex problem. And of course, a system that can be organized at any time, should the situation call for it, is pragmatically good, but disorganization encourages individual freedom. Thus, neither being fully organized or disorganized is a desirable attribute, so the parts can work together if required, while still retaining their individuality.

The idea of *metastability* may be applicable to fireflies, ballet and the brain. However, the idea can be applied more broadly to societies. Social coordination dynamics is an extension of coordination dynamics that covers interactions between different humans. It aims to examine the mesoscopic or macroscopic interactions between humans rather than just testing interactions between two individuals. Experiments for social coordination dynamics often involve identifying patterns in interactions, such as individuals tapping a pad to allow LEDs to emit, usually resulting

in a pattern of coordination (Zhang et al., 2018). Yet, we can also identify coordination more broadly across society through interpersonal relationships. People can share similar thoughts, emotions and feelings when they are especially connected through close relationships (Vallacher et al., 2005). Yet, if we are to arrive at a theory of how individuals do come together, to exchange knowledge and act to tackle problems, we need social coordination to be evident across the whole of society. I would argue that macroscopic coordination between individuals is already present across multiple facets of society. For example, political voting can mobilize a majority of a country's population, protests and petitions can bring a united effort to promote certain issues. Sporting events can cause large gatherings, meanwhile a gathering of students can take place in a lecture theater or seminar room. With this understanding, it is more possible to envision individuals coming together to make *acts* (as described above) to tackle complex problems. The state as the 'included middle' would act as the catalyst for bringing these different knowledge agents together. Morin (1993) describes society as something that can experience crises (like a complex problem), in such a scenario we might activate a group of individuals to tackle the crisis. However, pivotal is that this group remains transient, though possibly reoccurring, as does the state. Morin, who suggests organization and disorganization are not necessarily contradictory, describes the process of freezing and unfreezing certain aspects of society (including during crises). They (Morin, 1993) describe how we can freeze feedback mechanisms in a system, thus resulting in increased rigidity. On the other hand, this freezing causes the defreezing of other components of the system and allows new possibilities. The key point behind this is that, if we keep something permanently frozen or defrosted, it limits the components of a system we can use. We are therefore better placed to tackle complex problems, through a continuous process of freezing/defreezing and organization/disorganization to allow much adaptability as possible when we need individuals to come together to tackle problems. In this way, we can also encourage individual freedom, while also allowing the state to catalyze the coming together of individuals if required.

Morin is also against holism and reductionism (Morin, 1992). Holism is examining a system as a whole, whereas reductionism is reducing it to its parts. From a political stance, this again reemphasises the need to complexify the governance unit, as the allusion to *metastability* did. You cannot represent the whole with understanding its parts, but the parts cannot be understood separate from the whole. The whole, in this instance, would be the state and the part would be a smaller governance unit, like individuals brought together to tackle a specific complex problem. The state would remain just a synthesizer, as exposited above, in this

way the whole nor the parts would gain dominance- as both would play a role in governance, even if the state is nothing more than an apparatus for group ideation.

Morin's anti-holism and anti-reductionism can be seen in the way his politics advocates for an earth-wide identity while also retaining the diversity of specific individuals and groups. As he says himself (Morin, 2001), there is 'unity in diversity, diversity in unity.' By this, Morin means humans share lots of characteristics in common, such as genetics, being cerebral, being intellectual and also affectivity, but there is also a lot of diversity as expressed through our cultures (Morin, 1995). Morin (1995) suggests we should adapt a concentric view of society. This is where some layers are within other layers of society, while still also sharing the same center-point. In other words, we are unique, but also share unifying features. Morin (1999) also proposes a more practical manifestation of this belief- a confederacy of countries, rather than a one-world government or individual countries. This would allow us to have a planetary identity while also being able to express our other identities. My transdisciplinary politics has no issue with having a 'polyidentity' (consisting of multiple identities, including a planetary and a more localized one). However, this planetary identity would have to follow the principles of organization/disorganization as outlined above, as well as be pluralistic and epistemically distributed, otherwise it would not be congruent with transdisciplinarity as outlined. The confederacy would not have to use violence to push aims, it would have to be democratic. Morin (1995, 2001) argues for democracy and dialogue taking place within it. However, individuals would have to connect and respect the democratic process. I suggest the individual state or the confederacy could be activated when particular crises in democracy occur, it could bring together individuals. While also being deactivated when it is no longer required. Its function as the 'included middle' has an ability to unite people as it brings together different ontologies and epistemologies. However, if a state or confederacy is permanently activated it could allow the accumulation of power and eventually an ideological monopoly. Morin (1991) critiques the Soviet Union, but focuses on the Communist Party, rather than the Union itself- it was the control of the party that caused such the grave errors in the Soviet Union's history. Yet, if a state is permanently in a single configuration, then its diverse components do not get the chance to generate new configurations. Thus, ironically, I use Morin's idea of organization and disorganization and freezing and unfreezing to suggest that a state should never truly be activated indefinitely. Being part of a nation state or polycentric confederacy is fine, so long as these act as synthesizers and catalysts for a meeting of minds rather than a permanent association in which power could accumulate. Of course, Morin argues for a multi-

layered approach (neither holistic or reductionist), yet I feel his confederacy of nations and avoidance of critiquing the state as it exists in the past or today, does not fit with the transdisciplinary argument I have been making. A planetary confederacy may be required for specific problems and we should always acknowledge the unity of humanity, but a confederacy that has permanency is always going to cause trouble through its acquired hegemony. Instead, I suggest we need a pluralistic and epistemically distributed society which has the state acting as temporary, but reoccurring, apparatus, Naturally, we may need a national-level or planetary-level meeting of minds at some point, but this should not be seen as a given and should only happen if the problem requires it.

If the state acts as apparatus for knowledge synthesis, then how would 'teams' deal with problems? I have already emphasized that an egalitarian view of knowledge is required in politicizing transdisciplinarity, but then there are the problems and issues the actors have to deal with. I have mentioned Morin (2014) and his comments on dealing with 'uncertainty' and 'randomness'. Morin (2008) is another example of complex thought being required to deal with the challenges we face, Morin states; 'complexity presents itself with the disturbing traits of a mess, of the inextricable, of disorder, of ambiguity, of uncertainty.' It is clear then that a transdisciplinary politics will have to deal with *complexity* because of the existence of *complex problems.* I argue that this could be achieved through the use of *agile project management*.[6] Agile is a method of development that relies on releasing a project early and gathering feedback on it which could result in adaptations being made for the next iteration (Fernandez & Fernandez, 2008; Dybå et al., 2014). This allows the ability to deal with emerging problems and opportunities, especially complex problems because a feedback effect is inherent to them and the targeted complex system (Morin, 2007). Longer-term complex problems, like climate change or poverty, need action now, and feedback from our actions can guide how we deal with these problems in the longer term.

There are several transdisciplinary ideas that allow us to think more about 'teams.' Below, I will use complex network theory to elaborate on this. Now, I wish to comment on some of the theory surrounding 'teams' coming together in the transdisciplinary literature, so we are better placed to understand them. Firstly, teams must consist of a diverse, ontologically and epistemically, group of people coming together through the state as 'the included middle.' Dialogue would be crucial in this. Pipere and Lorenzi (2021) describe how there is epistemic dialogue, ontological dialogue and axiological (value-based) dialogue. A team can only come together if there is dialogue between these different aspects of individuals and groups' thought systems. A degree of understanding is required, but there will also be disagreement within a team. In the first instance, this

could be sorted out through the state being the 'included middle' in the assembled team. Secondly, it could be achieved through emphasizing solutions that respect the plurality and distribution of views and realities. Violence against epistemologies and ontologies, would only deepen wounds created. The dialogue, to solve disagreements, also needs to not only be between policymakers and academics it needs to involve other stakeholders as well. Once we develop a transdisciplinary respect of the knowledges and realities different individuals and groups experience, it is harder to take a confrontational attitude as we become more acquainted with diversity, while at the same time being unified by it. The ability to confront would be hardened if we took a homogenous and rigid view of society and politics, but if we take the view of a transdisciplinary politics that respects differences while also emphasizing similarity, disagreement becomes less violent and more minor and solvable. Next, if we organize teams around common problems disagreement may become less common. Matsumoto et al. (2022) argue for transdisciplinary communities of practice, I suggest if people share a common concern and issue, regardless of their position in the dialogical team, they are more likely to provide a solution through synthesis. If everybody wants the river cleared of sewage, then people are more likely to put aside differences in order to clear the river of sewage. Of course, we should not rid ourselves of the plurality of views, as that would contradict transdisciplinarity and limit opportunities to solve a problem- my point here is that a synthesis of views leading to an action in transdisciplinarity is likely, if the teams remain centered around issues that affect everyone on a given locality or globality- in other words if they are complex problems. Gudowsky et al. (2021) describe how the EU Horizons 2020 programme involved over 1000 laypeople coming together to produce visions for the future. While they produced 179 different visions of the future, they all agreed on one major thing- 99% believed the EU should organize more consultations like this. There is a desire for individuals to come together as a team to solve problems- despite differences- a transdisciplinary politics would take advantage of this through ontologically and epistemically diverse teams brought together by the state as the 'included middle.'

Complex Networks: Social and Political Relations

I have so far discussed the state as an apparatus for a meeting of agents/minds who all have their pluralistic ontologies and epistemic background, it is possible to conceptualize these as temporarily activated configurations of relations. Theorizing these temporary relations requires the use of complex network theory. Networks, especially complex ones, are transdisciplinary because they can be biological, social, digital, etc. They can

have simultaneous traits across these domains. I first want to highlight that these networks would be dynamic (which means they evolve over time), in fact Barabasi (2003) suggests the ability to evolve over time is a characteristic of complex networks. Farine (2018) highlights why thinking of networks dynamically is useful, a static network (one that does not change) does look at the factors that may impact a network over time. In our context, this means networks should be open to change, especially as the iterative process and its resultant feedback, shape the context of the complex problem being tackled. In this way, a network is transient which can be activated in various configurations when required.

The next feature of complex networks I want to discuss is the 'small-world' effect (Albert & Barabási, 2002, Newman, 2003; Strogatz, 2001). This means there is generally a small distance, in terms of connections, between any two individuals. The most famous example is the 'six degrees of separation', which suggests on average most people are separated by six connections, but Albert and Barabasi (2002) suggests there are on average nineteen degrees of separation between web pages, meaning it takes nineteen 'clicks' to reach any page on the internet. The 'small world' effect would be pivotal for a transdisciplinary 'team'. Existing connections could allow recruitment of individuals for the transient network. Nevertheless, to be democratic and epistemically just, all considered stakeholders would have to be involved in tackling the complex problem. The 'six degrees of separation' would simply be a useful utility for the establishment of a team.

Clustering (the tendency to form in small groups), another feature of complex networks (Newman, 2003), could be representative of the sort of networks that could form in a transdisciplinary politics. Groups are likely to center around specific problems, yet there is a danger of nepotism and clique behavior. On the other hand, this could be prevented by ensuring a distributed epistemology and ontological pluralism, complex problems demand complex teams and it would soon become apparent that nepotistic or cliquish behavior is not suited to tackling complex problems. The involvement of a broad base of agents and stakeholders is therefore pivotal.

Another feature of complex networks is that they tend to follow a power-law and are scale-free (Albert & Barabasi, 1999). Essentially, this means there tends to be a few nodes with many connections, while there are many nodes with few connections. In other words, there are a few are extremely good 'connectors.' I would suggest in a transdisciplinary politics, the state or as I have called it 'apparatus' would take the role of the connector. The state would be the forum and means to connect agents. The apparatus, like the network, is transitory though and would only be activated to tackle a specific problem. Think of the state as more of a meeting

place and ontology and knowledge exchange, than an omnipresent entity- it's prime purpose would be to facilitate temporary configurations.

Albert and Barabási (2002) describe attacks on the top connectors being critical to a network, whereas random attacks tend to not damage a network much. It is beyond the scope of this essay to posit a defence-policy (if such a thing would even be necessary in a transdisciplinary world.) However, I would argue that attacks on the apparatus or configurations of relations would not be as lethal, if the network can be deactivated and reactivated at any time. Only permanent institutions are vulnerable to permanent attacks.

Lessons Learned and Conclusion

Through a review of the transdisciplinary literature, this paper has advocated for a politics based on transdisciplinarity. I started by engaging with Nicolescu's ontological pluralism which indicates that individuals and groups ontologies are equally valid as each other, which forces us to consider a political view not just as an ideology but an actual part of the world. This led to 'Mode 2′ science and its epistemic distribution, because of the ontological pluralism, we need to give respect to individuals knowledge more broadly. A politics must be inclusive when it comes to knowledge- as argued sheep farmers sometimes know things that policy makers do not because they have their knowledge and ontologies. This, to be just and to encourage effectiveness, requires mutual respect. 'Mode 2′ Science also blurs the state and society division, meetings of knowledge agents facilitated by the state acting as the 'included middle' causes our conceptualization of how society should be governed as different- we need to take onboard ontological pluralism and epistemic distribution in how we are governed. The state would be a synthesizer of knowledge and make acts based on these, this would be done by teams of knowledge agents who come together to tackle specific problems. The state though must never remain permanent, using the ideas of Morin, I argued for the neither organized nor disorganized nature of the state, this would encourage individual freedom while also allowing teams to come together if required. I then described certain aspects of teams, this was done in the section on Morin where I emphasized dialogue, but also through using complex network theory which emphasized the need to view teams through a dynamic lens, while also emphasizing how connections might arise, such as the state acting as the catalyst for connections. By theorizing transdisciplinary politics, I have aimed to discuss the best way of tackling complex problems and it is hoped this essay can provide a starting point for more ideation or even more radically actual change, which

is within our reach if we adopt a transdisciplinary paradigm. Let us begin to change thinking and action.

Notes

1. There is a vast amount of literature, including popular, on complexity theory, examples of such texts include; (Cilliers, 2002), (Johnson, 2009) and for complex networks (Barabasi, 2003).
2. As exemplified by the famous Political Compass online quiz available at https://www.politicalcompass.org/.
3. It could be tempting to go down a rabbit hole with this part of my theory, into the realm of paradoxes like those found in Quantum Mechanics (Hobson, 2018) or extended modal realism (Yagisawa, 1988). I have tried to not stray too far from the political motivations behind this study.
4. Emmel (2021) uses this as an example in his essay on post-disciplinary realism.
5. 'Mad' is a term that is of course debated among mental health patients, some find it empowering, as in the case of Mad Studies, others find it offensive.
6. One only needs to look at the UK's civil service job page at https://www.civilservicejobs.service.gov.uk/csr/index.cgi to see that Agile is gaining currency already in government, especially in digital software development.

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