

INNER AND OUTER TRANSFORMATION IN THE ANTHROPOCENE

a relational approach

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Abstract ENG

To respond to the challenges of the Anthropocene, scholars from various disciplines increasingly emphasize that a mere outer transformation is insufficient and that we also need an inner transformation that addresses deep leverage points. Yet, the open questions are how the inner and outer dimensions relate to each other and how inner transformation might lead to outer transformation.

How we attempt to answer these questions is determined by our dominant paradigm. Paradigms define how we understand and shape the world, and thus, they define how we conceptualize challenges, such as inner and outer transformation. Various authors argue that the dominant paradigm, which is characterized by reductionism, empiricism, dualism, and determinism, might be a root cause for insufficiently addressing sustainability challenges. As an alternative, many argue for a relational paradigm, which understands complex phenomena in terms of constitutive processes and relations. A relational paradigm might offer possibilities to reconceptualize inner and outer transformation in the Anthropocene and might shed new light on how to integrate both in sustainability science.

Yet, it is still being determined how a relational paradigm can contribute to the understanding of inner and outer transformations towards sustainability in the Anthropocene. Therefore, this dissertation's overarching scope is to contribute to systems change towards a more social-ecological future by generating insights into and exploring possibilities of a relational paradigm for inner and outer transformation in the Anthropocene.

This thesis is divided into three sub-questions. The first research question aims to contribute to transformation research by increasing the theoretical understanding of a relational paradigm. The second research question aims to contribute to transformative research by developing a transformative educational case study grounded in a relational, justice-oriented approach. The third research question aims to contribute to transformation research by analyzing how a relational paradigm might contribute to policies and practices for sustainable lifestyles.

The results indicate that inner and outer transformation in the Anthropocene can be reconceptualized as paradigm-ing relationality in the Ecocene. "Paradigm-ing"

as an active verb, reconceptualizes inner and outer transformation into ontologies, epistemologies, ethics, and socialecological realities that are ongoing, nonhierarchical, nonlinear, dynamic, co-creative processes of intra-action. The Ecocene decenters the human and attends to what we might be able to intra-act and become-with. These insights can offer unexplored perspectives to address sustainability challenges and increase our capacities to respond in novel ways.

Zusammenfassung DE

Um auf die Herausforderungen des Anthropozäns zu reagieren, betonen Wissenschaftler verschiedener Disziplinen zunehmend, dass eine ausschließlich äußere Transformation – wie zum Beispiel technische Innovationen, neue Infrastruktur oder politische Anreize - nicht ausreicht, und es neben einer äußeren auch einer inneren Transformation – wie zum Beispiel unseres Mindsets, unserer Werte und unserer Paradigmen - bedarf. Dies führt zu den offenen Fragen, wie sich die inneren und äußeren Dimensionen zueinander verhalten und wie eine innere Transformation zu äußerer Transformation führen kann.

Wie wir diese Fragen beantworten, wird von unserem vorherrschenden Paradigma bestimmt. Paradigmen definieren, wie wir die Welt verstehen und gestalten, und sie definieren, wie wir Herausforderungen, wie innere und äußere Transformation konzeptualisieren. Verschiedene Autoren argumentieren, dass das vorherrschende Paradigma, das durch Reduktionismus, Empirismus, Dualismus und Determinismus gekennzeichnet ist, eine Ursache dafür sein könnte, dass Nachhaltigkeitsprobleme unzureichend angegangen werden. Als Alternative plädieren viele Autor*innen für ein relationales Paradigma, das komplexe Phänomene als konstitutive Prozesse und Beziehungen versteht. Ein relationales Paradigma bietet Möglichkeiten, innere und äußere Transformation im Anthropozän neu zu konzeptualisieren und kann ein neues Licht darauf werfen, wie beides in die Nachhaltigkeitswissenschaft integriert werden kann.

Unklar ist jedoch, wie ein relationales Paradigma zum Verständnis innerer und äußerer Transformationen im Anthropozän beitragen kann. Daher ist das übergeordnete Ziel dieser Dissertation, einen Beitrag zum Systemwandel hin zu einer sozial-ökologischen Zukunft zu leisten, indem Einblicke in und Möglichkeiten eines relationalen Paradigmas für die innere und äußere Transformation im Anthropozän betrachtet werden.

Dazu gliedert sich diese Arbeit in drei Teilfragen. Die erste Forschungsfrage zielt darauf ab, einen Beitrag zur Transformationsforschung zu leisten, indem das theoretische Verständnis eines relationalen Paradigmas erweitert wird. Die zweite Forschungsfrage zielt darauf ab, einen Beitrag zur transformativen Forschung zu

leisten, indem eine transformative Fallstudie entwickelt wird, die auf einem relationalen, gerechtigkeitsorientierten Ansatz basiert. Die dritte Forschungsfrage zielt darauf ab, einen Beitrag zur Transformationsforschung zu leisten, indem analysiert wird, wie ein relationales Paradigma zu Praktiken für nachhaltige Lebensstile beitragen könnte.

Die Ergebnisse deuten darauf hin, dass innere und äußere Transformation im Anthropozän als „paradigm-ing relationality“ konzeptualisiert werden kann. „Paradigm-ing“ als aktives Verb beschreibt innere und äußere Transformation als einen fortlaufenden, nicht hierarchischen, nicht linearen, dynamischen, co-kreativen Prozess des Zusammenspiels von Ontologien, Epistemologien, Ethik und sozial-ökologische Realitäten.

I. Introduction

The human imprint and impact on natural systems and processes have turned humankind into a geological agent, which has led to term this epoch Anthropocene. The term Anthropocene which is derived from the Greek words anthropo, for “human,” and cene for “new,” suggests that human actions are collectively - yet unequally - shaping the state of the Earth system (Crutzen, 2002; Steffen et al., 2007). Within the Anthropocene, we face multiple unprecedented challenges, including but not limited to the degradation of ecosystems, overexploitation of natural resources, climate change, wealth inequalities, and human conflicts (IPCC, 2021). These interconnected challenges are threatening the “Great Transformation” (WBGU, 2011) toward sustainability and hence the sustainable development of society (Kates and Parris, 2003; Rockstrom et al., 2009). The Anthropocene, therefore, calls for sustainability science to deal with complexity, uncertainty, and transdisciplinarity (Lang et al., 2012; Mauser et al., 2013; Schellnhuber, 2002; Schmuck and Schultz, 2002).

To respond to the challenges of the Anthropocene, sustainability transformations are increasingly understood in the conceptual framework of the dynamics of complex adaptive systems (Clark et al., 2005; Capra and Luisi, 2014; Clemens, 2009; Cornell et al., 2012; DeFries, 2008; Espinosa and Porter, 2011; Kauffman, 2015; Kay et al., 1999; Schellnhuber, 2002; Waltner-Toews et al., 2008). One of the most critical facets of complex adaptive systems is where to intervene in the system to change it (Meadows, 1999). Within this framework, scholars from various disciplines increasingly emphasize that to effectively intervene in the system, an inner transformation that addresses deep leverage points is required (Abson et al., 2017; Bohm and Edwards, 1991; Brown and Kasser, 2005; Ericson et al., 2014; Ives et al., 2019; Gidley, 2010; Göpel, 2017; Hulme, 2009; Hunecke, 2013; Hüther, 2013; Kasser, 2002; Meadows, 1999; Parodi and Tamm, 2018; Rowson, 2014; Singer, 2015; Wahl, 2016; Wamsler and Brink, 2018; Welzer, 2011; Hedlund De Witt, 2012; Woiwode et al., 2021). A recent systematic literature review shows the increasing interest of researchers in this field (Wamsler et al., 2021). Inner transformation is hence attracting increased attention in various disciplines as a promising extension

of the hitherto existing approaches of outer transformation. While inner and outer transformation are not clearly defined, the inner dimension commonly addresses the intra-subjective dimension, such as worldviews (de Vries, 2013; Hedlund Dewitt, 2012), mindsets (Wamsler, 2017; Goepel, 2017; Hunecke 2018), paradigms (Lange, 2019; DuPlessis, 2008; Ulanowicz, 2009) or values and virtues (Schwartz, 1992; Kasser, 2017), while the outer dimension commonly refers to “events” (Meadows, 1999) such as technologies, policies, or infrastructures.

Despite its possible relevance, inner transformation is a relatively marginalized topic in sustainability research (Ives et al., 2019; Wamsler et al., 2021). For example, although research exists about how the inner dimension might affect the outer dimension, for instance, how pro-environmental values drive sustainable behavior (Kasser, 2017), the relation between the inner and outer dimensions and how to conceptualize them still needs to be clarified. One reason for that might be that the studies of inner transformation through established scientific research methods are often complex. As Manuel-Navarette (2015) points out, the difficulty lies in the objectizing of an experiential concern, as well as in the dichotomy of the observed (object) and the observer (subject). Moreover, the challenge is to orient inner transformation towards socio-ecological transformation and simultaneously consider socio-ecological transformations in their relation to inner transformation. On the one hand, inner transformation often evaluates the impact of a specific transformative practice at the individual level by considering changes in individual well-being or health without considering impacts on systemic conditions (Walsh, 2017). Thus, the normative dimension of inner transformation and a comprehensive understanding of what it is oriented towards often needs to be improved. On the other hand, conventional discourses on socio-ecological transformations towards sustainability primarily focus on aspects of systems change (like policy and technology) while disregarding aspects of subjectivity. These difficulties in conceptualizing inner and outer dimensions results in open questions such as “How do inner dimensions contribute to transformations towards sustainability? How do inner and outer dimensions relate to each other? How can we measure the effect of the inner on the outer? How do we distinguish

between inner and outer? How can we conceptualize the relationship between the inner and outer dimensions?"

To answer those questions, paradigms - which are considered an inner dimension - can be a crucial determinant. Paradigms shape our ways of knowing, being, and acting in the world (Walsh et al., 2020a) and can be both a critical barrier and driver for sustainability. Paradigms not only influence us personally (i.e., our motivation, values, attitudes, psychological make-up) but also shape our structures (i.e., economic, infrastructural, institutional) and cultural associations (i.e., narrative frames and cultural norms) (Lakoff, 2014; Wahl, 2017; Escobar, 2017; Orr, 2002). Paradigms are thus central and might offer insights into how we approach inner and outer transformation. This thesis defines paradigms as commonly agreed-upon ways of perceiving the world based on linked assumptions that have been accepted into the mainstream.

Our systems (i.e., political, economic, and social systems) and the tools we use (i.e., electronic devices, vehicles, machinery) are a reflection of society's dominating paradigm (Wahl, 2016; Orr, 2002). Pirages and Ehrlich describe society's dominating paradigm as:

"... the socially relevant part of a total culture. Different societies have different dominant social paradigms. A social paradigm is important to society because it helps make sense of an otherwise incomprehensible universe and to make organized activity possible. It is an essential part of the cultural information that is passed from generation to generation as it guides the behavior and expectations of those born into it." (Pirages and Ehrlich, 1974:23)

The dominant paradigm that we find today in the modern world and with which we address many of the challenges of the Anthropocene can also be referred to as a mechanistic paradigm, which is considered to be endemic to Western civilization (Kilbourne et al., 2002; White 1967; Hedlund Dewitt, 2012). The mechanistic paradigm is based on a fundamental dualism and an atomistic view of life that privileges individualism and independence. As the name suggests, the basic idea is that the world functions as a machine (Peitgen et al., 1994). Enlightenment thinkers like Isaac Newton, Immanuel Kant, Rene Descartes, John Locke, Thomas

Hobbes, and Francis Bacon developed some of the core tenets of the mechanistic paradigm, which is based on separation and dualism. They developed a way of looking at the world like a clock. Whole systems were reduced to their constituent parts and analyzed in terms of mechanical interactions. Nature was understood to be an object—a resource—for people to exploit. The capacity to shape the world through technology underpinned notions of progress, creating a culture of individualism and industriousness (Capra and Luisi, 2014).

The result was a civilization organized on the basis of separation among people, between people, and between people and nature. The mechanistic paradigm presupposes that if one has full knowledge of the exact state of a given object at a point in time, and one knows the interactions informing that state, then its future state could be reasonably determined as a result of prediction. This assumes that the act of observation itself can be independent of the factors considered to influence phenomena. The mechanistic paradigm is thus characterized by rationalism, reductionism, empiricism, dualism, and determinism (Redclift and Sage, 1994; Rees, 1999; Capra and Luisi, 2014). The three core patterns that characterize the mechanistic paradigm and that are especially relevant in the context of sustainability are: the idea that humans are separate from and above nature, that humans can control nature, and that nature is a machine and can be known and addressed by reducing it to its parts (Redclift and Sage, 1994; Rees, 1999; Capra and Luisi, 2014). As scholars increasingly emphasize, the mechanistic paradigm might hinder sustainable developments and be one of the leading causes of unsustainable practices (Capra and Luisi, 2014; Corral-Verdugo, 2012; Escobar, 2017; Haraway, 2016; O'Brien, 2020; Wahl, 2016).

The mechanistic paradigm has affected how we approach transformations towards sustainability. For example, Hertz et al. (2019) point out how the separation between the social and the ecological plays out in research on social-ecological systems, affecting frameworks, theories, and methods, as well as research and policy insights. A further key implication is a focus on outer transformation, such as policy regulations or technological solutions, and marginalization of inner transformation (Ives et al., 2019; Wamsler et al., 2021). The focus has been on changing elements within the system, assuming that the

challenges of sustainability, for example, excessive carbon emissions, can be controlled by mechanical solutions such as greener technologies (e.g., renewable energy, recycling technology, or technology for filtering environmental pollutants). Various authors across academic disciplines suggest a shift toward a relational paradigm to overcome the challenges posed by a mechanistic paradigm in sustainability research (e.g., Hertz et al., 2020; Hörl, 2017; Mancilla Gacia et al., 2020; Stalhammar and Thorén, 2019; Ulanowicz 2009). A relational paradigm – as I will describe in more detail throughout the thesis - attempts to understand complex phenomena in terms of constitutive processes and relations. Because as O'Brien points out, paradigms "represent the dominant thought patterns that underlie theories and methods of science, as well as policies and practices related to how we organize society" and "influence the way that problems are defined and addressed" (O'Brien, 2021:21), the relational paradigm might offer alternative possibilities to address the challenges of inner and outer transformation. Yet, it is unclear how a relational paradigm can be integrated into a coherent understanding of inner and outer transformation in the Anthropocene. Therefore, this thesis's main goal is to contribute to systems change towards a more social-ecological future by generating insights into and exploring possibilities of a relational paradigm for inner and outer transformation in the Anthropocene.

II. Objectives and Research Questions

The overarching scope of this dissertation is to contribute to systems change towards a more social-ecological future by generating insights into and exploring possibilities of a relational paradigm for inner and outer transformation in the Anthropocene. Based on this scope, the main research question is: How can a relational paradigm contribute to the understanding of inner and outer transformations towards sustainability in the Anthropocene? This question can be broken down into three major sub-objectives, which I will discuss in the following.

This thesis's first objective is to map discourses of the relational paradigm. As it is unclear whether different relational thinkers share linked assumptions that constitute a relational paradigm and to what degree they relate to sustainability, a first step is to understand and conceptualize the relational paradigm across disciplines in the context of sustainability.

The second objective of this thesis is to gain insights into how a relational paradigm can be disseminated within a transformative educational context. If the relational paradigm is conducive to a sustainable future, the question arises if and how it is possible to intentionally change a mechanistic paradigm towards a relational paradigm. The transformation towards a sustainable future has considerably better chances of succeeding if awareness can be raised or sharpened through education as an important channel of communication (WBGU, 2011). One such possibility for dissemination is transformative learning approaches. Transformative learning approaches are directed at making apparent and changing people's underlying paradigms (Merzirow, 1991). It aims to transform our existential understanding of humanity, including interrelationships among humans and between humans and non-humans (Laininen, 2019). Current mainstream educational policy and practices are rooted in modern ontological and epistemological traditions that largely reflect a mechanistic paradigm (Bateson, 1982; Orr, 1991). As a result, educational approaches typically fail to teach how to understand and address the interrelated social and ecological problems (Henderson and Wamsler, 2020; Wamsler, 2020). Some authors argue that a relational shift is thus needed to better orient transformative education towards sustainability. Yet, it has not so far been

realized, and related methods are lacking (Spretnak, 2011). Despite recent advancements in transformative education toward sustainability, current practices have not fully taken advantage of the potential of relational paradigms.

This thesis's third objective is to identify how a relational paradigm can be used to reconceptualize sustainable lifestyles. Increasingly, it is recognized that the transformation of lifestyles is an important dimension of sustainability transformations (O'Neill et al., 2018). It is widely argued, for example, that the dominant lifestyles that originate in industrialized countries are not compatible with ecological capacities and that a shift towards less material-intensive lifestyles characterized by sufficiency would help greatly reduce pressure on ecosystems. Lifestyles, however, are shaped by a variety of complex factors. They are cultivated by individuals, communities, and societies and reflect the dominant paradigm, including how to satisfy material needs (e.g., food, drinking water, and shelter) and social needs (e.g., the search for meaning, belonging, and status). Approaches to changing sustainable lifestyles are often based on the assumption of a unidirectional relationship between inner and outer transformation, which is rather a characteristic of the mechanical paradigm. From a deterministic point of view, it is assumed that addressing inner transformation, such as changes in values (e.g., Brown and Kasser, 2005), knowledge (Maiteny, 2002), or worldviews (Hedlund Dewitt, 2012) shapes pro-sustainable behavior. Common problems for sustainable lifestyles, like the well-researched value-action-gap (Blake, 1999) or knowledge-action-gap (Kollmuss and Agyeman, 2002; Maiteny, 2002; O'Brien, 2013), might be a result stemming from this deterministic understanding. Bridging these gaps is increasingly recognized as a key challenge for achieving sustainability which emphasizes the need to find pathways for translating human intentionality into action. A relational paradigm might offer such new pathways to lifestyle transformations.

Based on the objectives mentioned above, three research questions emerge:

1. How have relational discourses been understood and conceptualized across a broad range of disciplines and contexts relevant to sustainability?

2. How can a relational paradigm contribute to transformative learning for sustainability?
3. How can a relational paradigm reconceptualize sustainable lifestyles to more effectively address sustainability challenges?

III: Methodology

In line with the interdisciplinary nature of the research question and the explicit goal of contributing to socially relevant knowledge, I use a research approach that contributes to transformation and transformative research (WBGU, 2011). Both transformation and transformative research are in line with mode 2 science, which overcomes disciplinary boundaries and is characterized by complexity, hybridity, non-linearity, reflexivity, social accountability, mutual learning, heterogeneity, and transdisciplinarity (Hirsh Hadorn et al., 2008) and supersedes Mode 1 science. As Nowotny et al. (2003:179) note:

“The old paradigm of scientific discovery (Mode 1) – characterized by the hegemony of theoretical or, at any rate, experimental science; by an internally-driven taxonomy of disciplines; and by the autonomy of scientists and their host institutions, the universities – was being superseded by a new paradigm of knowledge production (Mode 2), which was socially distributed, application-oriented, transdisciplinary, and subject to multiple accountabilities.”

With that, the thesis aligns with the research approach of the Research Institute for Sustainability (RIFS) in Potsdam, where the research for this thesis was primarily conducted. The research at the RIFS is grounded in interdisciplinary and transdisciplinary knowledge generation. It performs transformation research and transformative research. Transformation research deals with the characteristics, mechanisms, and causes of change processes. It generates knowledge in a descriptive or analytical sense. Transformative research explicitly raises a claim to design change “processes in practical terms through the development of solutions and technical and social innovations, including diffusion processes in economy and society” (WBGU, 2011:351). The work of the RIFS is characterized by bringing both research types into dialogue and integrating them to answer the question of how the generation of knowledge for transformation itself can be improved. In the following, I will clarify how transformative research and transformation research is apt in the context of the three research objectives.

The first research question aims to contribute to transformation research predominantly in the form of target knowledge by increasing the theoretical

understanding of a relational paradigm. The second research question aims to contribute to transformative research by developing a transformative educational case study grounded in a relational, justice-oriented approach. The third research question aims to contribute to transformation research by analyzing how a relational paradigm might contribute to policy and practice of sustainable lifestyles.

IV: Summary of Articles

In this section, I summarise the published research articles. Each article is summarised regarding its main objective, approach, key results, and a reflection of the limitations and potentials. The summaries are followed by an overview table showing the research question, the method used, and the key findings related to the overarching research question. I then synthesize key insights that emerged through this research and tie them back to the overarching research question.

Article I

Walsh Z, Böhme J, Wamsler C (2020). Towards a relational paradigm in sustainability research, practice, and education. *Ambio*.

The first research question was how relational discourses had been understood and conceptualized across a broad range of disciplines and contexts relevant to sustainability.

To answer this question, we conducted a qualitative literature review. In the first step, we categorized the literature into the three categories of ontology, epistemology, and ethics. These three categories were selected as fundamental aspects of relationality based on the work of Varela (1999), Barad (2007), Kassel et al. (2016), Escobar (2017), and Puis de la Bellacasa (2017), who describe relational ways of being, thinking, and acting as a single tri-partite constellation—an ethico-onto-epistemology—that does not presuppose subject-object and nature-culture binaries. The categorization of the literature was based on the authors' expertise.

To identify literature, we conducted a qualitative literature review by following an exploratory approach on databases, such as google scholar and Scopus. Search terms included relational ontologies, relational epistemologies, relational ethics, worldview, and paradigm in the context of sustainability, environment, transformation. Moreover, literature was suggested to us through a consultation process with stakeholders through a total of five workshops and continuous communication through the participatory development of a web-based communication platform and database between 2017-2019. These key stakeholders were identified through a targeted selection of scholars and practitioners and an open call for participation related to mindsets, relational

approaches, and inner transformation for sustainability and included a total of 125 participants. The stakeholder network resulted predominately from the project “A Mindset for the Anthropocene” at the Institute of Advanced Sustainability Studies in Potsdam, which - at that time - built a physical and online network of stakeholders engaged in topics relating to inner and outer transformation.

In total, we identified 25 publications in the category of ontology, 52 publications in the category of epistemology, and 23 publications in ethics. The publications came from twenty-six relational discourses relevant to sustainability and were represented in a tanglegram to offer an overview of the multiplicity of discourses and to show the entanglement of the categories (an overview of the related discourses and fields as well as of the results can be found in annex 1).

Within the research, we identified how relational approaches had been understood and conceptualized.

Relational Ontologies aim to overcome the bifurcation of nature/culture and various other dualisms (e.g., mind/matter, subjectivity/objectivity) shaping the modern worldview. Differentiated (as opposed to undifferentiated) relational ontologies respect the integrity of individuals while understanding how relations of all kinds fundamentally constitute their being. In this context, speculative realism, process philosophy, new materialism, and indigenous and religious wisdom traditions are knowledge systems providing well-developed understandings of relational ontology relevant to sustainability.

Relational approaches to epistemology account for the observer’s role in shaping knowledge; acknowledge that agency is distributed across networks; view objects as assemblages of humans and nonhumans; increasingly focus on transdisciplinary methods to cut across disciplinary boundaries, and use diffractive methods to integrate different ways of knowing.

Relational approaches to ethics include non-anthropocentric perspectives; value nonhuman nature in non-instrumental terms; use of intersectional methods to analyze the inter-relations between social and ecological issues, and contextualizing human-nature interactions in light of asymmetrical power relations and dynamics between assemblages or networks of interest.

In summary, the research showed that a relational paradigm requires relational ways of knowing, being, and doing or a relational ethico-onto-epistemology. Key characteristics that constitute a relational paradigm can be summarized as a paradigm that (i) is grounded in a relational ontology, (ii) emphasizes the need for understanding human and nonhuman nature as mutually constitutive, and (iii) values more-than-human relations.

One limitation of the research is that the process grew out of an organic intra-action based on years of networking and researching in the field. Moreover, we allocated the categories of ontology, epistemology, and ethics based on our personal understanding and experience, yet we did not clarify what this understanding and experience are and how they affected our decisions. Both of these practices made it challenging to describe a clear methodology. Yet, as Smartt Gullion (2018) points out, research following a relational epistemology is not a structured, linear process but is messy, iterative, and non-linear. Nonetheless, to clarify what that “messy” process looked like, a more detailed description of our process would have been helpful. The benefit of this approach, though, was that we were able to identify a broad field of discourses, which might have been more limited if we had followed a less “messy” process. Moreover, the research contributed to a tangible result in the form of an online platform which makes it possible to search for institutions, publications, projects, and people addressing inner and outer transformation for sustainability. And as Davis (1008:36) notes, “no method or approach should be discarded if it helps illuminate a situation, process or issue.”

Article II

Walsh Z, Böhme J, Wamsler C, Lavelle B (2020). Transformative Education: Towards a Relational, Justice-Oriented Approach to Sustainability. Journal of Sustainability in Higher Education.

The second research question was how a relational paradigm could contribute to transformative learning for sustainability.

To answer this question, we conducted a reflexive case study of the design, content, and impact of a transformative educational course that takes a relational

and justice-oriented approach to sustainability. Transformative education was developed by Jack Mezirow (1991) and is defined as

"the process of deep, constructive, and meaningful learning that goes beyond simple knowledge acquisition and supports critical ways in which learners consciously make meaning of their lives. It is the kind of learning that results in a fundamental change in our worldview as a consequence of shifting from mindless or unquestioning acceptance of available information to reflective and conscious learning experiences that bring about true emancipation". (Simsek, 2012).

The WBGU (2012) distinguishes between transformation and transformative education. Whereas transformation education makes scientific findings of transformation research available to society, transformative education generates an understanding of action paths and possible solutions. We aspired to develop such a transformative learning journey that addresses deep processes (Mezirow, 1991) and generates possible solutions (WBGU, 2012). To do that, we developed an eco-justice course that was prototyped in a transdisciplinary setting with practitioners and experts on relational approaches and subsequently taught at Lund University. The course integrates relational learning with an equity and justice lens and provides a critical, exploratory self-assessment, including interviews, group discussions, and surveys with key stakeholders and course participants. Our process was divided into three phases.

In the first phase, we co-created a course in close collaboration between the project "A Mindset for the Anthropocene" (AMA) at the Institute of Advanced Sustainability Studies in Potsdam and the Courage of Care Coalition based in the United States. The Courage of Care Coalition aims to help individuals and organizations develop compassionate, just, and equitable communities of practice through training in relational care practices (loving), anti-oppressive pedagogies (seeing), restorative healing tools (healing), visionary and artistic tools (envisioning) and systems thinking (acting). Their five-step curriculum of love-see-heal-envision-act aims at deep transformations, as described by Mezirow. We combined this process with the insights from the literature review (paper I) and determined the goals of the five steps in the categories of knowing, being, and acting. Whereas the AMA project has

predominately experience about ecological issues, the Courage of Care Coalition has predominately addressed social justice issues. Following the relational understanding of dissolving the dichotomy between social and ecological issues, the goal of the course was to develop an EcoJustice course that shows the intra-action and entanglement of both.

In the second phase, we prototyped the course in a 2.5-day workshop (2019) in a retreat center in Ratna Ling, California, with 17 participants. The participants were selected and invited based on their expertise in areas relevant to the course. Our connection to the participants resulted from former networking activities within the AMA project. The work of the participants was rooted in relational approaches (such as process philosophy or care practices). They were scholars, activists, and authors. We assessed the prototype based on participatory observation and two group discussions which were documented in the form of report minutes and a follow-up survey. We integrated the insights and feedback in so far as we saw fit. As I will describe in the reflection later, a more systematic approach to integrating the feedback would have been helpful in increasing the transparency of our process.

In the third phase, the EcoJustice course was turned into an online course and then tested in the context of a Master's Program as an obligatory component of the master's level course on "Sustainability and Inner Transformation" in Environmental Studies and Sustainability Science at the Lund University Centre for Sustainability Studies in Sweden. The course took place from November 2019 to January 2020, including 24 students. We collected data during the course period from an online discussion platform that was actively used by the students as they were required to answer questions about each session as part of their course participation. We also collected data afterward through in-class group discussions and a follow-up survey. To integrate the insights, we clustered the information thematically and compared the empirical results from phases II and III to existing literature to validate identified patterns.

The insights from the development and implementation of the EcoJustice Course show that embracing a relational and justice-oriented approach can support the

important emotional, cognitive, and relational competencies needed for linking personal, societal, and ecological transformations. It hence provided valuable insights into linking inner and outer transformation. Moreover, the results show that a relational paradigm in transformative education requires embodied learning, human–nature connectedness, a sense of place, intersectionality, handling uncertainty, and engaging in Communities of Practice. With that, the research shows how relational approaches can support transformative learning for sustainability and provides concrete practices, pathways, and recommendations for curricula development that other training institutions might follow or learn from.

One of the limitations of the research was that we did not sufficiently take into account transformative learning theory as well as approaches to education for sustainable development. So other educators who would like to apply our insights might have difficulty situating our research within existing educational approaches and are hence unable to apply our curriculum. Another limitation was that we were rather focused on teaching the WHAT of a relation paradigm, without fully acknowledging the HOW of how we, as researchers and teachers, were following a relational approach in our ways of teaching. Furthermore, as St. Pierre (2009) points out, when we follow the relational turn, researchers must consider not just interviews but all of the "stuff" that we think with: theory, interviews, images, texts, other beings and objects, dreams, sensual data, memories, etc. Within this study, I only considered interviews, group discussions, and surveys and disregarded aspects such as the online platform, the place, the history of Ratna Ling, etc. Lastly, it is questionable how far our normative approach of wanting to change people turns them into objects to be changed rather than subjects of change (O'Brien, 2021; Wamsler et al., 2021).

Article III

Böhme J, Walsh Z, Wamsler C (2022). Sustainable Lifestyles: Towards a Relational Approach. Sustainability Science.

The third research question was how a relational paradigm can reconceptualize sustainable lifestyles to more effectively address sustainability challenges. To do that, we conceptually applied the relational paradigm to frame sustainable

lifestyles more effectively for policy and practice by analyzing the existing literature on relational patterns and their possible implications on sustainable lifestyles.

It is increasingly understood that sustainable lifestyles are not a simple matter of changing habits and behaviors. Instead, they require deep, systemic changes that presuppose new ways of living, communicating, feeling, and thinking. Nonetheless, the term 'sustainable lifestyles' is commonly used interchangeably with 'behavioral change' to refer to pro-ecological, frugal, altruistic, and equitable behaviors. In our research, we wanted to show that such a view of sustainable lifestyles is limited and results from a mechanistic paradigm. In contrast, a relational paradigm might offer a more comprehensive understanding of sustainable lifestyles.

To do that, we first analyzed how the mechanistic paradigm correlates with barriers to sustainable lifestyles. The three common patterns we identified for a mechanistic paradigm were the understanding that humans are separate from and above nature, that humans can control nature, and that nature is a machine and can be known and addressed by reducing it to its parts. We then analyzed how these three patterns may affect sustainable lifestyle policies and practices, namely motivation, perception of behavioral control, sufficiency, deep, systematic change, valuing personal and planetary wellbeing, and valuing social and ecological justice. These policies and practices were identified through an exploratory literature review of empirical and conceptual work dealing with sustainable lifestyles. They do not give a comprehensive overview but rather exemplify the broad range of issues related to sustainable lifestyles.

In the second step, we analyzed how a relational paradigm can help overcome some of the common barriers. Here we drew heavily from the literature review from the first paper. The relational patterns we focused on were a shift from separation to interconnection, from human agency to intra-action with the more-than-human, from individuals to dividuals, from the idea of control to emergence, mind-body dualism to embodiment, from individual wellbeing to relational wellbeing, and from meaninglessness to meaningfulness. We then analyzed how these patterns influence sustainable lifestyles and relate to the six areas of policy and practice mentioned in the previous section.

Based on these insights, we developed a Relational Lifestyle Framework (RLF) that questions some common assumptions and understandings of sustainable lifestyles. Instead of the idea that sustainable lifestyles can be implemented, managed, fostered, or willed, from a relational perspective, sustainable lifestyles are subject to an ongoing, nonhierarchical, nonlinear, dynamic, co-creative process and emerge out of ethico-onto-epistemologies and socioecological realities. From a mechanistic understanding, lifestyles were seen as an individual matter with the individual in the center, whereas from a relational perspective, sustainable lifestyles emerge from intra-action and mutual dependence that dissolve the binaries of inner and outer, personal and social, or natural and cultural. Positionalities are not understood as something 'out there' or 'external' but instead as an inherent, constitutive part of various phenomena. And lastly, the relational lifestyle framework renames sustainable lifestyles. The reason is that language shapes how we know, act, and are in the world. Sustainable lifestyles point to the idea of sustaining the status quo, which is insufficient. We, therefore, decided to refer to relational lifestyles to point to a deeper desire for a shared sense of belonging and moving away from merely answering living-how (sustainably) questions towards a shift of living-with as an epistemological, ethical, and ontological task.

The relational lifestyle framework is not a tool with specific prescriptions and instructions but instead a proposition that "triggers conditions of emergence" (Springgay 2015:78). This moving away from offering a tool was a decision we took in the process of developing the paper. From a relational perspective, "tools are never 'mere' tools ready to be applied: they always modify the goals you had in mind" (Latour 2005:143), and by offering a practical tool or figure, we risked offering a simplistic conceptualization that narrows one's understanding (Mancilla Garcia et al., 2020a). The benefit of describing the framework more openly is that it leaves room for recontextualizing it and using it - not as a representation of a complex reality - but instead as an enactment of it.

Overview of Key Findings

The key findings and the methodology used for each of the three research questions are shown in table 1.

Question	Methodology	Key Findings
<p>How have relational discourses been understood and conceptualized across a broad range of disciplines and contexts relevant to sustainability? (Walsh et al., 2020a)</p>	<p>Qualitative literature review</p>	<p>A relational paradigm can be characterized as a turn toward a relational ethico-onto-epistemology, a single tri-partite constellation that does not presuppose subject–object and nature–culture binaries. Important developments, common themes, and patterns that constitute characteristics of a relational paradigm (and possible shift towards a relational paradigm) are a paradigm that</p> <ol style="list-style-type: none"> I. is grounded in a relational ontology, II. emphasizes the need for understanding human and non-human nature as mutually constitutive, III. values more-than-human relations.
<p>How can a relational paradigm contribute to transformative learning towards sustainability? (Walsh et al., 2020b)</p>	<p>Reflexive case study</p>	<p>Embracing a relational and justice-oriented approach can support the important emotional, cognitive, and relational competencies needed for linking personal, societal and ecological transformations. A relational paradigm can best be applied in transformative education through:</p> <ol style="list-style-type: none"> I. embodied learning II. human–nature connectedness III. sense of place IV. intersectionality V. handling uncertainty VI. Engaging in Communities of Practice.
<p>How can a relational paradigm be used to reconceptualize sustainable lifestyles? (Böhme et al., 2022)</p>	<p>Conceptual paper</p>	<p>The Relational-Lifestyle-Framework (RLF), which is a conceptual framework of sustainable lifestyles grounded in a relational paradigm, advances current knowledge by illustrating how sustainable lifestyles are a manifestation of patterns of thinking, being, and acting that are embedded in socioecological realities. We identified seven patterns that show how a relational paradigm may be conducive to sustainable lifestyles:</p> <ol style="list-style-type: none"> I. From Separation to Interconnection II. From Human Agency to Intra-action with the More-than-human III. From Individuals to Dividuals IV. From Control to Emergence V. From Mind-Body Dualism to Embodiment VI. From Individual Well-Being to Relational Well-Being VII. From Meaninglessness to Meaningfulness

Table 1: overview of the characteristics of a relational paradigm

V: Synthesis

The overarching scope of this dissertation was to contribute to systems change towards a more social-ecological future by generating insights into and exploring possibilities of a relational paradigm for inner and outer transformation in the Anthropocene.

The thesis adds to transformation knowledge (Walsh et al., 2020a; Böhme et al., 2022) and transformative knowledge (Walsh et al., 2020b) for sustainability. Article I contributes to transformation research predominantly in the form of target knowledge by increasing the theoretical understanding of a relational paradigm (Walsh et al., 2020a). Inner and outer transformation are reconceptualized through the normative lens of a relational paradigm as a tripartite constellation of onto-ethico-epistemologies in socioecological realities offering a more comprehensive approach to systems change that does neither neglect nor hierarchically order inner and outer transformation. Article II contributes to transformative research by developing a transformative educational case study grounded in a relational, justice-oriented approach. According to the WBGU (2011), transformative education makes the findings of transformation research available to society. The case study provides concrete practices, pathways, and recommendations for curricula development that other universities/training institutions could follow or learn from. Article III contributes to transformation research by analyzing how a relational paradigm might contribute to policy and practice of sustainable lifestyles. It reconceptualizes sustainable lifestyles as subject to an ongoing, nonhierarchical, nonlinear, dynamic, co-creative process of intra-action that emerges out of ethico-onto-epistemologies and socioecological realities.

Overall, the findings allow for a better understanding of transformations in complex systems and offer more effective approaches to systems interventions by showing how a relational paradigm can contribute to understanding inner and outer transformations towards sustainability in the Anthropocene. They call for an engagement of inner transformation as an inherent part of transformations towards sustainability and explicitly point out the intra-action, mutual dependence, and co-constituency of inner and outer transformation. Phenomena, such as

climate change, are not something 'out there' or 'external' but an inherent, constitutive part of one's inner dimension. The inner and outer dimensions are then subject to an ongoing, nonhierarchical dynamic process of intra-action. The inner and outer dimensions are not distinguishable but co-constituted. Ives et al. (2019) recently called for exploring relations among the inner and outer dimensions rather than discussing them as discrete dimensions, pointing out that.

"while the inner life is a deep driver of behavior, it is unlikely sufficient to generate the profound systemic change necessary for addressing global sustainability challenges in isolation. Any exploration of inner worlds within sustainability science must be done in conjunction with analysis of institutional structures, social context, and politics" (Ives et al., 2019:212).

The insights of this thesis respond to this call.

Moreover, the findings indicate that systems' well-being depends on the relationship quality. The relational paradigm reveals the complexity and intersectionality of the multiple converging crises. The integration across dimensions is essential to overcome systems-level crises, such as health issues. For example, the health of the planet can be seen as a mirror of the health of our bodies, communities, and habitats. Toxins in the air, water, or land can contaminate our bodies. Attending to inner and outer dimensions in isolation is, therefore, inadequate. The implication is that sustainability goals, such as the Sustainable Development Goals, might be more effectively addressed by focusing on the quality of the relations between the goals.

Additionally, the findings add to the understanding of the leverage points model described in the introduction (e.g., Meadows, 1999). The reasoning behind engaging in inner transformation is that it is a lever for social-ecological transformation towards sustainability, building specifically on Meadow's model of leverage points. This model is based on the understanding of complex systems. Yet, by defining hierarchies of interventions, it somehow falls prey to the same kind of thinking it aims to overcome, such as claiming causality, linearity, and predictability. The proposed re-conceptualization of inner and outer transformation might therefore be a helpful additional heuristic to approach systems change, such

as the model of change for internal–external transformation towards sustainability by Wamsler et al. (2022), which provides a roadmap for future systematic research, policy, and practice grounded in a relational paradigm.

Furthermore, the findings show that ideas about managing a “great transition” (WBGU, 2011) might need to be questioned. The findings indicate that complex systems cannot be managed, stirred, or forced. From this point of view, transformation is already always ongoing in all aspects of life. It is not something to be found but an emergent phenomenon that unfolds as we explore it (Bodén and Sauzet, 2021). The result of understanding transformation this way is that incremental change, as opposed to a great transition, might be a more conducive way forward.

The following table (table 2) summarizes the key insights and contrasts the above-mentioned key points from a mechanistic paradigm and a relational paradigm. Yet, any paradigm is likely to be partly true and partly false. Postulating relationality as an alternate truth or claiming its ontological realness is not conducive to moving the discourse forward. I, therefore, do not propose either a mechanistic paradigm or a relational paradigm; instead, I propose a both/and. A mechanistic paradigm can be helpful in certain considerations, while the relational paradigm might be more suitable in other situations. One way to practically work with this tension is to ask, “How would things be different from a relational perspective?”. With this, the relational paradigm suggests an evolutionary and emergent view of paradigm change instead of Kuhn’s understanding of successive paradigms, acknowledging and integrating the partial validity of multiple preceding paradigms.

Mechanistic Paradigm	& Relational Paradigm
Interaction between shallow vs. deep leverage points (Abson et al., 2017)	Inner and outer dimensions are not clearly distinguishable but co-constituted.
Changing elements within the system e.g. mindsets	The well-being of systems depends on the quality of the relationships.
Measuring the effect from inner on outer	Understanding intra-action.
Leverage Points Model (Meadows, 1999)	There is no lever to change the system.
Great Transition (WBGU, 2011)	Incremental change as opposed to a great transition that can be managed, stirred, or forced.
Successive Paradigms (Kuhn, 1996)	Evolutionary and emergent view of paradigm change, acknowledging and integrating the partial validity of multiple preceding paradigms.
Paradigms can be defined as commonly agreed upon ways of perceiving the world based on linked assumptions which have been accepted into the mainstream.	Paradigms can be defined as ways of knowing, being and acting that inform and are informed by our socialecological realities.

Table 2: synthesis of a mechanistic and a relational paradigm

Lastly, I would like to propose reframing the idea of “inner and outer transformation in the Anthropocene” to “paradigm-ing relationality in the Ecocene.” As the research shows, a paradigm is not an object with distinct properties but may better be described as a process that comes into being through relational phenomena. This shift - from understanding paradigms from a substance ontology to understanding

them from a process ontology - can be exemplified by moving from nouns to verbs (Hertz et al., 2019). In this case, using “paradigm-ing” as an active verb that describes ontologies, epistemologies, ethics, and socioecological realities as ongoing, nonhierarchical, nonlinear, dynamic, co-creative processes of intra-action in which none pre-exists the other, but comes into being through the entanglement with the other.

Figure 1 aspires to visualize this insight. Each loop represents one of the constituent dimensions of knowing-being-doing in socioecological realities, capturing the intra-action, mutual dependence, and co-constituency that dissolves the binaries of inner and outer. Phenomena are represented as an inherent, constitutive part of one’s inner dimension and outer dimension. The dimensions are constituted in relation to each other, showing that one affects the other. The figure also captures a sense of co-creation and flow between the different dimensions and shows that all four are subject to an ongoing, nonhierarchical dynamic process of intra-action.

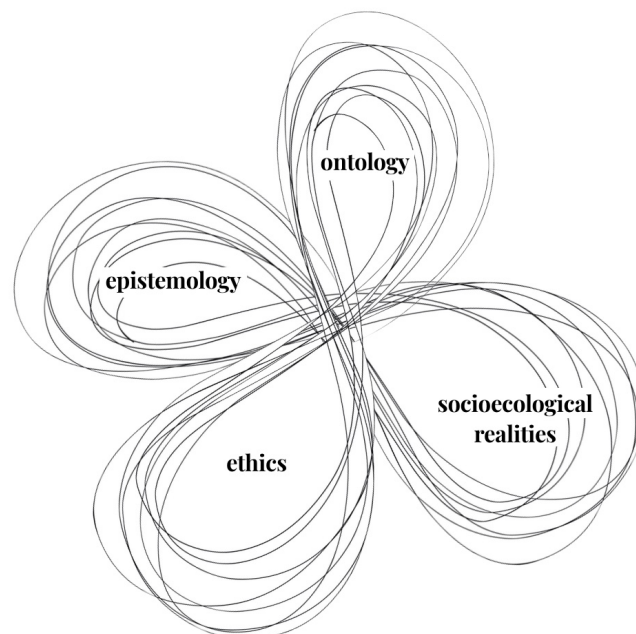


Figure 1: paradigm-ing relationality

By situating the research in the Ecocene, as opposed to the Anthropocene, I follow Küpers` (2020) suggestion to recontextualize the human as part of, rather than as dominating, the social-ecological system to decenter the human. The Ecocene acknowledges a relational approach. Decentering the human and attending to what we might be able to intra-act and become-with increases our capacities to respond to unsustainability (O'Brien, 2016). Instead of working upon the world, humans work with the world and foster the capacity to respond to unsustainability in previously unthought ways. Sustainability, then is not approached from a normative viewpoint, based on the exclusive human agency (as follows from human exceptionalism), but from the perspective that we are a species living in conjunction with the more-than-human world.

VI: Reflections

The potential strength of this thesis lies in its synthesizing character, integrating a range of disciplines - such as philosophy, indigenous and religious studies, political science, cognitive science, psychology, and sustainability science - into transformation research. By integrating such a vast field of disciplines, this thesis exemplifies how interdisciplinary research might contribute to systems change. A second strength lies in the integration of multiple perspectives on relational approaches from scholars, practitioners, and activists. Because of the existing expertise in relational approaches of the stakeholders, we received insights into where we ourselves did not apply a relational paradigm, for example, in terms of framings, language, and ideas. I found this especially relevant because the relational paradigm does require deep, fundamental changes on all levels, and it was challenging to identify where I automatically follow a mechanistic paradigm, for example, by framing a sustainability problem in nature-culture binaries. A third strength lies in the exploration of the topic via case study and conceptual, theoretical work. Although it has been difficult to distinguish how exactly these perspectives were integrated into the research results, close collaboration with various stakeholders has been essential to the research. One way to overcome this lack of clarity could have been a more detailed process description.

One challenge was what Spivak (1990) refers to as strategic essentialism. While, in some instances, as a researcher, I was aware that I did not follow a relational approach, I decided to use the mechanistic paradigm's framings, like sustainable lifestyles, the Anthropocene, or dualisms. As West et al. (2020) point out, "retaining familiar concepts – while at the same time challenging and expanding their meaning – is strategically useful in pursuing practical change in a wider world that still largely expects and operates on the basis of them."

A limitation of the research is the focus on ontologies and ethics and a need for more focus on applying relational epistemologies. Looking back, I found it particularly challenging to apply relational methodologies while I was still learning about relational approaches. This challenge was reinforced by the fact that there are no how-to manuals of relational epistemologies to do the research. As Smartt

Gullion (2018:4) cites Elizabeth St Pierre from a 2014 international congress of qualitative inquiry, „I have not been able to get my students a methodology for this work. The problem of writing a how-to manual is that it would counter many of the arguments made by these theorists.” Moreover, a relational approach poses certain challenges to the researcher, such as identifying the self in relationality, understanding the self as performative, acknowledging that research is subjective and clarifying that knowledge is co-created. I found that learning about these challenges, as I did at the very beginning of this thesis, especially through the literature review, was very different from understanding it on a more fundamental level in such a way that I feel equipped to do research accordingly.

A further challenge, which relates to the former one, was that I am socialized and grounded in a mechanistic paradigm. Albert Einstein is supposed to have said that “you can’t solve a problem with the same kind of thinking that created it.” Yet, I researched - for me - new ways of thinking while being grounded in an old way of thinking.

Furthermore, relationality can easily be misunderstood as a romantic idea and hence not taken seriously. For example, until recently, the notion that nonhumans have agency was seen as primitive. This brings with it the challenge of how to talk about these topics 1. without sounding naive, 2. acknowledging the long tradition of these thoughts in other cultures, and 3. bridging this with scientific knowledge.

Lastly, a further limitation of the research is that all of us authors come from a background of what Heinrich (2020) refers to as WEIRD: western, educated, industrialized, rich, and democratic. Relational ontologies, though, are heavily informed by indigenous knowledge, and although we did integrate what we learned about relational approaches from indigenous knowledge sources, none of us are grounded in these ways of knowing, being, and acting.

VII: Outlook

In this thesis, I have attempted to generate insight into the complex interface of inner and outer transformation for sustainability transformations in the Anthropocene. A relational paradigm can be understood as a way to make sense of the world that departs from the dominant Western paradigm and allows for ways of knowing, being, and acting in line with sustainable futures. It offers a framing to overcome common challenges for a socioecological just future by dissolving the distinct boundaries between inner and outer transformation. This can be especially helpful to address deeper underlying system structures for revealing underlying epistemologies, ethics, ontologies, or socialecological realities and bringing them and their intra-action to the surface.

One aspect that repeatedly emerged during the research was the need to create new words to reinforce a relational paradigm. Language can be seen as an expression and reinforcement of paradigms (Ives et al., 2019). For example, as Ives et al. point out, the frame "sustainability science" implies a pursuit of maintenance, whereas terms such as "flourishing" point to a "deeper desire and inspire us to seek and create the futures we want" (Ives et al., 2019:213). Moreover, paradigms form frames and language and vice versa (Lakoff, 2014; Ives et al., 2019). "Frames are mental structures that shape the way we see the world. (...) They shape the goals we seek, the plans we make, the way we act, and what counts as a good or bad outcome of our actions" (Lakoff, 2014:131). In politics, frames shape our social policies and the institutions that implement them. Reframing paradigms and the associated frames are, thus, crucial for social change (Lakoff, 2014). Helfrich and Bollier (2019) point out that "If the words in a given language focus on shapes over function, then no wonder the speakers of that language prefer to group things according to their shape rather than their function" (Bollier and Helfrich, 2019:location 708). Knowledge creation through words always has material consequences (Barad, 2007; Jackson and Mazzei, 2012, Smartt Gullion, 2018). Facts and truths are inextricably tied to the vocabularies and paradigms the scientists use to represent them (Kuhn, 1996). In literature about relational paradigms, word-making is therefore not unusual (e.g., diffr-action, becoming-with,

or intra-action). Additionally, there is an open question of how to navigate the dance between paradigms: How do we talk about relational paradigms in a way that acknowledges the limitation of language and introduces new words while at the same time remaining accessible and open. Therefore, further research into analyzing and identifying language and the words we use to describe transformations is necessary to establish a relational paradigm.

To make the best use of the relational paradigm, developing diagnostic tools for reflections on epistemologies, ethics, ontologies, and socioecological realities might be conducive. Yet, as Latour points out, "tools are never 'mere' tools ready to be applied: they always modify the goals you had in mind" (Latour 2005:143). Offering a practical tool or figure might lead to a simplistic conceptualization that narrows one's understanding (Mancilla Garcia et al., 2020). To overcome this challenge, Puis de la Bellacasa (2021) suggests instead to aim for a commitment of asking how things could be different. Regarding the relational paradigm, this might be a practice of asking what would be different if the relationship is focused or how it would be different from a relational and a mechanistic paradigm. Therefore, developing processes and practices of asking might help to integrate the relational paradigm into one's work and research. Yet, more research on how relational approaches can be used to develop methodologies in sustainability science is necessary.

Because these reflections and diffractions take time and resources, increasing the effectiveness of relational ways of knowing, being, and acting would call for institutionalized facilities and spaces that positively influence specific inner dimensions and reflexive practices among the involved stakeholders. Following a relational paradigm can be troubling (Haraway, 2016), as it opposes the dominant social paradigm. On the one hand, it is necessary to be a strong identity that expresses one's relational values and, on the other hand, to recognize oneself relationally. The individual is not a singular subject but is produced by various material, discursive and affective forces within society and reproduces them. To stay with this trouble, specific personal skills must be developed. These skills encompass one's ways of knowing, being, and acting in socioecological realities (Böhme et al., 2022). This requires a lifelong learning process (Walsh et al., 2020)

of unlearning many of our habituated ways of paradigm-ing (in the Western, industrialized world) and calls for institutionalized facilities and spaces. For example, leading authors in the field of transdisciplinarity emphasize that research processes benefit significantly from integrating reflexive and contemplative practices so that individuals or collectives become aware of their role as interveners (Lang et al., 2017). They argue that mindfulness exercises should become an integral practice in transdisciplinary research projects to cultivate sustainability values of collaboration, mindfulness, and altruism (Lang et al., 2017). Wamsler et al. (2020) report that shared self-reflection may benefit negotiations at the UNFCCC Conference of the Parties (COP). By inquiring about how the challenges of sustainability transformations reveal our ways of knowing, being, and acting in the world, they have the potential to make us re-paradigm our relationships with ourselves, each other, and the more-than-human world. And since paradigms create worlds, this may be a powerful way forward for a flourishing future.

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Appendix I: Overview of literature review.

Category	Related Fields	Related Discourses	# of pubs	Results
Ontology	philosophy, indigenous and religious studies, cultural studies, and political science	speculative realism, process philosophy, new materialism, indigenous wisdom, and religious wisdom	25	<ul style="list-style-type: none"> aim to overcome the bifurcation of nature/culture and various other dualisms (e.g. mind/matter, subjectivity/objectivity)
Epistemology	cognitive science, psychology, sociology, philosophy, science and technology studies, feminism, and sustainability science.	4E cognition, affect studies, ecopsychology, assemblage theory, actor network theory, multi-species ethnography, integral ecology, geophilosophy, non-philosophy, transdisciplinary methods, intersectional analysis, systems and complexity theory, and reflexive and diffractive methods	52	<ul style="list-style-type: none"> account for the observer's role in shaping knowledge acknowledge that agency is distributed across networks; view objects as assemblages of humans and nonhumans; increasingly focus on transdisciplinary methods to cut across disciplinary boundaries; and use diffractive methods to integrate different ways of knowing.
Ethics	sustainability science, philosophy, religious studies, and cultural studies.	biocentrism, ecocentrism, deep ecology, social ecology, political ecology, environmental and climate justice, ecofeminism, and posthumanism	23	<ul style="list-style-type: none"> non-anthropocentric perspectives; value nonhuman nature in non-instrumental terms; use intersectional methods to analyze the inter-relations between social and ecological issues; and contextualize human-nature interactions in light of asymmetrical power relations and dynamics between assemblages or networks of interest.

Table 3: Overview of fields, discourses and results of the literature review.

Appendix II: Overview of Articles

Article No.	Bibliography	Publication Status
1	Walsh Z, Böhme J, Wamsler C (2020). Towards a relational paradigm in sustainability research, practice, and education. <i>Ambio</i> . DOI 10.1007/s13280-020-01322-y	Published on Feb 28th, 2020
2	Walsh Z, Böhme J, Wamsler C, Lavelle B (2020). Transformative Education: Towards a Relational, Justice-Oriented Approach to Sustainability. <i>Journal of Sustainability in Higher Education</i> . DOI 10.1108/IJSHE-05-2020-0176	Published on Sep 3rd, 2020
3	Böhme J, Walsh Z, Wamsler C (2022). Sustainable Lifestyles: Towards a Relational Approach. <i>Sustainability Science</i> .	Published on Mar 17th, 2022

Appendix III: Articles

Article I: Walsh Z, Böhme J, Wamsler C (2020). Towards a relational paradigm in sustainability research, practice, and education. *Ambio*. 50:74-84

Abstract

Relational thinking has recently gained increasing prominence across academic disciplines in an attempt to understand complex phenomena in terms of constitutive processes and relations. Interdisciplinary fields of study, such as science and technology studies (STS), the environmental humanities, and the posthumanities, for example, have started to reformulate academic understanding of nature-cultures based on relational thinking. Although the sustainability crisis serves as a contemporary backdrop and in fact calls for such innovative forms of interdisciplinary scholarship, the field of sustainability research has not yet tapped into the rich possibilities offered by relational thinking. Against this background, the purpose of this paper is to identify relational approaches to ontology, epistemology, and ethics which are relevant to sustainability research. More specifically, we analyze how relational approaches have been understood and conceptualized across a broad range of disciplines and contexts relevant to sustainability to identify and harness connections and contributions for future sustainability-related work. Our results highlight common themes and patterns across relational approaches, helping to identify and characterize a relational paradigm within sustainability research. On this basis, we conclude with a call to action for sustainability researchers to co-develop a research agenda for advancing this relational paradigm within sustainability research, practice, and education.

Introduction

Shifting the paradigms from which systems arise is said to be the most effective leverage point for creating change (Meadows 1999; Abson et al. 2017). Paradigms shape how we perceive the world, what we believe is possible, and how we understand and address sustainability challenges. It is, therefore, critical for sustainability scholars to understand the paradigms shaping their field and to orient their work in line with the most advanced theories and practices from fields relevant to sustainability.

In this paper, we define paradigms as commonly agreed upon ways of perceiving the world based on linked assumptions which have been accepted into the mainstream (Mackinnon and Powell 2008). Mainstream approaches to sustainability currently fall mainly within a technocratic paradigm, focused on addressing certain elements of the system without addressing the intrinsic relations between those elements. System science reveals though, that relations between the elements in the system effect the state of the system as a whole (Kauffman 1995).

Accordingly, various authors have recently argued that a lack of relationality is at the core of many of our current crises, and describe what may be considered an emerging paradigm informed by relational thinking using different terms and concepts, such as the ecological paradigm (Ulanowicz 2009; Hörl 2017), systems approach (Capra and Luisi 2014), integral theory (Wilber 1996), metamodernism (Freinacht 2017), and constructive postmodernism (Cobb 2002). As relationality has become a buzz word with many meanings, however, it is unclear whether different relational thinkers share linked assumptions that constitute an emerging paradigm and to what degree they relate to sustainability.

Against this background, we analyze how relational discourses¹ have been understood and conceptualized across a broad range of disciplines and contexts relevant to sustainability to identify and harness their connections and contributions for future sustainability-related work. For an emerging paradigm to become mainstream, there must be a coordinated shift in our way of being, thinking, and acting. To better understand how assumptions may be linked, we have, therefore,

¹ The term 'discourse' defines ways to think and communicate about a given subject matter.

categorized literature into ways of being (ontologies), thinking (epistemologies) and acting (ethics). These three categories were selected as fundamental aspects of relationality based on the work of Varela (1999), Barad (2007), Kassel et al. (2016), Escobar (2017), and Pius de la Bellacasa (2017) who describe relational ways of being, thinking, and acting as a single tri-partite constellation—an ethico-onto-epistemology—that does not presuppose subject-object and nature-culture binaries.

Accordingly, in this paper, we will identify relational approaches to ontology, epistemology, and ethics which are relevant to sustainability. After describing our method of analysis (“Methodology”), we present what relational approaches to ontology encompass (“Relational Approaches to Ontology”), how relational approaches to epistemology can shape research practice (“Relational Approaches to Epistemology”), and the normative, ethical orientations underlying relational approaches to sustainability (“Relational Approaches to Ethics”). On this basis, we discuss the identified trends, themes, and patterns characterizing a relational approach to sustainability, concluding with recommendations for future research (“Conclusions”).

Methodology

This study presents a qualitative literature review to analyze how relational approaches relevant to sustainability have been understood and conceptualized. Indications of a relational paradigm come from diverse systems of knowledge in the humanities, social sciences, and natural sciences. Academic literature across multiple disciplines was selected for analysis insofar as they discussed relational approaches to ontology, epistemology, and ethics and were related to the context of sustainability.

Literature was selected based on an exploratory approach, combining the use of scholarly database searches (e.g. Scopus and Google Scholar) with a consultation process with different key stakeholders and informants.² The latter involved a total of five workshops and continuous communication with participants through the participatory development of a web-based communication platform and database in

² The key stakeholders were identified through a targeted selection of scholars and practitioners and an open call for participation related to the themes of this paper. The workshops included a total of 125 participants.

the field between 2017 and 2019.³This resulted in the identification of a total of 100 publications for analysis (cf. “Relational Approaches to Ontology”, “Relational Approaches to Epistemology” and “Relational Approaches to Ethics”). The categorization of the identified papers to the three categories (ontology, epistemology and ethics) was based on the following definition of these terms and their relevance for sustainability:

- A. *Ontologies* describe the “assumptions (which may be implicit or explicit) about what kinds of things do or can exist in [reality], and what might be their conditions of existence, relations of dependency, and so on” (Scott and Marshall 2009, p. 531).
- B. *Epistemologies* describe how we come to know the world. They define the criteria, standards, and methods for understanding reality (Steup 2018).
- C. *Ethics* describes “what is morally good and bad and morally right and wrong” (Singer 2019, para. 1). It includes cultural values, morals, and norms shaped by social and political life.

These 3 categories were separated for the purposes of presenting a clear analysis, while acknowledging that the categories and discourses are mutually entangled. As such, the categorization schema is a fuzzy set⁴ which assigns discourses membership to a primary category while acknowledging that they relate to more than their assigned category.⁵ We separate discourses to highlight specific relationships that could prove helpful in further developing relational approaches to sustainability, whilst we recognize that discourses could be differently categorized, allowing new relationships to become visible. What we construct is therefore one potential functional assemblage that may be explored in future sustainability research. Figure 1 presents a tanglegram (Hodder 2012), highlighting the identified entanglements of the 26 most prominent discourses outlined in our analysis (“Relational Approaches to Ontology”, “Relational Approaches to Epistemology” and

³ <http://www.ama-project.org/>.

⁴ Zadeh (1965) defines fuzzy sets as “a class of objects with a continuum of grades of membership. Such a set is characterized by a membership (characteristic) function which assigns to each object a grade of membership ranging between zero and one” (p. 338).

⁵ For instance, posthumanism and ecofeminism make ontological and epistemological critiques, not just ethical ones; nevertheless, they have been included under ethics because unlike other discourses, they are explicitly normative in orientation.

“Relational Approaches to Ethics”).⁶ The tri-partite categorization offers a functional framework for developing relational approaches to sustainability in concert with each other, drawing upon the diversity of discourses while respecting both their distinctions and intra-relations.

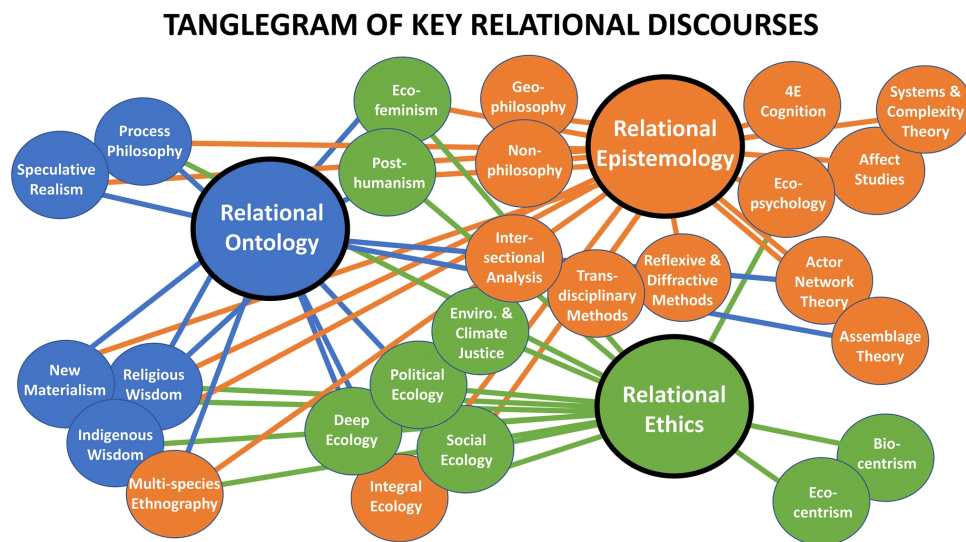


Fig. 1: Functional assemblage of twenty-six relational discourses relevant to sustainability with connections to ontology, epistemology, and ethics

Relational approaches to ontology

A total of 25 publications were identified as relevant regarding relational approaches to ontology. They come mainly from the fields of philosophy, indigenous and religious studies, cultural studies, and political science. In this context, relevant discourses describing relational ontologies relate to speculative realism, process philosophy, new materialism, indigenous wisdom, and religious wisdom (Fig. 1). All relational ontologies posit that “the relations between entities are more fundamental than the entities themselves” (Wildman 2006, p. 1). No entity preexists the relations that constitute it.

Within the identified literature, the majority of sources describe relational ontologies that can be broadly categorized as either undifferentiated or differentiated. Undifferentiated relational ontologies are monistic, viewing an entity as “an evolving expression of a metaphysical source” (Stout 2012, p. 389). Ecological holism is a

⁶ Although certain discourses have been clustered together to designate their relative affinity, the distance between discourses and the 3 categories is insignificant.

form of undifferentiated relational ontology, for example, that dissolves the distinctions between mind, matter, and life in terms of more fundamental activities of the universe (Smuts 1926). By contrast, differentiated relational ontologies view reality as an evolving unique expression of complex, relational, multidimensional sources (Stout 2012, p. 389). The latter conceives identity and difference in relation to each other, whereas the former assimilates differences in more fully encompassing forms of identity. The difference between undifferentiated and differentiated relational ontology is consequential for sustainability research. White et al.'s (2016) comprehensive survey of hybrid theoretical approaches to society and nature demonstrates the importance of taking a differentiated relational approach, so as to understand the mutual relations between social and ecological systems without dichotomizing or subsuming one into the other.

Contemporary discourses on relational ontology in Western thought were identified as belonging to speculative realism, process philosophy, and new materialism. Speculative realism (hereafter SR) is a heterogeneous body of thought in which various philosophies posit very different alternatives to the bifurcation of nature/culture and the anti-realism of modern Enlightenment philosophy. SR's core commitments are to a renewed willingness to entertain speculative metaphysics and ontological realism in an attempt to overcome the problem of correlationism. As most famously described by Kant, correlationism posits that an object cannot be known outside its relationship to the mind, such that knowledge of reality is always a correlation between thinking and being (Bryant et al. 2011). SR seeks various ways to describe reality outside this contradiction.

Process philosophy is an antecedent of SR known to possess a differentiated relational ontology (Keller and Daniell 2002; Faber and Stephenson 2011; Shaviri 2014). The progenitor of process philosophy, Alfred North Whitehead (1929), posited that every actual entity composes societies of ever-greater societies, while being both internally related and differentiated from other actual entities. The social, he claimed, "is a way of describing how each entity is constituted by and through its environment" (Halewood 2011, p. 121). Recent works by Henning (2005), Ims et al. (2015), Stengers (2015), Muraca (2016), Latour (2017), Kaaronen (2018), and Mancilla et al. (2019) demonstrate the multiple ways process-relational ontologies shift epistemological and ethical orientations to human–nature interactions based

on an understanding of their co-constitution. Latour (2017) is probably one of the best-known authors writing about process philosophy and ecology who argues that the Earth should be conceived as a complex assemblage of living and agential processes which should be given political standing.

Another heterogeneous body of thought that develops relational approaches to ontology in the context of sustainability is new materialism. New materialism makes a core commitment to experiment with post-Cartesian ontologies that explore the variegated relationships between different nature-cultures. New materialists generally employ multi-modal methodologies that examine various levels (micro-, meso-, and macro-) of socio-ecological systems simultaneously (Coole and Frost 2010). Jane Bennett is, for instance, one of the better-known new materialists. In *Vibrant Matter* (2010), she develops a “vibrant materialism” that (like Latour) attributes agency to nonhumans, and that (like Whitehead) views living and non-living matter as co-constituting assemblages.

These discourses on relational ontology (SR, process philosophy, and new materialism) are comparatively recent developments emerging within Western thought. Most relational ontologies have, however, developed historically outside the West for millennia (Todd 2016). Worldwide, there are many non-modern, earth-based, indigenous and religious ontologies that never inherited the bifurcation of nature/culture characteristic of the Western modern worldview. These traditions all focus on the inter-related, inter-dependent, and inter-active aspects of nature-cultures. Unlike Western environmentalism, these traditions do not relate to the environment as something ‘out there’ that needs to be protected. Landscapes are considered both physical and mental phenomena, bearing the markings of personal and collective biographies, task-scapes, customs, rituals, and cosmologies (Miller et al. 2014; Miller 2017). Indigenous peoples of the Americas, for example, follow a relational ontology based on kinship. They perceive themselves and nature as part of the same family sharing origins and ancestral bonds (Salmon 2000; Datta 2015; Posthumus 2018).

Relational approaches to epistemology

A total of 52 publications were identified as relevant regarding relational approaches to epistemology. They come mainly from the fields of cognitive science, psychology, sociology, philosophy, science and technology studies, feminism, and sustainability science. Relevant discourses describing relational epistemologies within the identified literature relate to 4E cognition, affect studies, ecopsychology, assemblage theory, actor-network theory (ANT), multi-species ethnography, integral ecology, geo-philosophy, non-philosophy, transdisciplinary (TD) methods, intersectional analysis, systems and complexity theory, and reflexive and diffractive methods (Fig. 1).

There is broad consensus that modern western epistemologies arising from the Enlightenment and scientific revolution are largely responsible for creating profound divisions and patterns of exploitation between humans and nonhumans. Their intellectual foundations were formed by figures such as Isaac Newton, Immanuel Kant, David Hume, John Locke, Francis Bacon, and René Descartes (Griffin 2001). They posit: (1) The idea that causation is determined only by external relations between objects; (2) that no object can be understood outside its relation to thought; (3) that primary and secondary (sensible) qualities are separable and that science can objectively study the former without the latter; (4) that nature can be mastered, 'her' secrets revealed to instrumental reason and scientific 'progress'; and finally, (5) that mind and body are separable substances, and that the latter is the domain of objective scientific inquiry. These ideas formed the philosophy of empiricism that shaped the development of science, technology, and industry throughout the modern period. Though these ideas have been profoundly influential in shaping society, as Latour (1991) argues, we have never been truly modern. Despite modern people believing nature could be understood objectively, scientific knowledge is fundamentally shaped by social relations and practices. Researchers have always shaped and been shaped by the objects of their research. As such, many researchers now increasingly use reflexive methods to account for the observer's role in shaping knowledge (May and Perry 2017).

In this context, the identified relevant literature from the field of cognitive science uses embodied, embedded, extended, and enactive (4E) approaches to cognition to

scientifically understand the complex and dynamic interactions between coupled brain–body–environment systems (Varela et al. 1991; Clark 2008). Evan Thompson (2010), for instance, argues that closing the explanatory gap between consciousness and life is possible by incorporating phenomenological accounts of experience into scientific accounts of mind and life. Frequently, 4E approaches are also called 4EA, so as to include the growing field of affect studies (Gregg and Seigworth 2010)—an interdisciplinary body of research taking relational approaches to emotions (Slaby 2016) that has examined emotional relationships to environments (Bladow and Ladino 2018), media ecology (Angerer 2017), and body politics (Protevi 2009).

The review of relevant literature in psychology stipulates that identity-based, value-based, and socio-cognitive approaches provide the best ways of bridging knowledge of personal and social-ecological transformation (Bögel and Upham 2018, p. 18). Ecopsychology is a branch of psychology that draws upon the ecological sciences to study the constitutive relations between minds and environments (Kanner et al. 1995; Fisher 2013). Studies on ecopsychology are typically concerned with the ecological unconscious, phenomenology, the interconnectedness of all beings, the transpersonal, and the transcendental (Kahn and Hasbach 2012).

The review of the identified social scientific literature shows a growing interest in relational approaches to knowing. These approaches allow social scientists new methods for analyzing human-nonhuman relations. Assemblage theory (DeLanda 2006) considers all things living and non-living to be assemblages of human and nonhuman parts. Several methods for studying assemblages have developed in empirical work (e.g. McFarlane 2011; Baker and McGuirk 2017; Feely 2019). Actor-network theory (ANT) is among the relational methods most frequently used in the social sciences (Latour 2005). It does not position humans at the center or apex of agency and responsibility, but rather, considers agency to be distributed among various actants—none of which are themselves solely responsible for change. It studies how agency is formed by an interlinked chain of beings and processes, rather than any individual. To write about agency outside humanist epistemology, scholars frequently employ multi-species ethnography (e.g. Kirksey and Helmreich 2010; Kirksey 2014; Multispecies Editing Collective 2017).

In the field of philosophy, our review shows that relational epistemologies are being developed to help us think transversally across different geo-social scales. Integral approaches to ecology, also known as integral ecology, cross-boundaries between the humanities, social sciences, and natural sciences (e.g. Esbjörn-Hargens and Zimmerman 2009; Mickey 2014; Mickey et al. 2017). O'Brien and Hochachka (2010), for example, use integral theory to develop a multi-disciplinary, multi-perspectival understanding of climate change adaptation. Deleuze and Guattari's geo-philosophy is another approach to traversing mental, social and environmental ecologies (Bonta and Protevi 2004), as is Francois Laruelle's non-philosophy, which provides a method for different ways of knowing (e.g. theologically, philosophically, and scientifically) to inform each other without imposing hierarchies (Smith 2013). These emerging philosophical approaches offer ways to think ecologically; not just to think 'about ecology,' but rather to think in terms of a 'general ecology' (Hörl 2017). Morton (2013, 2016) exemplifies work in this mode. He defines ecological awareness as a knowing that loops in on itself, as in a meditation, where one becomes familiar with 'the mesh' of inter-related happenings and their constitutive relations to oneself.

Transdisciplinary sciences have also begun developing relational approaches to knowing (Nicolescu 2002; Craps and Brugnach 2015; Van Breda and Swilling 2018). Systems theory (incl. general systems theory, cybernetics, and complexity theory) is among the most prevalent discourses within these sciences (cf. Barile et al. 2018; Preiser et al. 2018). According to Capra and Luisi (2014), systems thinking developed in the 1920s by biologists, Gestalt psychologists, ecologists, and quantum physicists. It is characterized by several important shifts of perspective: from the parts to the whole; from disciplines to multidisciplinary; from objects to relationships; from measuring to mapping; from quantities to qualities; from structures to processes; from objective to epistemic science; and from Cartesian certainty to approximate knowledge (pp. 80–82).

Feminist scholars offer important socially situated epistemological discourses, including standpoint theory (Harding 1991), situated knowledge (Haraway 1988), and intersectional analysis (Crenshaw 1989). These discourses politicize and ethically orient sustainability research and have been most frequently employed within environmental justice scholarship (e.g. Kaijser and Kronsell 2014; Malin and Ryder 2018). Feminist scholars have also developed diffractive methods to

overcome the shortcomings of reflexive methods (e.g., Barad 2007; Bozalek and Zembylas 2017; Hill 2017). Diffractive methods are used to read the insights of one discipline through another discipline to generate novel insights in the relation between differences (e.g., Larson and Philips 2013; Massei 2014; Doucet 2018; Gullion 2018).

Finally, our review shows that in the field of sustainability science, scholars increasingly call for developing empirical methods that account for subjectivity and its role in shaping scientific practice (cf. Wamsler et al. 2018). Manuel-Navarrete (2015) claims for instance that research on 'mind maps' and 'mental models' provide generalizable ways of objectively analyzing subjectivity and integrating it in systems research and institutional arrangements.

Relational approaches to ethics

A total of 23 publications were identified as relevant regarding relational approaches to ethics. They come mainly from the fields of sustainability science, philosophy, religious studies, and cultural studies. Relevant discourses describing relational approaches to ethics within the literature studied include biocentrism, ecocentrism, deep ecology, social ecology, political ecology, environmental and climate justice, ecofeminism, and posthumanism (Fig. 1). The latter five discourses have been provisionally included under the category of ethics. Although they have shaped understandings of ontology and epistemology, they are nevertheless normative discourses influencing values, morals, and norms, especially at a societal level.

The identified dominant relational approaches to ethics within the fields of environmental and climate ethics include biocentrism and ecocentrism. Biocentrism and ecocentrism attribute moral significance to biological organisms and ecological systems, respectively. Collectively, they are committed to non-anthropocentrism, meaning that they do not position human interests at the center of moral concern.⁷

Deep ecology is an influential discourse, emphasizing the need to shift consciousness as a prerequisite for shifting modern industrial society toward a more sustainable paradigm. It was coined by the Norwegian eco-philosopher Arne Naess. Naess contrasts deep ecology with shallow ecology, arguing that whereas

⁷ Non-anthropocentric approaches to environmental and climate ethics are collected in Henning and Walsh (2020).

the latter views nature anthropocentrically in terms of nature's utility for us, deep ecology mines resources from spiritual, religious, and philosophical traditions to view nature eco-centrally. Although there can be many different versions of deep ecology, Naess' version (ecosophy 'T') is informed by Spinoza, Mahayana Buddhism, and the Gandhian philosophy of non-violence. As conflicts of interest arise, the health and flourishing of humans and nonhumans are considered holistically, such that the vitality of higher-order (more complex) systems is protected over that of lower-order systems (Drengson and Devall 2010).

Critical scholars contend that deep ecology has an apolitical view of systems change, so they claim it is important to integrate deep ecology with social ecology (Slocombe 2002). Gary Snyder is one example of a thinker who has integrated both deep and social ecology in his activism and writings (Messersmith-Glavin 2012). As developed by Bookchin (Biehl 1999), social ecology adds a critical perspective on class-based struggles of marginalized people by considering how ecology is informed by social hierarchy and domination. Radical social ecology investigates the material, social, and spiritual conditions of an ecological society by pursuing the elimination of human's domination of nature via the elimination of human's domination of humans. It connects ecological issues to a broad array of interconnected social issues (Bookchin 1980).

Similarly, political ecology examines asymmetrical distribution of resources and power, helping to address the structural causes, not symptoms of sustainability challenges (Robbins 2012). Environmental and climate justice scholarship applies the methods of intersectional analysis in social and political ecology to the modern environmental movement. By forming alliances with marginalized groups, environmental and climate justice activists and scholars integrate personal and socio-ecological transformation by addressing both social justice issues (especially race, gender, and class-based injustice) in relation to ecological issues (such as air pollution, waste disposal, and access to clean water) (Carder n.d; Mohai et al. 2009).

Among the identified literature from social and political ecology, ecofeminism is among the most important and influential discourses. Ecofeminism "seeks to understand the interconnected roots of all domination," connecting the oppression and domination of women in particular and marginalized groups in general to the

oppression and domination of nature (Plant n.d., p. 101). Plumwood (1993) connects the logic of domination to dualistic structures of reasoning in Western thought. Male/female, mind/body, civilized/primitive, and human/nature dualisms, she argues, naturalize unequal and exploitative relationships based on the domination of subordinate groups. Other noted ecofeminists like Merchant (1980) and Shiva (1989) document how science, technology, and economic development espouse ideas of progress tied to the control and mastery of nature and of women; while spiritually informed ecofeminists such as Ruether (1992, 2005) develop religious responses to these critiques, emphasizing the liberative potential of cultivating feminine principles in society.

In making the claim that women are closer to nature, however, some (but by no means most) ecofeminists have problematically upheld gendered concepts of nature that fail to overcome the dualistic thinking underlying the logic of domination (Gaard 2011). Ecofeminism has since become more critical, intersectional, materialist, and posthumanist (Alaimo and Hekman 2008; Gaard 2017). Prominent recent works include Alaimo (2010), Braidotti (2013), Zylinska (2014), Haraway (2016), Keller (2017) and Puis de la Bellacasa (2017). Posthuman feminists reject essentialist concepts of gender, and are much more technomaterialist, viewing human–nonhuman relations as materially informed by socio-technical systems. Posthumanism does not relegate its interest to animal (zoologic) encounters but explores relations of all kinds—both between biological beings (such as symbionts or holobionts) and cyborgs (or flesh machines).

Discussion and Conclusions

Our review of the existing bodies of literature that take relational approaches to ontology, epistemology, and ethics relevant for sustainability has identified important developments, common themes, and patterns that constitute characteristics of a relational paradigm (and possible shift towards a relational paradigm) in sustainability research. Despite differences between the various perspectives cited, all describe a paradigm that (i) is grounded in a relational ontology, (ii) emphasizes the need for understanding human and non-human nature as mutually constitutive, and (iii) values more-than-human relations.

Our analysis shows that relational ontologies aim to overcome the bifurcation of nature/culture and various other dualisms (e.g. mind/matter, subjectivity/objectivity) shaping the modern worldview. Differentiated (as opposed to undifferentiated) relational ontologies respect the integrity of individuals while understanding how their being is fundamentally constituted by relations of all kinds. In this context, speculative realism, process philosophy, new materialism, and indigenous and religious wisdom traditions are systems of knowledge providing particularly well-developed understandings of relational ontology relevant to sustainability.

Our review also shows that relational approaches to epistemology account for the observer's role in shaping knowledge; acknowledge that agency is distributed across networks; view objects as assemblages of humans and nonhumans; increasingly focus on transdisciplinary methods to cut across disciplinary boundaries; and use diffractive methods to integrate different ways of knowing.

Lastly, our review shows that relational approaches to ethics include non-anthropocentric perspectives; value non-human nature in non-instrumental terms; use intersectional methods to analyze the inter-relations between social and ecological issues; and contextualize human–nature interactions in light of asymmetrical power relations and dynamics between assemblages or networks of interest.

This paper discretely analyzed relational approaches to ontology, epistemology, and ethics in an attempt to outline avenues to further develop them as a tri-partite constellation in future sustainability research, practice, and education.⁸ Accordingly, the results and the developed analytical tri-partite framework on which they were based, can enable scholars and practitioners to identify and harness the contributions of relational approaches to sustainability in a more systematic way.

Currently, there exist only a few studies that explicitly take, to some extent, relational approaches to sustainability. These include research in fields, such as resilience (e.g. Darnhofer et al. 2016; Lejano 2019); socio-technical transitions (e.g. Garud and Gehman 2012; Chilvers and Longhurst 2015; Haxeltine et al. 2017); sustainability education (e.g. Netherwood et al. 2006; Williams 2013; Lange 2018; O'Neil 2018;

⁸ The web-based platform, upon which this research is partly based, has been developed to support such a task: <http://www.ama-project.org/>.

McPhie and Clarke 2019; Taylor and Pacini-Ketchabaw 2019); environmental values (e.g. Jax et al. 2018; Pascual et al. 2018; Saxena et al. 2018); posthuman sustainability (e.g. Cielemecka and Daigle 2019; Fox and Alldred 2019; Smith 2019); and quantum theory in sustainability (e.g. O'Brien 2016; Rigolot 2019). In spite of such exceptions, few sustainability researchers make explicit the related discourses outlined in this paper.

In fact, our analysis shows that relational approaches are marginalized within sustainability scholarship, despite the broad academic interest in relationality emerging across other fields. This article, therefore, calls scholars to consider the identified discourses in future sustainability research, practice, and education.

The identified relational approaches provide a basis for integrating so-called “inner” and “outer,” “personal” and “collective” dimensions of sustainability without presupposing the logic of dualism underlying that language and framing. Ives et al. (2019) recently called for exploring relations among these dimensions, rather than discussing them as discrete dimensions.

Based on our results, we call for further research to better understand the generative interconnections between these various discourses and dimensions. More specifically, we call for further research that investigates how relational ontologies, epistemologies, and ethics intra-act to compose a relational approach to sustainability. In this context, intra-action means “the mutual constitution of entangled agencies. That is, in contrast to the usual ‘interaction,’ which assumes that there are separate individual agencies that precede their interaction, the notion of intra-action recognizes that distinct agencies do not precede, but rather emerge through, their intra-action” (Barad 2007, p. 33). On this basis, we conclude with a call to action for sustainability scholars and practitioners to co-develop a research agenda for advancing a relational paradigm within sustainability research, practice, and education based on relational ways of being, knowing, and acting.

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Abstract

Purpose

This paper aims to increase related knowledge across personal, social and ecological dimensions of sustainability and how it can be applied to support transformative learning.

Design/methodology/approach

The paper provides a reflexive case study of the design, content and impact of a course on eco-justice that integrates relational learning with an equity and justice lens. The reflexive case study provides a critical, exploratory self-assessment, including interviews, group discussions and surveys with key stakeholders and course participants.

Findings

The results show how relational approaches can support transformative learning for sustainability and provide concrete practices, pathways and recommendations for curricula development that other universities/training institutions could follow or learn from.

Originality/value

Sustainability research, practice and education generally focuses on structural or systemic factors of transformation (e.g. technology, governance and policy) without due consideration as to how institutions and systems are shaping and shaped by the transformation of personal agency and subjectivity. This presents a vast untapped and under-studied potential for addressing deep leverage points for change by using a relational approach to link personal, societal and ecological transformations for sustainability.

1. Introduction

Given that the Earth-system is a complex adaptive system coupled with social systems, it is crucial that education programs support capacities for dealing with complexity, uncertainty, and transdisciplinarity to effectively address sustainability challenges (Schellnhuber, 2002; Schmuck and Schultz, 2002; Lang et al., 2012). Current mainstream education, however, tends to teach students to “think the world to pieces,” through analysis, compartmentalization or reductionism (McInnis, 1972). In fact, today’s educational policy and practices are rooted in modern ontological and epistemological traditions that reflect what Gregory Bateson referred to as an illusion of separation from nature (Bateson, 1982). The “modern curriculum” fragments “the world into bits and pieces called disciplines and subdisciplines” (Orr, 1991, p. 52). As a result, mainstream education typically fails to teach students how to understand and address the complexity of today’s interrelated social and ecological problems.

Transformative learning was developed as a response to such shortfalls. It is learning that aims to transform our existential understanding of humanity, including interrelationships both among humans and between humans and non-humans and the fundamentals of wellbeing (Laininen, 2019). On this basis, it “aims at developing a holistic worldview and deep realization and coherence of the purpose, direction, values, choices and actions of one’s life” (Laininen, 2019, p. 183). It is presumed to lead to the emergence of learning communities and ecosystems in which new lifestyles and more widespread cultural transformations can support sustainability in society (Laininen, 2019; Lange, 2018). This requires transforming how we relate to ourselves, to each other, to the environment and to the future (Wamsler and Restoy, 2020).¹

At the same time, increasing experience with, and research on, transformative learning has also illustrated its limitations (Taylor and Cranton, 2013). Accordingly, scholars have increasingly suggested that relational modes of knowing

¹ Transformative learning, also called transformational learning, was developed by Jack Mezirow in 1978. It was used to shift one’s way of being in the world by shifting one’s perspective and thus “affects personal understanding of ourselves, relationships with other people, ways of thinking, belief systems, responses to environment, and overall interpretation of the world” (Simek, 2012, p. 1). Transformative learning has most commonly been used in adult and higher education to shift from mere conceptual learning towards self-directed, experiential, practical and applied adult learning (Cranston, 2006). Using transformative learning theory to inform sustainability education was first recognised at the 8th International Transformative Learning Conference in 2009 (Lange, 2012).

(epistemology), being (ontology) and doing (ethics) would offer significant possibilities for revitalizing the field of transformative learning (Lange, 2018; Walsh et al., 2020). This need is supported by a growing body of scholars from various disciplines who emphasize that a broader cultural transformation towards sustainability requires a shift toward a relational paradigm (Walsh et al., 2020).

A relational shift is thus urgently needed to better orient transformative education towards sustainability, yet it has not so far been realized and related methods are lacking (Spretnak, 2011). Such a shift can be characterized as a turn toward a relational ethico-onto-epistemology, which Karen Barad refers to as a single tripartite constellation that does not presuppose subject-object and nature-culture binaries (Barad, 2007). Although few examples exist (Netherwood et al., 2006; Mcphie and Clarke, 2019; Taylor and Pacini-Ketchabaw, 2019), relational approaches to sustainability and transformative education are under-studied and vastly under-employed (Walsh et al., 2020; Williams, 2013; Lange, 2018; O'Neil, 2018).

Relational approaches to transformative education are not only key to advance transformative learning, they also have the potential to support social justice goals (Lange, 2018). Social justice issues are important for transformational education to facilitate societal change and activate transformation towards sustainability (Tomlinson-Clarke and Clarke, 2016). However, social justice issues are often not adequately addressed in sustainable education (Bradley, 2009; Godfrey, 2015; Friesen, 2014). In spite of the fact that "social inequality and imbalances of power are at the heart of environmental degradation, resource depletion, pollution and even overpopulation" (Bullard and Chavis, 1993, p. 23), the role of individuals and the intertwined issues of justice and equity are still insufficiently addressed (Brechin, 2008; Lever-Tracy, 2010; O'Brien and Leichenko, 2019). Social-ecological transformation is in fact an intergenerational equity issue, including all people on this planet and future generations (Schneidewind, 2019). It should allow for people's flourishing now and into the future "whilst living within the limits of supporting ecosystems" (Agyeman et al., 2003, p. 5).

The EcoJustice course, which is assessed in this article, was developed to address current shortfalls in sustainability education. In fact, it was developed to foster transformative learning towards sustainability using a relational, justice-oriented

approach. After a description of the methodology (Section 2), the assessment of its development (design and content) and impact are presented (Section 3), before we conclude with lessons learned and recommendations for curricula development that other universities/training institutions could learn from (Section 4).

2. Methodology

This article provides a reflexive case study of the EcoJustice course, which was developed during 2018–2019 and implemented during 2019–2020. More specifically, we assess the following three phases of its development and implementation:

2.1 Phase I: development of the EcoJustice course

The development of the EcoJustice course was the outcome of a broad consultation process between the Courage of Care Coalition in the United States and the A Mindset for the Anthropocene project at the Institute for Advanced Sustainability Studies (IASS) in Germany. It was informed by a series of five workshops and a literature review. The workshop participants were identified through a targeted selection of scholars and practitioners and an open call for participation related to the themes of this paper. The workshops included a total of 125 participants.²

For the literature review, the literature was selected based on an exploratory approach, combining the use of scholarly database searches with input from the consultation process, the associated five workshops and following continuous communication with participants.³ The latter was also supported through the participatory development of a web-based communication platform and database in the field between 2017 and 2019. The process resulted in the identification of a total of 100 publications for analysis. The assessment of this phase provided critical input for the course development process and the resultant curriculum of the first prototype. More specifically, it provided the scientific knowledge base and the identification of current gaps in sustainability research, practice and education which the course was based on.

² Workshop 1 took place from 14 Aug. 2017 to 15 Aug. 2017 at the IASS Potsdam, Germany, workshop 2 from 13 Aug. 2019 to 16 Aug. 2019 at Ratna Ling, workshop 3 from 9 Sept. 2019 to 12 Sept. 2019 at Neudenau, Germany, workshop 4 from 30 Sept. 2019 to 2 Oct. 2019 at the IASS Potsdam, Germany, workshop 5 from 9 Dec. 2019 to 12 Dec. 2019 at Duke Kunshan University, China. All workshops aimed at identifying the scientific knowledge base and the identification of current gaps in sustainability research, practice and education regarding the inner aspects of transformation.

³ For more information regarding the literature review, the list of identified publications and their analyses, please see Walsh et al. (2020).

2.2 Phase II: prototype in Ratna Ling

The goal of the second phase was to implement the first prototype via in-person education, and to experiment with various practices that were developed to foster a relational paradigm. It was implemented during a 2.5-day workshop from August 14th to August 16th, 2019 at the Ratna Ling retreat center in California, USA. Participants were selected and invited by invitation-only based on their expertise in areas relevant to the course. They included contemplative scholar-practitioners, equity and systems change workers, activists, and sustainability scholars.

The overall purpose of the prototype implementation was to deepen our understanding of the impact and effectiveness of the developed content and practices and to learn from other practitioners. The assessment of this phase was based on participatory observation, two group discussions and a follow-up survey (Table 1). This way, participants could provide different input and experiences that helped rapidly crowdsource feedback to enhance the course. Among the 17 participants, there were: 9 males, 8 females; 14 North Americans, 2 Europeans and 1 Asian; 7 spiritual activists and contemplative practitioners, 6 university professors in relevant fields and 4 sustainability researchers.

Love	<ul style="list-style-type: none">• How do you experience the non-separation between inner and outer ecology?• What, if any, practices or traditions have informed your own relational approach and understanding?• How do you sense your intrinsic relationships with the web of life and life processes (e.g. plants, animals, minerals, water, etc. . .)?• How do you sense your disconnection?• How can we build care-based systems and structures that enhance the 'quality' of our relationships (to each other, to non-humans, to life cycles, etc. . .)?
See	<ul style="list-style-type: none">• What is the history of people's relationships to the environment in which you live?• Try mapping some place-based connections to your bioregion or community. How are you situated in the urban/rural ecology around you?• How does un/sustainability shape subjectivity (e.g. our ways of experiencing, relating, and being in the world)?• How does your way of being in the world reproduce the underlying histories, patterns and dynamics of un/sustainability?• How do you experience the differential impacts, responsibilities and experiences of those suffering from various social-ecological crises?• How does your privilege (class, race, gender), biases, etc. . . inform your experience?
Heal	<ul style="list-style-type: none">• What is your experience with the seven stages of grief? Where do you get stuck?• How have you internalized systems of eco-crisis?• How are your experiences and relationships informed by an industrial growth paradigm?• How is this related to other systems of oppression?• Consider your stress shapes and conditioned tendencies: How have they served you? What is their shadow side? Could you meet your underlying needs in healthier, more sustainable ways?
Envision	<ul style="list-style-type: none">• What do you think the future will be like?• What are the hidden assumptions of your vision of the future?• How are your hidden assumptions informed by your culture (e.g. ideas about gender, nature and technology, values and traditions, etc. . .)?• What is your preferred future? How might you get there?• Are there ways to orient yourself more clearly toward your preferred future?

Act	<ul style="list-style-type: none"> • Take a personal inventory and/or community assessment of your strengths and weaknesses. • Can you identify the boundary conditions, constraints and conditions of support for taking effective action? • When is it more or less appropriate to reform, resist or create alternatives? • What are your unique personal capacities to affect transformation based on your skills, experiences, talents, privileges, social networks, etc. . . ? • What relationships empower you to affect change, given your individual role and circle of influence?
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Table 1. Leading questions for group discussions for each capacity: love, see, heal, envision, act

2.3 Phase III: online course at Lund University Centre for Sustainability Studies

Based on the results from Phase II, the EcoJustice course was turned into an online course and then tested in the context of a Master’s Program on Environmental Studies and Sustainability Science at the Lund University Centre for Sustainability Studies in Sweden. More specifically, the EcoJustice course was implemented as an obligatory component of the master’s level course on “Sustainability and Inner Transformation”. The course took place from November 2019 to January 2020, including 24 students.

Data was collected during the course period (from online discussion platforms) and afterwards through in-class group discussions and a follow-up survey (Table 2). Among the 24 participants, there were: 18 females, 6 males; 12 Europeans, 5 Asians, 4 Latin Americans and 3 North Americans. Finally, the empirical results from phases II and III were also compared to existing literature to validate identified patterns.

Logic and flow of modules	<ul style="list-style-type: none"> • Did the underlying logic and flow of the sessions (love, see, heal, envision, act) support your learning? • What were related strengths and weaknesses?
Presentations and practices	<ul style="list-style-type: none"> • How did the presentations and practices resonate with you? • What were their strengths and weaknesses? • What was particularly helpful for you?
Personal, social and ecological dimensions	<ul style="list-style-type: none"> • How did you experience the interrelation between personal, social, and ecological transformation? • How well did we integrate these aspects to link inner and outer transformation?
Gaps and blind spots	<ul style="list-style-type: none"> • Did you feel at any point that something was missing for you? • What would you like to add or change? • Were there things you did not feel comfortable sharing? • How could this be addressed by the course/ online format?
Follow-up and future work	<ul style="list-style-type: none"> • What question(s) are you sitting with after the online course? • How do you plan to integrate the learnings of the course in your daily work?

Table 2. Survey questions regarding the implementation process

3. Results

3.1 Results Phase I

Because of the fact that the course was aimed to address current shortfalls in sustainability education and transformative learning (Section 1), the development of the curriculum (and its relational, justice-oriented approach) required a broad consultation process and a critical review of current knowledge and approaches. In fact, to be able to apply relational approaches to transformative education, we first needed to identify what these relational approaches in the context of sustainability consist of.

The results of the broad consultation process and review (Section 2) were peer-reviewed and published (Walsh et al., 2020), and were key for the curriculum development. They influenced: the development of the content of the different course modules, the selection of related practices and the establishment of cooperation with practitioners and scholars in the field, which was important for the following phases II and III (Section 3.2). In fact, the established cooperation ensured for instance the successful implementation of phases II and III through the identification of relevant participants for the first prototype implementation and the testing of the online version in cooperation with Lund University (Section 3.2).

The identified relational modes of knowing (epistemology), being (ontology) and doing (ethics) in the context of sustainability (Walsh et al., 2020), which in the following guided the curriculum development, were defined as follows:

- Relational epistemologies acknowledge the observer's role in shaping knowledge and call for transdisciplinary, intersectional and diffractive (nonrepresentational) methods to ensure the integration of different ways of knowing for sustainability.
- Relational ontologies posit that no entity preexists the relations that constitute it. All entities emerge out of their constitutive relations. Personal and socio-natural processes are mutually entangled and co-shaping sustainability.

- Relational ethics describe non-anthropocentric perspectives about which actions are conducive to human–non-human flourishing as an essential aspect of sustainability.

To identify the most adequate teaching methods regarding these relational approaches towards sustainability and to ensure a justice lens, during the consultation process it was also decided to co-develop the curriculum with the Courage of Care Coalition, because of its extensive experience with transformative learning to support social justice. Courage of Care has developed a social movement-based strategy that aligned well with the ideas of the EcoJustice course. It aims to help individuals and organizations develop compassionate, just, and equitable communities of practice (CoPs) through training in relational care practices (loving), anti-oppressive pedagogies (seeing), restorative healing tools (healing), visionary and artistic tools (envisioning) and systems thinking (acting). These five core capacities are taught iteratively using a modular approach (Table 3). Whilst we kept the same modular approach, the content of each module was further developed to address current gaps in sustainability research, practice and education.

	Knowing (lecture)	Being (experience)	Doing (skills)
LOVE	<ul style="list-style-type: none"> • Understand how modern concepts of "Nature" are based on a fundamentally flawed sense of separation and dualism • Understand how this sense of separation and dualism underlies historical and current social and ecological injustices • Develop an alternative systems view of life that views ecology as a web of inter-relationships • Consider how this systems view could provide more equitable social and material conditions for flourishing in the face of crises 	<ul style="list-style-type: none"> • Cultivate a non-dual field awareness of inner and outer ecology. • Gain a vital appreciation for life and life-giving processes as sacred. • Reconnect to love as the ground for being in right relationship with others. • Cultivate a renewed sense of intimacy with nature. • Sense one's intrinsic relationships to the web of life and life processes (e.g. plants, animals, minerals, water, etc...) 	<ul style="list-style-type: none"> • Develop skills to extend and receive care to non-humans (animals, plants, etc...). • Develop skills that center and foster reciprocity and co-creation of meaning

SEE	<ul style="list-style-type: none"> Understand the complexity of today's ecological challenges and their socio-historical-cultural-psychological roots. Develop an intersectional analyses of sustainability issues that includes social and ecological justice lenses. Understand sustainability from multiple perspectives and social sectors. Learn various methods for systematically understanding the complexity and diversity of perspectives and experiences. 	<ul style="list-style-type: none"> Become aware of how you are situated in the urban / rural ecology around you, including the ways in which your privilege (class, race, gender), biases, etc... inform your experience. Map place-based connections to your bioregion / community. What is the history of people's relationships to the environment in which you live? Become aware of how your way of being in the world reproduces the underlying histories, patterns, and dynamics of unsustainability. Experience how unsustainability shapes subjectivity (e.g. our ways of experiencing, relating, and being in the world)? Reflect on the differential impacts, responsibilities, and experiences of those suffering from related social-ecological crises. 	<ul style="list-style-type: none"> Develop experience-based competencies for systems thinking.
HEAL	<ul style="list-style-type: none"> Understand the physical and mental impacts of ecological crises. Learn about habituated and automatic personal and social patterns driving unsustainability (e.g. consumerism, addictions, transgressions, burnout). Learn how to transform unsustainable into sustainable patterns. 	<ul style="list-style-type: none"> Metabolize and transform negative responses to ecological trauma (e.g. denial, grief, anger) and separation from nature (e.g. psychoterrata). Experience ourselves in compassionate relation to human and nonhuman Others. Transforming negative emotions into constructive responses to eco-crisis. Exercises that scaffold healing from the trauma of ecological suffering. 	<ul style="list-style-type: none"> Practice tools for healing any fundamental rupture, separation, or disconnection to life.
ENVISION	<ul style="list-style-type: none"> Understand that current archetypes, cultural assumptions, values, and systems that we take as given are socio-historically conditioned and subject to change. Imagine many possible futures and envision futures from the standpoint of the cultural heritage, values, systems etc... that one aspires to express. Understand the baseline criteria for a sustainable, ecological civilization and become familiar with sustainable alternatives that meet these criteria. 	<ul style="list-style-type: none"> Practice dialogical, reflective, and arts-based exercises that express the aesthetics of sustainable futures. Narrative storytelling exercise. 	<ul style="list-style-type: none"> Develop a short, medium, and long-term perspective on change. Cultivating positive potentials in the midst of suffering.
ACT	<ul style="list-style-type: none"> Understand current movements and just strategies that support the movement to sustainability. Understand our individual roles/circle of influence. What relationships (dis)empower our capacity to affect change? Assess strategic leverage points for taking action toward sustainability. 	<p>Explore our unique personal capacities to affect transformation based on our skills, experiences, talents, privileges, social networks, etc...</p>	<ul style="list-style-type: none"> Develop skills to align sustainable values and attitudes with sustainable behavior. Develop a personal and/or community strategy for change. Build the relationships, systems, and structures that support life's flourishing. Whole systems design for sustainability Take a personal inventory and/or community assessment of your strengths/weakness and opportunities for change.

Table 3. Overview of the course's logical steps and learning objectives

The key learning objective of the LOVE module was defined to deconstruct nature–culture dualisms and develop a systems view of life that views ecology as a web of inter-relationships. Love is foundational to the overall course, as it forms the basis of the relational approach that informed each module. Given that the field of transformative learning and sustainability education critiques the lack of relationality in mainstream education, the love module is about reclaiming relationality as a foundational principle and approach to education. Love was defined as an active stance of care. The love module taught (knowing) how a sense of separation and dualism underlies historical and current social and ecological injustices and how love-based activism (doing) provides more equitable social and material conditions for human–Earth flourishing. In addition, contemplative practices for extending care, receiving care and practicing deep self-care were used to cultivate love (being) as an active stance of care. This first module links to other research and competency frameworks for transformative skills, which have highlighted the importance of compassion and empathy for sustainability (Glasser and Hirsh, 2016; Sterling et al., 2017; Wamsler, 2019; Wamsler et al., 2020; CCCE, 2019).

The key learning objective of the SEE module was defined to develop the capacity to see the complexity and intersectionality of multiple converging crises. It considered the breakdown of ecological systems as effectuated by the breakdown of interlocking personal and social sub-systems. It identified six of the underlying systems driving eco-crisis – capitalism, anthropocentrism, patriarchy, militarism, colonialism and white supremacy. Students were taught to understanding (knowing) their intimate relations to eco-crisis by considering the mundane ways they communicate, the values they have and the daily choices they make within such systemic contexts. Contemplative and somatic practices (being and doing) helped participants to explore their coping and protective strategies under stress. By becoming more aware of their stress responses, they developed an increasing capacity to tolerate complexity and also to respond to and address systems of domination and oppression that exacerbate the climate crisis in more just and sustainable ways.

The key learning objective of the HEAL module was defined to facilitate restorative and reparative processes internally, between communities, and with our world. Part

of this involves helping people heal from the pain and trauma of the eco-crisis. It also includes helping people understand (knowing) that healing will also require restoration of land, redistribution of resources and protections for communities most affected by sustainability crises. Contemplative practices (being) were used to introduce participants to collective approaches for healing grief. Healing was also presented as requiring not just personal work but also social and political responses creating shifts in ourselves and societies. The module thus not only encouraged stopping harm at its source but also encouraged participants to cultivate regenerative, care-based relationships and care-based systems (doing).

The key learning objective of the ENVISION module was to inspire new narratives that imagine viable pathways toward a socially just and sustainable future. Plausible futures arise out of a combination of the past, present, and future. Students were taught several archetypal ways to understand the future (i.e. evolutionary progress, social collapse, Gaia, globalism and retro-futurism). Climate fiction (or cli-fi) was presented as a genre of speculative fiction to illustrate and reflect about visions of the future impacted by climate change. Participants learned (knowing) about alternative visions of the future, emerging in speculative fiction sub-genres such as the new weird, solarpunk, indigenous futurism, afrofuturism and sinofuturism. Centering, presencing and visioning practices were used to deepen participants' experiences of climate-related suffering (being), and the possibility for deeply transformative action (doing). The second, third and fourth module link to research and competency frameworks for transformative skills, which have highlighted the importance of openness, self-awareness, self-reflection and perspective-seeking for sustainability (Glasser and Hirsh, 2016; Sterling et al., 2017; Wamsler et al., 2020; CCCE, 2019).

The key learning objective of the ACT module was to describe, assess and move to implement strategies for a just transition. Students were introduced to three logics of transformation: reform, resist and build alternatives. They learned (knowing) how sustainability is practiced via lifestyle changes, spiritual and community preparations, socio-technical transitions and social and environmental movements. Such transformative practices were also discussed in the context of strategies for systems change. Six important political trends were introduced: eco-socialism, eco-civilization, social anarchism, the commons, degrowth and buen vivir. Contemplative

and reflective practices (being) were used to take stock of participants' current spiritual and practical approaches to climate preparedness and systems change. Students concluded by considering how the communities they engage with can meaningfully contribute to a just transition (doing). The last module links to research and competency frameworks for transformative skills, which have highlighted the importance of agency, sense-making and values-based courage and engagement for sustainability (Glasser and Hirsh, 2016; Sterling et al., 2017; Wamsler et al., 2020; CCCE, 2019).

The diagnostic logic that informs Courage of Care's theory of change was useful for the course development as it is applicable and relevant across contexts. The five-module structure allowed participants to understand the relational nature of eco-crisis (LOVE), its roots (SEE), how to address them (HEAL), what alternatives to create (ENVISION) and what pathways can guide transformation (ACT). Within the five modules, the content and practices were further developed based on the relational modes of knowing (epistemology), being (ontology) and doing (ethics) identified by Walsh et al. (2020) as relevant to the context of sustainability.

The greatest challenge of the curriculum development process (results Phase I) was to develop the curriculum in a way that addressed the diverse knowledge and needs of different participants. Sustainability practitioners less familiar with certain sustainability dimensions (personal, societal, ecological) and contemplative and relational practices often needed more support processing their experiences (being) and aligning them with their practice (doing); whereas contemplative practitioners often needed more support understanding the complexity of the eco-crisis and aligning this understanding (knowing) with their practice (doing).

Future iterations of the curriculum could better meet participants' needs if different versions were developed to scaffold learning according to specific developmental trajectories. However, for the next phase, it was decided to keep a balance that was seen as adequate for a broad audience.

3.2 Result Phases II and III

The second and third phases focused on prototyping and implementing the course to assess the impact of using a relational, justice-oriented approach on transformative learning towards sustainability. Through the participatory

observation, group discussions and survey, we could identify what helped the participants to understand and experience relationality (Section 3.2.1) and social justice (Section 3.2.2).

3.2.1 Relationality.

In sum, the aspects that helped participants most to understand and experience relationality through the course's content and design were related to issues of:

- embodied learning;
- human-nature connectedness;
- place-based learning; and
- handling uncertainty.

Embodied learning: Most participants highlighted the importance of linking the provision of information and facts with embodied approaches and practices. In fact, each module started out with a lecture, followed by individual contemplative and somatic practices and reflective group exercises. In this way, knowledge coming from sustainability science, psychology, philosophy and transformation theories were integrated using embodied practices. Contemplative practices that were particularly relevant included compassionate presence to feelings, arts-based practices and the three modes of care (extending care, receiving care and deep self-care). The three modes of care comprise the relational model of compassion, also known as sustainable compassion training, that Courage of Care utilizes in its approach (Condon and Makransky, 2019; Lavelle, 2017).

To experience relationality, the participants affirmed research that states that reconnecting to one's self, others and the environment requires not just a cognitive, but also an embodied shift. Embodied cognition suggests that the body is often disregarded as an integral part of knowledge generation, especially in higher education (Eaton et al., 2016). This is unfortunate as the separation of mind and body is also said to be one important reason for unsustainable behaviour (Eaton et al., 2016). Transformation thus requires one not only to think differently, and is hence not merely an epistemological process, but as we noted in the beginning, also an ontological and ethical process.

Our results also showed that experiencing relationality may feel unfamiliar and challenging for course participants. Not only might one struggle to develop related emotions but also to communicate relationality, given that so much of our world is siloed. As Lakoff notes, our language determines how we think and feel (Lakoff, 2008) and is embedded in current cultures and structures. One participant, for example, asked:

"How can I use this knowledge within my work environment, especially if it is dominated by a corporate culture?"

Such difficulties illustrate the need for embodying and teaching new ways of being (and their linkages to societal and ecological transformation) as a part of transformative education (Daloz, 2004; Lange, 2004; Kollmuss and Agyeman, 2002), which the course achieved. A participant noted, for instance:

"It was very new to me to do these kinds of practices, but to me, this was the most important during the workshop."

Another participant said:

"So many of the practices were beneficial and helped to create a deep context of trust and intimacy."

Human-nature connectedness: The course supported in-depth reflections regarding human-nature connectedness. These included a collective meditation on the natural elements (earth, wind, water, fire) in our surroundings, their embodiment in each of the participants' physical bodies, and the inter-relation between those elements in their bodies and environments. The lectures presented information on how the systems view of life helps explain the interconnectedness of personal, social, and ecological systems, in contradistinction to dualistic views that objectify and reify nature as distinct from culture. Many participants highlighted the importance of such input. As stated by one participant:

"It is not often easy to relate [personal, social, and ecological systems] generically but when I think of particular contexts then it seems much easier to relate them [...] I believe these intercrossings between practical and theoretical, pragmatic and spiritual and inner and outer are a good starting point for [post-dualistic conceptualizations] to emerge."

Nonetheless, although the course referenced ways “nature” was historically tied to modern dualism and was reformulated along the lines of post-dualistic conceptualizations of inner and outer ecology (Morton, 2009; Puis de la Bellacasa, 2017), group discussions revealed that some participants persistently framed nature using the language of separation. For example, participants used language such as:

“[...] being “in” nature, connecting “to” nature, and watching nature.”

Overcoming this inner-outer binary often requires developing a new language, such as used by David Abram, who dissolves the dichotomy between nature and culture by referring to it as the human and more-than-human-world (Abram, 1996). As Bollier and Helfrich (2019) and Schaef (1987) note, overcoming the many forms of resistance to relationality in our culture requires a new language, which we are only beginning to form.

In addition, around one-fourth of participants noted that when they were young, they felt more connected to the more-than-human-world and experienced less of a dichotomy. This is crucial because research shows that people who have experienced this strong connection while young are more likely in adult life to act sustainably. For example, people who grow up spending free-time in the more-than-human-world, such as green neighbourhoods, at a coast, or regular visits to green spaces, are more likely to take later actions that benefit the environment, such as recycling, buying eco-friendly products, and environmental volunteering (Alcock et al., 2020). Moreover, research indicates that exposure to the more-than-human-world is of importance for physical and psychological health, increasing one’s ability to concentrate, improving one’s academic performance and reducing one’s stress (Faber and Kuo, 2006; Kaplan, 1995; Wells and Evans, 2003). However, our results showed that around one-fourth of participants felt rather indifferent to the more-than-human-world when they grew up. At the same time, it was reported that this changed through increased awareness while growing up. This shows, that even when not growing up with such access to green space, a shift to dissolve the dichotomy can come about through other means (including education).

One such possibility is by invoking feelings of awe, an aspect which also emerged from the course evaluation. The ability to be in awe is getting increased attention, especially in positive psychology, as it leaves one with a feeling of happiness and

content (Bethelmy and Corraliza, 2019). Moreover, recent research also shows that the experience of awe leads to pro-social and pro-environment behaviours, such as changed consumption patterns (Griskevicius et al., 2010). Wang et al. (2019), for example, shows that the feeling of awe increases green consumption (defined as consumption behaviour aimed at conserving resources and protecting the environment). Another study shows that people who experience awe become less self-centered and more considerate of others and the broader external environment (Keltner and Haidt, 2003). More importantly, Wang et al. (2019) suggest that awe in relation to nature increases the feeling of interconnectedness, because it encourages individuals to pay more attention to others and the natural environment, it makes people feel that they are no longer isolated individuals, but closely connected to other humans and non-humans and it enables people to see themselves and the world from a different angle, emphasizing their participation within a larger whole (Wang et al., 2019).

Several statements of participants indicated how the course has helped to spur feelings of awe and facilitate an associated increase in compassion to one's self, others and the environment. For example, one participant noted:

"Connecting with other forms of life gives me a great sense of humility, which I believe is very much needed in our times of human hubris. However, when caught up in my daily life, with the habits and sometimes stressful tasks, it is easy for me to forget this constant relationship with others and nature. Therefore, I believe it is important to take time every day to remind ourselves of this connection. In that regard, the exercises around care provided in this lecture have been very helpful to me."

The feeling of awe arises when people encounter something that is beyond their current way of knowing, provoking a need to update their mental schemas (Keltner and Haidt, 2003).

Place-based learning: Another aspect that was frequently highlighted by the participants as helpful for understanding and experiencing relationality was related to context and place-based learning. These were addressed through different lectures and practices, including land acknowledgements and nature wandering

practices. Participants asked permission to interact with other beings in nature, practiced sensing their inter-relatedness to other beings and made them offerings.

Some participants noted that context is important in determining whether they feel connected with the more-than-human-world or not. Participants noted for instance that it was easy to forget the more-than-human-world in an urbanized environment and to disregard topics such as climate change, if it seems invisible in their everyday environment. For example, one participant noted:

"I believe this type of mental disconnection with my surroundings contributes to blur the consequences of my actions on the environment around me. This aspect is reinforced by the fact that I personally do not directly suffer from these consequences."

This is in line with research on transformative learning approaches, which increasingly acknowledge the necessity of place-based learning, grounded in the relationship between place and people (Lange, 2019; Pisters et al., 2019). Several studies describe the value of appreciating the cultural, historical, and traditional connections between people and natural resources (Armitage et al., 2008; Bowers, 2005). Especially, as colonialism has disconnected people from the unique cultures that emerged in specific places (Battiste et al., 2005). As such, it is especially important to engage in place-based practices to address wealth and power disparities, resulting from colonialism, and it is important to recognize the damage that has been done to the land (Williams, 2018). Williams (2018) states that a relational shift remains only partial if the relation between place and people is not acknowledged (Williams, 2018).

Handling uncertainty: The framing of the course was oriented around two futures: the Great Transition and the Great Unraveling. The Great Transition describes a future in which society is comprehensively reorganized to sustain itself in dynamic equilibrium with the Earth's systems. The Great Unraveling describes a future in which society's population and complexity have grown beyond its capacity to sustain itself. Both these visions hold a certain truth, as both are already happening. The challenge is to stay attuned to both truths – to help people adapt to near-term social collapse, while cultivating the positive potentials of the Great Transition (Walsh and Lavelle, 2019; Walsh, 2020; Pihkala, 2018; Noorgaard, 2011).

The difficulty of dealing with the uncertainty of both futures was apparent during the workshops. Around two-thirds of the participants in the online course felt caught in between the two narratives. One-third tended to see a pessimistic future as more likely, and only around 10% explicitly leaned towards a more optimistic view. Interestingly, on all sides, people were aware of their tendencies to be rather optimistic or pessimistic.

Optimism can be distinguished between realistic and unrealistic optimism (Peterson, 2000). Realistic optimism can be very helpful, whereas unrealistic optimism can reinforce positive delusions that create suffering. If optimism is imposed, it can also encourage negative self-reflection, denial and dissatisfaction (Seligman, 1990). If there is no realistic hope, it is difficult to act. Research in positive psychology shows that people need a sense of manageability to take care of things (Antonovsky, 1987).

A relational approach to transformative sustainability education might distance itself from the idea of predefined goals, outcomes and actions, which is dominant in sustainability education. When taking action towards sustainability, the basic assumption is that sustainability can be controlled and managed. According to the philosopher Donna Haraway though, strings are always attached and we always become-with (Haraway, 2015). To become-with means that we are not pre-given, autonomous individuals who can act upon sustainability. Instead, we act and emerge with it. Our own agency emerges through the intra-action with what we are dealing with. Nothing exists outside of or prior to its relations with others and agency is not possessed by a single entity, but emerges through relationships (Barad, 2007; Haraway, 2015). Hence, concrete outcomes for action cannot be predefined, but rather emerge (Verlie, 2018).

As a lot of the participants were either pessimistic or oscillated in between optimism and pessimism, it seems important to include further exercises to evoke feelings of manageability. This might include linking education more to active engagement, to a practice of change, as research suggests that people that do take action often feel more empowered and less overwhelmed (Stoknes, 2015; Sharma, 2017).

3.2.2 Social justice.

In sum, the aspects that helped participants to understand and experience social justice through the course's content and design were related to issues of

- intersectionality; and
- CoPs.

Intersectionality: Several participants shared how their understanding and experience with sustainability was shaped by intersectionality. Intersectionality, first identified by Crenshaw (1989), reveals how individuals and groups relate differently based on their positionality. One's relation to climate change, for example, may differ because of their positionality within power structures, based on context-specific and dynamic social categorisations (Kaijser and Kronsell, 2014). One participant from Ghana, for instance, described how she grew up within a country with a high level of poverty and activities to survive, such as illegal mining, in which:

"Forests are cleared and lost, waterbodies are destroyed with chemicals, and livelihood is eventually lost in the quest to survive."

She acknowledged the intersectional nature of the problem, as it is:

2Related to the history and international politics of her home country."

Moreover, participants reflected on how intersectionality could help inform their studies. One student, for example, wrote her final term paper on the topic of how intersectionality informed the participants' perspective and future work. As Boström et al. (2018) note, in academia, learning is still primarily taking place within disciplinary boundaries and often lacks intersectional perspectives. However, intersectionality can help people become more comfortable with "otherness" (O'Sullivan and Taylor, 2004), it can support epistemological justice, and it is especially relevant for addressing justice issues and for ensuring the adaptability of societies (Swanson et al., 2010).

Transformative learning is still in an experimental and exploratory phase and therefore benefits from including various forms of knowledge without evaluating one form of knowing over the other (Lange, 2019). To foster epistemological justice, multiple perspectives can be explicitly invited into the classroom, for example, through audio and visual media.

The content of our curriculum, for instance, intentionally centered marginalized perspectives by exploring alternative speculative fiction sub-genres such as afrofuturism, sinofuturism and indigenous futurism, which was appreciated by the students. Moreover, the course used intersectional methods to present the eco-crisis as a byproduct of interlocking systems of oppression and domination, in line with Freirian approaches to pedagogy and justice (Freire, 1993).

Epistemological diversity was further supported through the course by positioning the teacher as a co-learner who acknowledges the experience and knowledge of each of the participants. Each person was acknowledged as having something to contribute, rather than presuming that one person (the teacher) has all the answers. This aligns with Lange's suggestion to position the teacher more as a co-learner to flatten hierarchies and to allow for experiences of democracy in transformative education (Lange, 2004).

Communities of practice: To move toward action, participants pointed out repeatedly that they enjoyed and appreciated having a group of supportive and like-minded people to learn and practice with. The feedback showed that most participants work mostly by themselves and often feel left alone with their concerns, thoughts and ideas. There was common agreement that relationships were formed through the curriculum. As one participant noted:

"Real relationships were formed that will lead to action and collaboration."

Participants also noted, that because of the trust that was formed within the group, they felt safe to articulate concerns and to be themselves.

The importance of so-called CoPs is increasingly acknowledged in the sustainability discourse as well as within the field of transformative learning (Murray and Salter, 2014). CoPs are based on the work of Wenger et al. (2002) and defined as "a group of people who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Murray and Salter, 2014, p. 4). CoPs are shown to be especially relevant to sustain change in the long-term (Bradbury and Middlemiss, 2014). This is also important to approach interlocking crises from multiple perspectives, as CoPs can help us notice and tend to blind spots (Patten, 2018).

4. Conclusions

The purpose of this case study was to increase knowledge on how transformative learning towards sustainability can be fostered by using a relational, justice-oriented approach. Despite recent advancements in transformative education towards sustainability, current practices have not fully taken advantage of the potential of relational ways of knowing, being and doing (Lange, 2018; Walsh et al., 2020). The EcoJustice course demonstrates possible pathways as to how this could be done. The lessons learned from its development and implementation show that embracing a relational and justice-oriented approach is possible and that it can support the important emotional, cognitive, and relational competencies needed for linking personal, societal and ecological transformations. They influence embodied learning, human–nature connectedness, sense of place, intersectionality, the handling of uncertainty, as well as CoPs. The identified competencies and associated impacts provide important input for further developing competence-based approaches to education for sustainability, which are often limited by some of its failures to represent their transformative aspects (Glasser and Hirsh, 2016; Sterling et al., 2017; Wamsler et al., 2020)

Putting these different features into practice can be a challenging endeavor, and especially in traditional, bureaucratic educational structures.⁴ It requires surpassing the limits of cognitive learning using emotional and experience-based learning methods that link theory and practice to foster sustained behavioural changes (Fugate et al., 2018). It also requires acknowledging that people of different social and cultural backgrounds have very different access points to this type of pedagogy. Experimental approaches such as the one taken in this case study show potential pathways forward. As Lange (2004) suggests, we are all learners in this. Teachers and facilitators should acknowledge that they are co-learners to promote the autonomy of students and encourage them to explore the ways they are related to other humans and non-humans. Although there is a broad spectrum of potential learning outcomes within transformative education, they are often aimed at cognitive and non-cognitive changes enabling transformative actions.

⁴ During Phase III, the presented course was included into existing structures. For related discussions on how educators can develop strategies to deal with traditional and bureaucratic education structures to achieve change, please see Wamsler (2020).

However, relational, justice-oriented approaches should not be bound to specific outcomes, as effective outcomes towards sustainability are always emergent. Supporting the emergence of new approaches and solutions, it seems particularly important to implement courses that also support CoPs through associated structures (such as online networks, forums, continuous face-to-face or online encounters).

This case study provides important insights for further investigating the potential advantages and obstacles of a relational, justice-oriented approach to transformative sustainability education. Although relational approaches are increasingly acknowledged as a critical component towards sustainability (Walsh et al., 2020), it is important to critically engage how they may be used to encourage sustainable transformations.

Our results present a concrete process, methodology and practices, together with supportive features that can support the development of related training programs and courses. The practices and features identified have been used within education previously, yet this case study shows the possibility of linking them to relational approaches and social justice issues, offering promising pathways for further developing transformative education for sustainability that other universities/ training institutions could follow or learn from.

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Article III: Böhme J, Walsh Z, Wamsler C (2022). Sustainable Lifestyles: Towards a Relational Approach. Sustainability Science.

Abstract

The concept of sustainable lifestyles is said to have reached the limits of its usefulness. As commonly understood, it impedes an effective response to our increasingly complex world, and the associated societal challenges. In this context, the emerging paradigm of relationality might offer a way forward to renew our current understanding and approach. We explore this possibility in this study. First, we systematize if, and how, the current dominant social paradigm represents a barrier to sustainable lifestyles. Second, we analyze how a relational approach could help to overcome these barriers. On the basis of our findings, we develop a Relational Lifestyle Framework (RLF). Our aim is to advance current knowledge by illustrating how sustainable lifestyles are a manifestation of identified patterns of thinking, being, and acting that are embedded in today's "socioecological" realities. The RLF revitalizes the field of sustainable lifestyle change, as it offers a new understanding for further reflection, and provides new directions for policy and transformation research.

1. Introduction

Sustainable lifestyles are of vital importance for social and ecological transformation towards sustainability (IPCC, 2014; IGES, 2019; Akenji and Chen, 2016; Gilby et al., 2019). Sustainable lifestyles make reference to the possibility that human and other life can flourish on the planet forever (Ehrenfeld, 2008). However, major changes are necessary to achieve this goal, as lifestyles are said to be difficult to alter. Moreover, even if there is a willingness to live sustainably, many people fail to make the necessary changes (Mont and Power 2010; Van Vliet et al., 2005).

It is increasingly understood that sustainable lifestyles are not a simple matter of changing habits and behaviors. Instead, they require deep, systemic changes that presuppose new ways of living, communicating, feeling, and thinking (Gilby et al., 2019; Bengtsson and Akenji 2010, Lorek 2010; Rijnhout and Lorek, 2012; Gifford et al., 2018; Mao et al., 2019).

Nonetheless, the term 'sustainable lifestyles' is commonly used interchangeably with 'behavioral change', to refer to pro-ecological, frugal, altruistic, and equitable behaviors in all areas of life, including diet, energy use, mobility, or political orientation and engagement (Corral-Verdugo, 2012; DeYoung, 1993; Schultz, 2001; Rijnhout and Lorek, 2012; IGES, 2019). Moreover, common sustainable lifestyle frameworks separate the personal from the structural and the cultural dimension and/ or address them hierarchically (e.g., Akenji and Chen, 2016). Although it is understood that behavior is not separate from its context, sustainable lifestyles are often treated as a linear problem in which misbehavior can be fixed. Additionally, they are often framed as individual endeavors, and their potential is thus marginalized due to a lack of influence and scale (Paech, 2012; WBGU, 2011). These misconceptions, we will argue, overlook the possibility of driving deep, systemic changes towards a flourishing future, as they are based on an outdated paradigm that is also reflected in current scientific approaches.

Dominant social paradigms underlie deep, systemic structures, mechanisms and changes (Meadows, 1999; Wamsler et al., 2018; Kagan, 2010; Ives et al., 2019; Fischer and Riechers, 2019) and can thus be both a barrier to or driver of sustainable lifestyles. They not only influence us personally (e.g., via our motivation, values, attitudes,

psychological make-up), but also shape our structures (e.g., economic, infrastructural, institutional) and cultural contexts and associations (e.g., narrative frames and cultural norms) (Akenji and Chen, 2016; Gilby et al., 2019; Gifford, 2011; Schösler and Hedlund de Witt, 2012; Shove et al., 2012; Sorin, 2010; Lakoff, 2014; Wahl, 2016; Escobar, 2017; Orr, 2002).

Thomas Kuhn (1996 [1962]) gave the term 'paradigm' its contemporary meaning, defining it as a set of practices that provide model problems and solutions for a community of researchers. On this basis, Pirages and Ehrlich (1974:23) write that paradigms are "... the socially relevant part of a total culture. Different societies have different dominant social paradigms."

Hence, political, economic, and social systems, as well as the tools we use (i.e., electronic devices, vehicles, and machinery), are a reflection of society's dominant paradigm (Wahl, 2016; Orr, 2002). Accordingly, lifestyles are particularly interesting to investigate in regards to paradigms, because – as we will explore in this article – they are a manifestation of each of these aspects.

Although we know that dominant social paradigms can be a barrier to, or a driver of sustainable lifestyles, the relationship between them has not been sufficiently investigated. Current theoretical efforts can be divided into psychologically-grounded, culturally-grounded, or structurally-grounded approaches. Psychologically-grounded approaches theorize causal relations between inner worlds and behaviors. Examples include the Theory of Planned Behavior (Ajzen, 1991) and its extension, the reasoned-action approach, which offers an integrative framework to predict and change human social behavior (Fishbein and Ajzen, 2010). Other examples are the Value Belief Norm Theory (Stern and Dietz, 1994), the Needs-Opportunities-Ability model (Gatersleben and Vlek, 1998; OECD, 2002) and the New Environmental Paradigm (Dunlap, 2008). Culturally-grounded approaches focus on social norms and behaviors. Examples include narrative frames and the communication of cultural norms (Nisbet and Mooney, 2007), and social marketing (Thaler and Sunstein, 2008). Structurally-grounded approaches theorize about how (infra-)structural measures cause behavior change (Akenji and Chen, 2016). Examples include the provision of car sharing services, the availability of organic and fair trade foods and goods, or renewable energy. Yet, none of

these approaches investigate the underlying paradigm and its relation to sustainable lifestyles.

The Integrative Worldview Framework (Hedlund Dewitt, 2012), which comes closest to addressing the relationship between paradigm and lifestyles, focuses on worldviews. Hedlund Dewitt draws the distinction between worldviews and paradigm as follows: “While a paradigm tends to define what is valid and what not for the whole of the ideological constellation of a given time and place, the worldview concept, in contrast, potentially aims to explicate and acknowledge the existence of different viewpoints” (Hedlund Dewitt, 2012:20). This approach therefore addresses worldviews, which may differ for each individual (Pirages and Ehrlich, 1974), in contrast to the notion of the paradigm as elaborated here, which addresses the “total culture” (Pirages and Ehrlich, 1974:23).

Against this background, this article aims to explore the theoretical linkage between paradigms and sustainable lifestyles by showing how the current dominant social paradigm, which we refer to as a mechanistic paradigm, may hinder sustainable lifestyles. We will then discuss how an emerging paradigm, which we refer to as a relational paradigm, may offer more effective pathways toward understanding and achieving sustainable lifestyles.

Accordingly, our study is based on a three-step methodology: First, we systematize the existing literature to identify if, and how, the mechanistic paradigm correlates with barriers to sustainable lifestyles (section 2). Second, we analyze how a relational paradigm can help overcome common barriers by exploring and systematizing relational patterns (section 3). Based on the results, we then develop and discuss a conceptual framework that delineates a relational approach to sustainable lifestyles (section 4). The resultant Relational Lifestyle Framework (RLF) underlines that sustainable lifestyles are a manifestation of patterns of thinking, being, and acting that are embedded in sociological realities. It reframes sustainable lifestyle change and argues that relational lifestyles are a more comprehensive framing. It advances current knowledge and revitalizes the field of sustainable lifestyle change by opening new policy pathways, offering a new frame for reflection, and giving directions for future transformation research and practice.

2. The Mechanistic Paradigm and its Implications for Sustainable Lifestyles

In this section, we analyze how the dominant social paradigm may hinder sustainable lifestyles. We begin with a brief overview of its characteristics (section 2.1) and then exemplify how it might foster or hamper sustainable lifestyles (section 2.2).

2.1 What is the Dominant Social Paradigm?

The dominant social paradigm, which structures society's beliefs and perceptions of the modern world (Kilbourne, et al, 2002), can also be referred to as the mechanistic paradigm. It is considered to be endemic to Western and industrialized civilization (Kilbourne et al., 2002). As the name suggests, the basic idea is that the world functions as a machine (Peitgen et al., 1994). It assumes that if one has full knowledge of the exact state of a given object at a point in time, and knows the interactions informing that state, then its future state could be reasonably determined as a result of prediction. This assumes that the act of observation itself can be independent of the factors considered to influence phenomena. The mechanistic paradigm is rooted in modernity, emerging out of the Scientific Revolution (14–16th centuries), the Renaissance (14–17th centuries), and the Enlightenment (starting in the 18th century). Modernism offered a secular understanding of the world in which individuals were understood as individualistic, materialistic, and competitive (Peat, 2002; Lent, 2017). One of its outcomes was the conquest of nature (Swilling, 2019). Although postmodernism questions and critiques modernity, it fails to confront the systemic nature and root causes of current challenges, due to its “relativism and its antipathy to integrated knowledge and meta-level understanding” (Bhaskar et al., 2016:2). The ideas of modernity therefore continue to dominate in many parts of the world (Nicholson and Dupré, 2018).

The mechanistic paradigm is characterized by rationalism, reductionism, empiricism, dualism, and determinism—approaches which are said to be inadequate to address the complex systemic challenges of sustainability (Capra and Luisi, 2014; Corral-Verdugo, 2012; Escobar, 2017; Haraway, 2016; O'Brien, 2020; Wahl, 2016). Three common patterns that are endemic to this way of understanding the world have been identified (Redclift and Sage, 1994; Rees, 1999; Capra and Luisi, 2014):

- Pattern 1: Humans are separate from and above nature.
- Pattern 2: Humans are able to control nature.
- Pattern 3: Nature is a machine, and can be known and addressed by reducing it to its parts

In the following, we exemplify how these three patterns hinder sustainable lifestyles.

2.2 How Does the Mechanistic Paradigm Hinder Sustainable Lifestyles?

In the following, we exemplify six requirements for supporting sustainable lifestyle approaches, together with policies and practices, and point out how a mechanistic paradigm might impact these.

Sustainable lifestyle policies and practices require motivation (Akenji and Chen, 2016, 15). The dualistic framing of humans and nature as two separate aspects of reality (pattern 1) presents humans as distinctly different from the non-human world. Hence, there is little motivation to preserve the non-human (Du Plessis, 2012; Schultz, 2001). Research on the 'connectedness to nature scale', for example, suggests that the perception of a connection to the more-than-human world is predictive of the motivation to engage in responsible environmental behavior (Mayer and McPherson, 2004).

Sustainable lifestyle policies and practices require a perception of behavioral control (Fishbein and Ajzen, 2010). Understanding oneself as separate from the larger world (pattern 1) can result in a sense that individual actions are insignificant, and hence one might not even try to change, as it does not seem to matter (O'Brien, 2020). This sense of insignificance and meaninglessness is a common symptom of post-modernity and is said to result from the separation between the individual and the greater whole (Freinacht, 2017; Alexander, 2010).

Sustainable lifestyle policies and practices require sufficiency (Hickel, 2020; Paech, 2012). Although sufficiency, which can be described as a reduction in consumption, is considered to be the least desirable way forward (Folkers and Paech, 2020), many studies have shown that economic growth cannot be totally decoupled from ecological impacts; sufficiency should, therefore, supplant growth as an overarching economic goal (Raworth, 2018). However, the idea that humans are able to control nature, and that nature is a machine that can be known by reducing it to its parts (patterns 2 and 3)

evoke a hierarchy of power, leading to a mentality of 'me versus' instead of 'me and'. It therefore fosters competition rather than co-creation (Capra and Luisi, 2014). When individual existence is based on competition, a sustainable lifestyle is associated with scarcity, renunciation, and constraints, along with feelings of being regulated and limitations on individual freedom (Verlie, 2017).

Sustainable lifestyle policies and practices require deep, systematic change (Lorek, 2010). The idea that humans are able to control nature (pattern 2), and that nature is a machine that can be known by reducing it to its parts (pattern 3) means that there is a strong reliance on business-as-usual technological fixes that emphasize consistency (changing one mode of development for another more sustainable one) and efficiency (IPCC, 2014; Schöpke and Rauschmayer, 2014). The idea here is that through better technology, nature can be controlled *ad infinitum*. Climate engineering is one example. Climate engineering tries to control climate change using new technologies without addressing its underlying causes. Sustainable lifestyle policies and practices that focus on changing technology, without questioning the underlying patterns are unable to create systemic change. They merely support the *status quo* (Gilby et al., 2019) and therefore do not create circumstances that support sustainable lifestyles.

Sustainable lifestyle policies and practices require valuing personal and planetary wellbeing. When humans are thought to be separate from nature (pattern 1), personal health and social and ecological health appear unrelated. For example, recent theories point to the possible loss of a connection to people, places, and an overarching narrative, which may result in addiction, depression, and a decrease in personal wellbeing (Hari, 2018; Schaef, 1988; Alexander, 2010). The lack of a connection fosters a tendency to care for personal health first and foremost, with no regard for any social and environmental consequences (Verlie, 2017; Sonu and Snaza, 2015). There is insufficient consideration of how to merge planetary boundaries with personal and societal wellbeing (Gilby et al., 2019; Büchs and Koch, 2019). Movements, such as Degrowth (Folkers and Paech, 2020), Minimalism (e.g., Fields Millburn and Nicodemus, 2011), and Voluntary Simplicity (e.g., Elgin, 1977; Shaw and Newholm, 2002) emphasize the personal freedom and wellbeing that comes with living a life of less consumption, and link sustainable development with notions of quality of life. Yet, the connection between quality of life and reduced material consumption still runs counter to mainstream ideas within the current paradigm (Gilby et al., 2019).

Sustainable lifestyle policies and practices require valuing social and ecological justice (Klein, 2014; Walsh et al., 2020; Swilling, 2019). The separation of humans from nature (pattern 1) often encompasses a separation between the individual and the collective, contributing to both social and ecological injustice. Although their inseparability is increasingly discussed and recognized by sustainability experts, they are mostly thought of as different phenomena without due consideration to their underlying and interrelated systemic and historical conditions (Schönach, 2016; Mercure et al., 2016).

3. How a Relational Paradigm Can Help Overcome Common Barriers to Sustainable Lifestyles

The relational paradigm represents a shift from a mechanistic understanding of the world to a holistic, interconnected, living systems understanding (e.g., Capra, 1997; Kumar, 2002; Raskin et al., 2002). It is not a new paradigm¹, but rather a rediscovery, by scholars of the western, industrialized world, of lines of thinking that can be found in Eastern mysticism and religious traditions, in the work of Western thinkers such as Baruch Spinoza (Naess, 1977) and Alfred North Whitehead (1978), as well as in deep ecology (e.g., Naess, 1977), ecofeminism (e.g., Plumwood, 1993), and Indigenous philosophies (e.g., Salmon, 2000). It is reinforced by recent scientific discoveries, such as quantum physics and ecology (as pointed out by Walsh et al., 2020).

Moreover, there is a growing body of sustainability science literature that addresses relational approaches with respect to their potential for sustainability transformations. Illustrations include relational ontologies as leverage points (West et al., 2020), relational values for pro-environmental behaviors and wellbeing (Thiermann and Sheet, 2020; Jax et al., 2018; Helne and Hirvilammi, 2015; Schulz and Martin-Ortega, 2018) or relational epistemologies for ecosystems research (Hertz et al., 2020; Mancilla Garcia et al., 2020a; Mancilla Garcia et al., 2020b) and sociotechnical change (Chilvers and Longhurst, 2015).

¹ We acknowledge that all of the authors of this study come from the western, industrialized part of the world and hence have a limited understanding of cultures in which the dominant social paradigm differs. This article particularly addresses the problems that result from the dominant social paradigm in western industrialized societies, and does not presuppose that everyone equally contributes to associated sustainability challenges (such as high carbon footprints).

At the same time, there are communities that are based on a relational paradigm or way of living. Notably, many indigenous cultures have a longstanding history of engaging in knowledge production practices that emphasize more-than-human relational ontologies (Todd, 2016). For instance, the Kogi, an indigenous ethnic group in northern Colombia, acknowledge that everything is interconnected, and live according to this understanding (Buchholz, 2019). Another example is the philosophy found in sub-Saharan Africa, in which the two most important concepts are Ubuntu and Ukama. Ubuntu refers to relational humanness, and Ukama means the relatedness of everything (Murove, 2009). Similarly, the Latin American philosophy of Buen Vivir refers to the right way of living, or *Good Living*, and relationality is one of the four principles that defines this way of living and being (Akosta, 2015).

The following sections (3.1 to 3.7) analyze how a relational paradigm could help overcome the barriers to sustainable lifestyles identified above (section 2). We identify seven key patterns based on an extensive literature review by Walsh et al. (2020), which analyzes the relational paradigm in terms of its ontological, epistemological, and ethical dimensions. We then discuss how the identified patterns may influence sustainable lifestyles by drawing on examples of how they affect policies and practices.

3.1 Pattern I: From Separation to Interconnection

The relational paradigm considers that humans and nature are linked. It views the world as an interconnected, complex, and adaptive socio-ecological system that is constantly in flux (Walsh et al., 2020). Humans are a part of nature and co-create with the more-than-human world (Abram, 2010) instead of merely using nature for their benefit. According to Spretnak:

“all entities in the natural world, including us, are thoroughly relational beings of great complexity, who are both composed of and nested within contextual networks of dynamics and reciprocal relationships. We are made entirely of relationships, as is the whole of the natural world” (Spretnak, 2011:4).

The interconnection between humans and the more-than-human world implies that the divide between nature and culture is socially and historically constructed. This has led to what has been called a post-natural ontology of the Anthropocene (Küpers, 2020),

also referred to as 'natureculture' (Haraway, 2003). From this perspective, nature and culture, or social and ecological, are not two separate interacting systems, but rather one autopoietic (self-maintaining and reproducing) system, in which humans are one participant among many others. Feeling and understanding the connection to the more-than-human world might lead to caring more for the general wellbeing of the whole system and marginalized groups within that system (Plessis, 2012), since one part cannot be healthy if the whole is not healthy. This highlights that various forms of social and ecological injustice are interrelated. It is, therefore, necessary to align human developmental models with justice frameworks, and the healthy development of natural systems, instead of equating human development with economic and technological progress (Plessis, 2012; Pirages and Ehrlich, 1974).

A further consequence of seeing oneself as interconnected with both humans and non-humans is that it may foster empowerment. Although sustainable lifestyles are contextualized as part of a sustainable future (WBGU, 2011; Buenstorf and Cordes, 2008; WorldWatch Institute, 2008), they are often marginalized as they are considered to be an inefficient driver for sustainability transformations. "The notion of people as active agents of change towards sustainability is by no means widely accepted and conflicts with some of the current, dominant belief systems and worldviews" (Wamsler et al., 2020:234). When the individual is seen as just that, the person remains isolated from the rest of the world, and sustainable actions seem insignificant and insufficient (O'Brien, 2020; Wahl, 2016).

However, when one sees oneself as an inherent and equal part of the world, personal lifestyle choices are not a private act, but instead may produce unexpected social dynamics (Draper, 2013; O'Brien, 2020). As any human is always part of a system that he or she influences and that is influenced by the person, the concept of sustainable lifestyles needs to move away from the idea of being an individual endeavor towards having systematic relevance. For example, a common discussion when trying to live a sustainable lifestyle is whether social issues matter in the face of climate change, based on the argument that the ecological foundation matters more than the social. Others argue that the root cause lies in economic or other systems and structures. Yet, understanding the relational nature of things, that the social and the ecological are not separate from each other, and addressing the relation between these aspects across personal, collective and system levels, is important (Walker et al., 2015; Smartt Gullion,

2018). From this perspective, sustainable lifestyles are not either a social or an ecological endeavor, but “socioecological”.

3.2 Pattern II: From Human Agency to Intra-action with the More-than-human

The physicist-philosopher Karen Barad (2007) takes the idea of interconnection a step further and argues that agency is not possessed by individual things or beings but emerges through relationships. Her approach, which is referred to as ‘agential realism’, is derived from understanding the inseparability of subjects and objects, and recognizes the ways humans invariably participate in the non-human world. By dissolving the subject-object dichotomy, the phenomena of unsustainability, as manifested in climate change for example, is not merely human-induced, but can be understood as co-produced by carbon and humans (as well as other more-than-human forces and entities) (Verlie, 2017). Together, these constitute entanglements of human and non-human materiality. This entanglement results in what Barad refers to as intra-action (Barad, 2007). We become-with carbon by being affected by carbon’s agency in less tangible and measurable ways (Haraway, 2016).

Clearly, living a sustainable lifestyle includes sustainable actions, such as reducing one’s carbon footprint, but it does not end there. The relational paradigm acknowledges that because we are always intra-acting with the world, our influence is much broader. At the same time, we cannot fully predetermine or control our actions. We can, therefore, also create unanticipated consequences (diffr-actions) with the world, rather than upon the world (Haraway, 2016; Verlie, 2017; Barad, 2007). For example, a simple climate action such as recycling can have unanticipated consequences, as Verlie (2017) describes. The latter author points out how one of her students started recycling to live a more sustainable lifestyle, but her determination made her increasingly aggressive towards her housemates who did not share her dedication. So-called ‘climate killjoy subjectivity’ (killing joy through the way people engage with the climate crises) can be the outcome. This illustrates the influence and limitations of human agency and decenters the human, acknowledging that sustainable lifestyles are co-produced with other beings, systems, and forces (Pickering, 1995; Latour, 2005; Barad, 2007; Abram, 2010; Bennett, 2010).

This recontextualization of the human as part of, rather than as dominating the human-Earth system is expressed in Küpers’ (2020) desire to rename the Anthropocene

(meaning the 'human epoch') as the Ecocene, which decenters the human and acknowledges a relational approach. Decentering the human and attending to what we might be able to intra-act and become-with increases our capacities to respond to unsustainability (O'Brien, 2016). Instead of working upon the world, humans work with the world and foster the capacity to respond to unsustainability in previously unthought ways. Sustainable lifestyles are, in this understanding, no longer approached from a normative viewpoint, based on exclusive human agency (as follows from human exceptionalism); rather, they follow from the perspective that we are a species living in conjunction with our kin, intra-acting with other agents, instead of controlling them (Verlie, 2017).

Barad (2007) argues for the inseparability of ethics (acting), ontology (being), and epistemology (knowing) as a tri-partite constellation, also referred to as ethico-onto-epistemology, that does not presuppose subject-object and nature-culture binaries (Verla, 1999; Barad, 2007; Escobar, 2017; Kassel et al., 2016; Walsh et al., 2020). We use the following definitions (based on Walsh et al., 2020): ontologies describe what is taken to be real; epistemologies describe how we come to know the world; and ethics describe what is right and wrong. Sustainable lifestyles that are based on a relational paradigm thus demand ethical, ontological, and epistemological transformations.

3.3 Pattern III: From Individuals to Dividuals

Identities come into being "through relationships which are ever changing and constituted at multiple scales" (Neely and Nguse 2015:141). Humans are and become-with their environment (Faber and Stephenson, 2011), and the environment constitutes part of the mind (Clark and Chalmers, 1998). Gregory Bateson saw the idea of a separate individual as a root cause of our multiple crises and argued that humans are essentially symbiotic with their environment (Bateson, 1994). To facilitate a shift in perspective that helps to understand oneself as being and becoming through relationships, individuals can be conceived of as dividuals (Wahl, 2016).

Moreover, identities and the boundaries between them are sociomaterially and performatively reconfigured. They can be understood as superpositionality: emerging "through the ongoing interference of natural-cultural waves (such as gender and climate change); superpositionality are momentarily articulable sociomaterial relational-locations which are both situated and dynamic" (Verlie, 2017:12). The concept of

superpositionality implies that economic, social, physiological, emotional, or ecological positionalities result in dynamically configured power hierarchies (Barad, 2007; Haraway, 2016; Verlie, 2017). These hierarchies cannot be erased but are instead constantly reconfigured through intra-action. The concept of intersectionality applies this perspective to the burgeoning literature on intersectional identity politics (Verlie, 2017). It implies not only the social and political context, but also the historical context, as well as the unique experiences of an individual.

Understanding that individuals are superpositionality helps us attune to how we are all a “wave of possibility” (O'Brien, 2020:26) informed by dominant sociomaterial (Verlie, 2017) or socioecological (see section 3.1) configurations of power. This may offer an even stronger frame for empowerment towards sustainable action (O'Brien, 2016). When moving towards a sustainable lifestyle, seeing oneself as a individual explains why sometimes, despite one's best intentions, actions fail. The individual that attempts to make the change is subject to the constraints of their environment. This frame also better-addresses injustices, and the fact that they have emerged from multi-layered, systemic, environmental, and institutionalized influences. It therefore removes the blame from the individual and shifts it towards a personal and collective endeavor to overcome injustices. Research shows that approaches that focus less on the individual, and more on the collective, group and mutual support make change more likely (Darnton, 2008; Sustainable Consumption Roundtable, 2006; McLoughlin et al., 2019). Collective approaches to injustice are therefore a key component for sustainable lifestyles, whilst at the same time they support individual capacities and agency for transformation (cf. Section 3.2).

By perceiving oneself as a individual, relational values emerge that are conducive to a sustainable lifestyle. Values define what leading a good life means (Hedlund Dewitt, 2012). Relational values are increasingly studied in the context of sustainability (e.g.. Klain et al., 2017; Thiermann and Sheet, 2020; Jax et al., 2018; Helne and Hirvilammi, 2015; Schulz and Martin-Ortega, 2018), and this shift illustrates that valuing the more-than-human world only for its functionality rather than its intrinsic worth, may lead to overexploitation. In simple terms, it is, for example, easy to cut down a tree when considering only its monetary as opposed to its intrinsic value.

3.4 Pattern IV: From Control to Emergence

Intra-action results in emerging phenomena that can be reinterpreted as a materio-culture or a socio-nature (Arias-Maldonado, 2015). Emergence is a process by which a whole becomes greater than the sum of its parts. New and often unpredictable properties of the whole emerge out of the intra-actions of its individual elements and are irreducible to them. A molecule, a cell, a human being, a community, and the planet can each be understood as an emergent phenomenon (Wahl, 2016). These living systems are not static configurations of components; they are rather continual flows of matter and energy whose form is maintained over time.

On the one hand, this perspective links a living system closely to metabolic and developmental processes. On the other hand, it raises the question of whether life itself is an emergent phenomenon. Maturana and Varela (1987) refer to life as structural couplings that create autopoiesis, defined as the self-making by which one brings forth a world. From this point of view a system is not static, but instead is constituted through patterns of relationships and interactions that emerge. The latter do not emerge randomly, but are based on structural couplings that stabilize over time. Synergetic relationships, for example, create new system properties through cooperative interactions. The process of emergence shapes sustainable lifestyles, for instance if we consider phenomena such as rebound or spillover effects. Rebound effects, for example, show that energy efficiency in one area may lead to increased energy use in another area. Spillover effects show that improving one area, such as eating vegan food, may lead to improvements in another area, such as only purchasing organic food. These phenomena emerge from a complex, dynamic process that is uneven and contingent, meaning that what unfolds cannot be fully controlled (Küpers, 2020). Hence, developing an understanding of the phenomenon of emergence also helps to overcome the belief that humans are meant to dominate and control the non-human world, and to understand why we should always consider how and why (human and non-human) agents are affected and influenced by an individual decision (Swilling, 2019). From the perspective of a mechanistic paradigm, the agent who takes sustainable action is presumed to be an autonomous, independent entity that acts upon the world rather than one that acts and emerges with it (Dürbeck et al., 2015; Verlie, 2017). From a relational perspective, humans and unsustainability do not pre-exist, but

are co-emergent. This offers a broader context for understanding and advancing individual sustainable actions.

An example that illustrates this point is meat consumption. Consuming meat can harm our own health, animals, and the environment. Therefore, the interpretation might be that a sustainable lifestyle involves not eating any meat, independent of the context and any alternative ways to produce and consume food. However, how we become-with these animals needs to be considered (Haraway, 2008). The question then becomes: What would a sustainable lifestyle look like that decenters the human and recognizes non-human agency? The answer is not a clear-cut, one-size-fits-all response (as is often given by sustainable lifestyles informed by a mechanistic paradigm). It is rather the ability to learn to listen and understand non-human agents, and to create unanticipated, creative, context-specific, different actions (diffractions) with these agents (Verlie, 2018).

3.5 Pattern V: From Mind-Body Dualism to Embodiment

Ever since Descartes observed, "I think therefore I am," the mind and body have been considered as separate entities (Hedlund Dewitt, 2012; Lange, 2018). The mind is understood as observing the world, independent of the body and the context. In the mid-twentieth century, philosophers like Edmund Husserl and Maurice Merleau-Ponty pointed out that the self, including the mind, cannot exist in an abstract sense (Sterling, 2003). Instead, it is derived from the experience of phenomena, and experience fundamentally depends on our body and our emotions. The field of constructivist developmental psychology, for example, conceptualizes individuals as constructing knowledge through their interaction with the world (e.g., Kohlberg, 1984; Loevinger, 1977). The body is the starting point of experience (Pelluchon, 2019; Toadvine, 2019). Merleau-Ponty's phenomenological approach views sensing and perceiving as not merely confined to the realm of matter and ideas, but as having expressive qualities (Küpers, 2014). Living, embodied beings are constantly exchanging with the environment, continually co-creating together (Küpers, 2020). Barad (2007) supports this notion that objectivity is contextual and embodied. She emphasizes that lived and embodied experience are crucial to addressing complex sustainability challenges (Barad 2007; O'Brien, 2016).

Through embodied awareness, humans can learn to acknowledge their relations to other human and non-human agents through relearning to sense, listen, perceive, and respond in caring ways (Küpers, 2020). Care for the non-human, in return, has been shown to increase personal wellbeing (Jax et al., 2018). When the body is understood as the starting point of experience, inter-being becomes apparent, because nourishment of the whole being connects the person's body with other bodies (air, food, sunlight, etc.) (Pelluchon, 2019). Seeing the world as nourishment implies that "we insist on the conditions of existence that are at once biological, social, and environmental, ceasing to separate man from nature" (Pelluchon, 2019:2). This helps articulate an ecology that emerges from the experience of the human condition, which offers a little-explored path to taking sustainable action (Pelluchon, 2019). It implies an ethics that focuses on the self as constituted by its relations to other beings, in which care for others becomes care for oneself (Groenhout, 2004).

Understanding embodiment as a form of knowing the world sets it apart from the dominant form of knowing-that, which Vervaeke refers to as propositional knowing (Vervaeke, 2013). Propositional knowing is the knowing that is found in making conceptual maps. Although helpful, over-reliance on such maps can be misleading as they reduce reality (i.e., the map is not the territory). According to the systems theorist Nicholas Taleb, phenomenological knowledge is more likely to be anti-fragile than propositional knowledge (Taleb, 2013). This does not imply that propositional knowledge should be abandoned, however. Instead, if it is enriched through phenomenological knowledge, it opens up space for more creative and applicable ideas to emerge.

For example, reducing carbon emissions can be a challenge for individuals. Here, it is helpful to rely on propositional knowledge that points out the increase in atmospheric carbon, and its consequences. Nevertheless, we are likely to be more willing to act if we also experience the effects of a rise in carbon emissions, in the form of, for example, climate hazards, climate grief, or climate anxiety. Allowing and combining different forms of knowledge and associated emotions can, therefore, be a more efficient catalyst for sustainable action.

3.6 Pattern VI: From Individual Well-Being to Relational Well-Being

The mechanistic paradigm focuses on the wellbeing of the individual as a part that is disconnected from the greater whole. As noted above, the result is that sustainable living is often associated with a decrease in wellbeing due to it being framed around negative consequences such as discomfort, inconvenience, and sacrifice (Vertugo, 2012). Yet research shows that the opposite is often true. Many scholars show that sustainable lifestyles are closely linked to wellbeing (Ericson, 2014; Brown and Kasser, 2005; Amel et al., 2009). They are increasingly highlighting how individual wellbeing can mutually benefit ecological and collective wellbeing, rather than being incompatible with it (e.g., Brown and Kasser, 2005; Jacob et al 2009).

For example, human wellbeing is closely related to two factors: a sense of autonomy and a sense of belonging. Both are equally important (Becker, 1993). This is supported by research showing that health and wellbeing are strongly dependent on social foundations and the associated social paradigm (Aknin et al., 2019; Helliwell et al., 2017). For example, poor social relationships are linked with a mortality risk that is similar to tobacco and alcohol use, and have a more significant impact on wellbeing than physical inactivity and obesity. Similarly, environmental factors play a key role in developing and regulating the immune system, gene expression, and brain function (Gallon, 2020).

Bacteria and other gut microorganisms influence physiological processes, but they also affect our psychological wellbeing (Lorimer, 2020; Spretnak, 2011). Researchers have investigated the importance of intestinal flora. From the moment we are born, we are populated by billions of living things. Bacteria colonize our skin and the interior of our body, and interact with us physically and psychologically. Studies show that the composition of the bacteria in our intestines, our so-called microbiome, influences how we feel, and our characteristics. And, vice versa, our moods have a significant influence on our intestinal flora (e.g., Tasnim et al., 2017; Spretnak 2011).

Social and environmental factors then underpin personal wellbeing, as it emerges through interactions. Recent studies have therefore shifted the focus from subjective to relational wellbeing (e.g., Jax et al., 2018; White, 2015). A sustainable lifestyle based on a relational paradigm recognizes that personal health and wellbeing are interconnected to social and ecological wellbeing. Health issues are then not merely

thought of as a personal matter, but instead become a socio-ecological one. If, for example, we suffer from phosphorus deficiency, the solution may not be to take supplements, instead it might require exploring soil health, and a shift toward regenerative agriculture.

3.7 Pattern VII: From Meaninglessness to Meaningfulness

A lack of meaning can lead to unsustainable behaviors such as compulsive consumption and is thus key to understand sustainable lifestyles (Hari, 2019; Zerach, 2016). Some authors refer to the root cause of our current multiple crises as a meaning-crisis (e.g., Schmachtenberger, 2019; Vervaeke, 2019). Merleau-Ponty's analysis of sense-making explains why meaning-making matters for a sense of wellbeing. The former term is closely associated with meaning-making, and is often used interchangeably. Even simple organisms make sense of the world by transforming it into an environment with salience, meaning, and value (Thompson and Stapleton, 2008). If sense-making is an inherent part of each autonomous being, not being able to make sense of the world can decrease wellbeing. This is acknowledged in research that refers to eudaemonic, rather than hedonic wellbeing, which considers that a sense of meaning is an essential constituent of wellbeing in general (Stone and Mackie, 2013). In the context of sustainable lifestyles, a shift from hedonic wellbeing (focused on subjective feelings) to eudaemonic wellbeing (focused on meaning) might also lead to a shift from more to less resource-intensive consumption patterns (Brown and Kasser, 2005).

Two centuries ago, Nietzsche pointed out that modernity led to a sense of meaninglessness. Today, various philosophical and sociological analyses have explored the connection between meaninglessness and psychological disorders (e.g., Hari, 2019; Alexander, 2010; O'Brien, 2016). These analyses point out that the experience of meaninglessness can result from various factors, such as a lack of embodiment through displacement (Alexander, 2010), a loss of connection to others (humans and non-humans) (Hari, 2019), or neglecting the metaphysical (O'Brien, 2020).

An underlying thread is that the mechanistic paradigm cannot fully explain subjective experience and the subject's relation to the greater whole, with negative consequences for our sustainable lifestyle approaches. In other words: the established frame does not capture the full picture.

As we lack an overarching frame to make sense of the world, we find what some call a war on sense-making, in which individuals try to impose their own frame onto the world (Vervaeke, 2013). A collective frame or narrative that reflects multiple truths, while at the same time offering an overarching perspective might be a key sustainability challenge (e.g., Wahl, 2016; Lent, 2017; Freinacht, 2019). The relational paradigm helps to provide a collective frame by acknowledging the importance of individual autonomy and the person's interconnection to the greater whole, while overcoming the dualism of subjectivity and objectivity. It gives meaning by enhancing the integration between the individual's subjective experience and actions toward sustainability and relating them to the world at large. This can be especially important for sustainability pioneers who may feel that their actions are insignificant. Moreover, it fosters a broader sense of self by engaging emotional, symbolic, and more contextual understandings of sustainability (Lange, 2019). As O'Brien observes, a relational paradigm widens the frame and "introduces meaning into what might otherwise be considered a meaningless world" (O'Brien, 2016:7). A relational paradigm may thus contribute to a sense of meaning for the individual in general and explain, more broadly, why, sustainable lifestyles matter.

4. Discussion

In the previous section, we presented seven patterns of a relational paradigm, and how each one might contribute to overcome challenges of sustainable lifestyles. We do not see these seven patterns to be an exhaustive list, but rather an exemplification of the importance of moving towards a relational approach. Building on these insights, in this section, we discuss the possible implications of changing our understanding of sustainable lifestyles, and propose a framing that lays the foundation for further research and operationalization. In this context, we briefly address the epistemological challenges that we faced during the research process.

4.1 Towards a Relational Approach to Sustainable Lifestyles – The Relational Lifestyle Framework

By adopting a relational paradigm to investigate sustainable lifestyles, we draw upon Haraway's idea of diffraction. Diffraction creates something new by looking at it through a different lens. Haraway (1997:14) first articulated the notion as a metaphor

for inquiry and a critical method, “where inference patterns can make a difference in how meanings are made and lived”.

On this basis, the knowledge that emerges from our work highlights that sustainable lifestyles are co-constituted by ethico-onto-epistemologies and socioecological realities. Four dimensions, namely epistemology, ethics, ontology (described in section 3.2), and socioecology (described in sections 3.1 and 3.3) are viewed through a new lens. These dimensions capture the intra-action, mutual dependence, and co-constituency that dissolves the binaries of inner and outer, personal and social, or natural and cultural. Positionalities are, then, not represented as something ‘out there’ or ‘external’, but instead as an inherent, constitutive part of various phenomena (see section 3.5). They are constituted in relation to each other, indicating that changes in one might change the other (see section 3.4): wellbeing in one dimension relates to wellbeing in other dimensions (see section 3.6). Such a new understanding gives meaning to sustainable lifestyles (see section 3.7), as it captures a sense of co-creation and flow between the different dimensions, and shows that all four are subject to an ongoing, non-hierarchical, non-linear, dynamic process of intra-action.

Accordingly, we propose to refer to sustainable lifestyles as relational lifestyles. Why? Because both the language and the frames we use are closely related to paradigms (Ives et al., 2019; Lakoff, 2014). As Smartt Gullion (2018:29) points out, “Paradigms by definition determine how we frame reality”, and, as Ives et al. (2019) note, language can be seen as an expression and reinforcement of paradigms. The term ‘sustainability science’ implies the pursuit of maintenance. Our study shows that the term ‘sustainable lifestyles’ is both outdated and inaccurate; while it is enough to sustain the status quo, it is insufficient to move beyond and support sustainable transformation (e.g., Wahl, 2016). Sustaining the status quo does not give a sense of direction or orientation.

Moreover, the term ‘sustainable lifestyles’ originates in mechanical ontologies that characterize a lifestyle with reference to fixed properties, and supports a type of thinking that focuses on the stability of entities and systems. As shown in our study, this hinders a flourishing future. In contrast, the term ‘relating’ points to a deeper desire, as it appeals to a shared sense of belonging. It moves away from merely answering *living-how* (sustainably) questions, and marks a shift towards *living-with* as

an epistemological, ethical, and ontological task that is composed of not just new lifestyles, but new conceptions of what it means to live well. In the following, we refer to the proposed new understanding and framework as the Relational Lifestyle Framework (RLF).

4.2 Epistemological Challenges

Although our initial intention was to develop a relational framework as a practical tool that is supported by a figure, because a growing number of scholars are calling for the use of relational frameworks in the social and natural sciences, as there is little rigorous, in-depth and/ or detailed advice regarding how empirical research can be conducted (Mannion, 2019; Smartt Gullion, 2018), we decided to abandon this goal during the research process. One reason was that the relational paradigm questions the linear model of causality, and therefore causations can rather be seen as probabilities in which certain characteristics relate to a change in another characteristic (Smartt Gullion, 2018). These intertwined entities make it difficult to identify clear cause-and-effect relationships, and the idea that a specific tool can be used to lead to relational lifestyles becomes questionable. Additionally, as Latour points out, “tools are never ‘mere’ tools ready to be applied: they always modify the goals you had in mind” (Latour, 2015:143). By offering a practical tool or figure, we risked offering a simplistic conceptualization that narrows one’s understanding (Mancilla Garcia et al., 2020a). Moreover, relational epistemologies question the idea that tools can be used to represent reality without acknowledging the entanglement of the researcher who is co-creating the knowledge (e.g. Latour, 2015).

We therefore suggest that the proposed RLF should not be seen as a tool with specific prescriptions and instructions, but instead as a proposition that “triggers conditions of emergence” (Springgay, 2015:78). Rather than generating data, it aims to construct new propositional knowledge (see also section 3.5). As Barad (2007:91) points out, “practices of knowing are specific material engagements that participate in (re)configuring the world”, and the understanding of sustainable lifestyles that is created has material consequences (Barad, 2007; Jackson and Mazzei, 2012) that can improve related policies and practice. The RLF then allows effects that would not have been obtained by other frameworks (Latour, 2005). It is not a representation of a complex reality, but an enactment of it (Latour, 2015). Thus, the RLF offers a more

encompassing framing that can help to better-cope with the complexity of sustainable lifestyles. While it is beyond the scope of this article to describe how to cultivate a relational paradigm in different settings and contexts, the RLF represents a starting point for changing our conversations, discourses, and approaches to support relational lifestyles through research, policy and practice.

5. Conclusion

Sustainable lifestyle concepts that are grounded in a mechanistic paradigm are no longer useful, and are preventing an effective response to our complex and dynamic world. We argue that our novel relational framing is a new conceptual approach that has the potential to transform research, policy, and practice.

The proposed RLF scales in depth, rather than breadth. It encompasses people's inner worlds, which is critical for sustainable lifestyles and transformation (Gilby et al., 2019; Wamsler et al., 2021). At the same time, it recognizes the need to scale up and out, as it acknowledges the importance of both inner and outer dimensions of transformation. In this respect, it contributes to the branch of transition studies that "posit[s] a profound cultural, economic, and political transformation of dominant institutions and practices" (Escobar, 2015:454), rather than the branch that narrowly focuses on socio-technical (e.g., Grin et al., 2010), and techno-industrial (e.g., Perez, 2016) transitions. The former focuses on post-development, non-neoliberal, post/ non-capitalist, biocentric, and post-extractivist futures (Swilling, 2019), and is aligned with approaches such as commoning (Bollier and Helfrich, 2015) and degrowth (D'Alisa et al., 2015).

It is important to note that the relational paradigm is not a simple substitute for the mechanistic paradigm; rather it should be understood as a container for a new story to emerge. A mechanistic approach may still be useful, especially when considering domains with clear objective, quantitative goals, such as carbon emission reductions. Understanding intra-action and carbon's agency on our actions should not stand in the way, or function as an excuse for an excessive carbon footprint. Nor should it misdirect responsibility, or be an excuse for inaction. Instead, our framing opens up new opportunities for creative solutions to emerge that address existing challenges. As Capra and Luisi (2014:79) note, "the emphasis on relationships, qualities, and

processes does not mean that objects, quantities, and structures are no longer important.”

In sum, our proposed RLF translates the relational paradigm into a comprehensive understanding of lifestyles. It helps to conceptualize multi-scalar sustainable lifestyle patterns, and to overcome the distinction between inner and outer or micro, meso, and macro registers of experience (Smartt Guillon, 2018). Lifestyles then are not only concerned with individual behavior but instead are a manifestation of identified patterns of thinking, being, and acting that are embedded in today’s “socioecological” realities. We acknowledge that it will take some time to recognize the benefits, as we are all immersed in the current social paradigm. However, it is a starting point that may help to ignite a new discourse. It can thus contribute to the transformation of lifestyles, which is required for a just socioecological transition towards a caring and flourishing society.

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