



# Can the sustainable development goals harness the means and the manner of transformation?

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## Abstract

The 17 sustainable development goals and their 169 targets comprise a comprehensive list of prerequisites for human and planetary well-being, but they also implicitly invoke many of the very trade-offs, synergies, and parallelisms that drive global crises. Decision-makers are familiar with these internal conflicts, and there is no shortage of frameworks, blueprints, and roadmaps to accelerate sustainability. However, thus far, inevitable trade-offs among competing priorities for sustainability are not catalyzing the types of transformations called for, indeed, demanded, by the SDGs. Habitual technocratic approaches, which the SDG lend themselves to, will report on indicators and targets, but will not adequately represent the ambitions of the goals themselves. Addressing these habitual tendencies, this paper therefore considers the inner dimensions of transformation, including emotions and meaning-making. Music offers a rich source of metaphor to reimagine interconnections and communicates affectively the feelings and embodied dimensions of intellectual thought and creativity. We draw on Western musical composition and history to offer insights on an intellectual path-dependency leading up to the current disembodied indicator-based management and regulation of global environmental and societal crises, and on potential alternatives. As metaphors, we consider what the SDGs might ‘sound like’ as either 12-tone, contrapuntal, or improvisational expression. We suggest that for the SDGs to release their transformative potential, ‘sustainability improvisers’ with a handle on both the ‘what’ and the ‘how’ of transformation are needed: harnessed with deep understanding of SDG indicators and targets, but with an ability to listen deeply and invite others to co-create transformative pathways.

**Keywords** Sustainable Developments Goals · Music · Metaphor · Embodied perspectives · Narrative · Transformation

## Introduction

The Sustainable Developments Goals (SDGs) list the most pressing aspirational priorities that have been identified over recent decades as critical for societies seeking economic, social, and environmental equity and justice. Significantly, the 169 targets in the SDGs embody many of the unresolved internal conflicts that produce global environmental

and societal crises on the path to human well-being. The UN goals, targets, and indicators contain a great number of trade-offs, parallel tracks, and synergies that both help and hinder reaching the 17 goals, locally and globally. As Hartley (2020, p.235) observes, efforts to localize the SDGs are “geographically heterogeneous and at the global scale reflect the entire continuum of political systems, confounding technocratic efforts to build an empirically-based success-narrative that is universal and consistent.” This exposes a tension between universality of the goals taken in their entirety and the necessity of contextual and heterogeneous implementation to resolve internal trade-offs locally and regionally.

Realizing the full suite of SDGs holistically implies a transformation of societies and how we relate to each other, the economy, and the natural and built environments of which we are part. Indeed, transformation is increasingly recognized as a necessity to halt and reverse environmental, societal, and financial crises. In this context, we take

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transformation to imply a fundamental change in the structure and functioning of an inextricably linked social and natural system (Gunderson and Holling 2002). While the idea of transformation has traditionally had a meaning transferred from ecology and natural systems to social systems (Gunderson and Holling 2002), the burgeoning literature on transformation in social systems now considers transformations in how societies are organized, including changes to the inner dimensions of paradigms, values and meaning-making that inform societal systems and relations (O'Brien and Sygna 2013, IPBES 2019). Despite growing interest, there is still little understanding of how the personal sphere of values and beliefs interlink with the practical and political spheres of transformation (c.f. Sharma 2017, O'Brien and Sygna 2013), let alone how this translates into transformation of interactions between humans and natural and built environments.

Our concern in this paper is that when the SDGs are approached selectively and individually, they will not unleash their transformative potential. Since the SDGs reflect an unprecedented breadth of requirements for human well-being, selective approaches could brand almost any initiative as contributing to some goal or target, and thence to the SDGs (by some referred to as *SDG-washing*, c.f. Johnson et al. 2020). We are not alone in voicing this concern. David Le Blanc (2015) at the UN Division for Sustainable Development says integration is the key to discovering and resolving the SDGs' myriad synergistic, competing, and parallel SDG targets, an observation Stafford-Smith et al. (2017), Nilsson et al. (2018), and Sachs et al. (2019) also make. The United Nations emphasize that the 17 sustainable development goals and 169 targets for 2030 are integrated and indivisible (The United Nations, 2015). This is not to say the targets are à priori integrated and indivisible, but rather that they require a relational and interconnected perspective. These assertions are not trivial, but cut to the heart of transformation: it is precisely in the effort to prioritize either societal, economic, or environmental sustainability that meeting goals in one area of sustainability erodes sustainability in other areas.

And yet, examples abound revealing the inclination of implementers in private and public sectors alike to select and delegate goals most relevant or synergistic with existing interests, and report on relevant indicators. Hartley (2020) points out that a technocratic focus on targets and indicators keeps the SDGs squarely within the Enlightenment episteme: governed by linear, causal relationships, reductive, atomistic strategies for progress, and the inevitability of an incremental approach to change. Perhaps for this reason, assigning any transformative hopes to the SDGs leads Horton (2014) to state that the "SDGs are fairy tales, dressed in the bureaucratism of intergovernmental narcissism, adorned with the robes of multilateral paralysis, and poisoned by the

acid of nation-state failure." The failure of the SDGs will be perhaps most spectacular for biodiversity, as Zeng et al. (2020) warn as they examine SDG indicators. The enlightenment episteme is the backbone of Western thought, and transcending its limitations require attention to how it conditions inner dimensions of transformation as the SDG challenge is taken on. There is need for greater imagination for how to approach this unprecedentedly comprehensive vision.

We posit that decision-makers at local, national, and international levels are aware of the means by which economic priorities (now mainly Goal 8) take precedence over other dimensions of sustainability. Even with stringent regulations for environmental protection and social process, the need for employment and economic growth (or at least avoiding economic loss) continuously overrides other needs for sustainability. Insistence on economic methods and measures for sustainability has been a key shortcoming of the sustainability agenda since 1987 (c.f. Sneddon et al. 2006). Perhaps more recently, climate change targets may override environmental and economic concerns or social preference (see next section). Hence, decision-makers may need less help creating blueprints to identify, measure, or weigh competing targets; and more help finding an underlying 'spirit of engagement' that will allow relevant publics to 'stay with the trouble' (Haraway 2016) of transforming the inner dimensions where inherited mental models, values, and worldviews limit what we are able to imagine. As Sharma (2017) suggests, this might transform the outer dimensions of practices and politics that generate competition among priorities for sustainability.

Narratives and mental models of global change are more than mere descriptions of a world in crisis (Veland et al. 2018). How the SDGs are imagined matters for how the lay public, policy makers, private industry, and civil society approach their implementation, and therefore, for how they might catalyze transformation for sustainability. As Olson (2015) has argued well, the language and imagery of scientific work is inadequate for inciting a sense of agency and involvement in solving global environmental crises. Similarly, Wyborn et al. (2020) argue "biodiversity research is replete with scientific studies depicting future trajectories of decline that have failed to mobilize transformative change" (p.670). We are concerned that, when imagined as a set of 17 separate indicator-based goal posts to be reached in some prioritized order, the failure of the SDGs is certain.

Approaching the SDGs holistically presents a humbling challenge. Integrating 169 targets creates more than 14 thousand interconnections with innumerable local variations, beyond the human mind, and beyond the boundaries of modeling. Seeking ways forward, sustainability scholars highlight the inherent unknowability of the transformed future and the path there (Hulme 2009, Veland and Lynch 2016, Horn 2021). Others urge greater imagination (Wyborn

et al. 2020; O'Brien 2021), some pointing to the potential for engaging creativity, motivation, and agency through the arts (Kagan and Kirchberg 2016, Bendor et al. 2017, Galafasi et al. 2018, Bentz 2020, Maggs and Robinson, 2020). Indeed, the lived reality of future sustainable conditions may seem inherently unpredictable, unforeseeable, or intolerable, from the perspective of any given individual at the present time (Veland and Lynch 2016). With this in mind, this paper looks for imaginative resources that do not attempt to make the future more knowable or map out a course there, but that instead might spur public and private decision-makers to reimagine and relate in new ways to the competing social, economic, and environmental sustainability pathways they navigate now.

Metaphors that can help reimagine the SDGs abound. Here, following the likes of Howitt (1998), Norgaard (2001) Olson (2015), and Ippolito and Adler (2018), we make use of musical metaphors to assist our aim of fostering inner creative potential and sense-making to transform practical and political processes. Our exploration is based first on music's emergence from and appeal to emotional as well as intellectual dimensions across cultures and traditions. This permits us access to both the feeling and thinking aspects of the inner human condition, and to reflect on their political and practical contexts. Second, music is already a rich source of metaphor in academic as well as everyday contexts, allowing us to build on established meanings.

We begin with a short exploration of challenges to transforming through the SDGs, before giving a presentation of the emotional aspects of transformation for sustainability. Next, we present our two approaches to music in this paper, as connecting the personal, practical, and political spheres of transformation (O'Brien and Sygna 2013), and as a metaphor and illustrative historical context for SDG implementation. The paper then elaborates on three key musical metaphors, exploring how the politics of the SDGs might emerge as a 12-tone composition, as a composition akin to *The Art of the Fugue*, and as improvisational music. We consider in these examples what insights the emotive (inner, personal), compositional (outer, practical), and historical (outer, political) aspects these forms might offer. The discussion finally argues that attending to the manner in which we imagine and co-create sustainable development can generate means of releasing the transformative potential of the SDGs.

## Challenges to transforming through the SDGs

This section focuses on two key methodological issues that need to be addressed to harness the SDGs for transformation. First, there is the matter of finding trade-offs, parallelisms, and synergies among the 17 goals and 169 targets. Where,

how, and between whom are transformed ways of imagining and deciding on trade-offs needed? Second, there is the issue of ensuring the goals and targets are filled with the intended meaning: do the indicators represent their targets, and the targets their goals? The discrepancy between indicators, targets, and goals leaves much space for the emergent and locally contextualized meaning-making that is required to revisit and reimagine the many trade-offs and parallelisms enfolded in the SDGs.

## Finding trade-offs and parallelisms

On a target by target basis, there are at least 14,196 possible interlinkages among the 17 SDGs, and 28 392 if considering the direction of influence.<sup>1</sup> The expression of and solutions to trade-offs among these interlinkages vary in space and in time, and are, inevitably, not universal (Le Blanc 2015; Nilsson et al. 2018). Consider, for instance, Norway's contribution to Target 7.2 to increase the share of renewables and Target 9.4 to reduce CO<sub>2</sub> emitted per unit of value added, among others (Fig. 1a). One approach to achieve these targets is the expansion of wind energy. The location of these windmill farms interfere with targets 2.3 and 2.4 for small-scale food production such as herding, Target 11.4 which seeks to safeguard cultural and natural heritage, and Targets 15.1, 15.4 and 15.9 to reduce loss of habitats and biodiversity such as bird species that collide with turbine blades (Fig. 1b,c) (See Avila (2018) for an overview of wind energy conflicts). The need to identify such trade-offs is not always self-evident, however. For instance, when Swain and Karimu (2020) reviewed renewable energy and the SDGs, they chose a selective approach to highlight only synergies between Goals 7 (energy), 8 (economic growth), 12 (responsible production), and 13 (climate action), while they were silent on trade-offs with other goals.

Consider also the trade-offs as the city of Bergen, Norway expands its public transport network to lower emissions from personal transportation. The investment addresses target 7.1 for clean fuels, Target 7.2 to increase the share of renewable energy, Target 9.4 to reduce CO<sub>2</sub> emitted per unit of value added, and Target 11.2 for access to public transport (Fig. 1d). Making space for railways and relocating businesses to secure employment and economic growth (Goal 8) meant digging up and storing high quality and productive agricultural soils. With this decision, the city government eroded the ability to reach Target 2.4 for sustainable food systems and improved soil quality, Target 11.4 to protect the

<sup>1</sup> 169 targets can have unique interactions with 168 targets, which mathematically equals 28,392. The lower number of 14,196 considers each interaction between targets once (e.g. the relation between Target 1.2 and 4.1 is counted once).



**Fig. 1** Illustration of goal conflicts in Norway; a artist's rendition of windmills included in the application to construct a wind park at Vardafjellet (credit: Multiconsult, Vardafjellet Vindkraft AS); b windmills are a known hazard to birdlife, here sea eagles near windmills are a concern for conservation (credit: Espen Lie Dahl, NINA); c Tonstad windpower park during construction in 2019 in former moor-

land (credit: Risa, La Naturen Leve); d excavation of food soils at Liland near Bergen to make room for car dealers displaced from the city rail construction (credit: Alice Bratshaug, Bergens Tiedende); e artist's rendition of the city rail stop at Mindemyren in Bergen (credit: Bybanen Utbygging, City of Bergen)

cultural and natural heritage of traditional farms, Target 12.2 to manage natural resources effectively, and Target 15.3 to restore degraded soil (Fig. 1e). Of course, these trade-offs did not arrive with the SDG agenda, and land use planners are used to weighing priorities such as these. Yet, could the dilemma be imagined otherwise?

The UN necessarily and appropriately does not provide a framework for implementing the SDGs holistically, as Le Blanc (2015) indicates. The explicit use of targets and indicators, nevertheless, begs the question of how the UN intends reaching all goals in concert. Meanwhile, this very lack of a shared framework for integration places on myriad local and regional decision makers, businesses, organizations, and local inhabitants the daunting task of revisiting and finding innovative solutions to conflicting goals and discovering synergies across sectors and scales (c.f. Hovelsrud et al. in press). On the one hand, this need to “let a hundred flowers bloom” is the very essence of adaptive management and co-existence (Lynch and Veland 2018). On the other

hand, the complexity of the interactions quickly overwhelms attempts to harmonize aspirations in any particular context. Thus, integrate we must (Le Blanc 2015, Stafford-Smith et al. 2017; Sachs et al. 2019; Nilsson et al. 2018), and reliance on selected individual targets and indicators to achieve each goal will not provide the seeds of transformation.

### Filling goals and targets with meaning

There is a reductionist unidirectional logic in the construction of the SDGs. The goal is represented by targets which are operationalized by indicators, but this chain cannot be directly reversed so that indicators completely represent their targets, and the targets their goals. This creates a disconnect between measuring an indicator and using this data to confirm that a goal has been achieved. Take, for instance, Goal 2 on Zero Hunger. The aim is to “end hunger, achieve food security and improved nutrition and promote sustainable agriculture.” This open-ended formulation permits

contextually appropriate and emergent targets for action and possible indicators for monitoring. However, once concretized into targets and indicators, there is a discrepancy in how well they represent the goal. For instance, in Target 2.3, the task is to “double the agricultural productivity and incomes of small-scale food producers.” The intention is that doubled productivity will help end hunger and malnutrition, produce food security, and support sustainable agriculture. This assumption, however, is highly contextual.

In many regions, increasing demands for productivity has led to a consolidation of farms into larger enterprises and more industrialized forms of production (c.f. Flaten 2002). These modes of production favor standardization over diversification, and in the context of climate change may perversely reduce productivity over longer time scales (c.f. Bjørkhaug and Richards 2008). Indicator 2.3.1 further concretizes this target to measure the “volume of production per labor unit by classes of farming/pastoral/forestry enterprise size.” This indicator-based means of managing food production collapses complex systems into focus on singular outputs (liters of milk, kilos of meat, percentage of fat) that disincentivize more extensive and ecologically integrated production systems that would help conserve genetic diversity and soil quality (c.f. Flaten 2002; Bjørkhaug and Richards 2008, Plumwood 2012). Indeed, measurable indicators such as these provide competitive advantage to actors who would prioritize achieving the target over actors who try to match the target against both the larger goal, other goals, and their own context. Troublingly, although not surprisingly, Zeng et al. (2020) find that present SDG indicators will not avoid environmental destruction; they do not adequately represent their targets and goals.

The legacy of scientific reductionism greatly informs the target- and indicator-based approach of the SDGs. Nobel laureate Philip Anderson (1972, p. 393) diagnosed such issues as asymmetry, saying “the ability to reduce everything to simple fundamental laws does not imply the ability to start from those laws and reconstruct the universe.” Of course, the need for SDG indicators to monitor trends in pollution, health, or economic activity, is not at question in this context. It is both necessary and imperative as part of ensuring evidence for meeting goals. Meanwhile, substituting these targets and indicators for the goal itself is goal displacement (Warner and Havens 1968, Lynch and Veland 2018). As Goodheart’s Law is often paraphrased to say, *when a measure becomes a target, it ceases to be a good measure* (c.f. Strathern 1997). It is important to keep in mind that while the targets and indicators are stepping stones to achieving the goals, they cannot substitute the goals themselves. There is much room for filling each goal with emergent and contextual meaning to foster transformation.

If the indicators and targets are necessary but insufficient for goal attainment, and the UN has not supplied a

methodology integrating goals, targets, and indicators, how can the sustainable development goals be harnessed for transformation? We have suggested that there is need to attend to the manner in which we imagine the task of filling goals with meaning and relating conflicting and parallel goals. The process of sustainability is so transformative that its future conditions cannot be perceived from where we now stand (Veland and Lynch 2016). The more we try and plan for transformation from within our current vantage point, the more the future resembles the present, and therefore, the more hesitant we are to go. How to generate the courage, imagination, and co-creation necessary to go beyond indicator-based governance to move through this uncertainty to practice and plan societies sustainably?

## The emotions of transformation

One of the main challenges of working with the SDGs may very well be a challenge of learning to “deal with complexity and uncertainty rather than learning a predetermined ‘sustainable’ set of values and behaviors” (Sandri, 2013, p. 767); to ‘stay with the trouble’ (Haraway 2017) in the sticky, fragile, and awkward spaces of coexistence (Howitt 1998, Lynch and Veland 2018). Turning to emotions and feelings might be an integral part of this challenge (Sharma 2017), as “feeling is a mode of active, perceptual engagement, a way of being literally ‘in touch’ with the world” (Ingold 2000). Art and creative expression provide potent pointers for how to work with complexity rather than against it through feeling. To imagine and narrate pathways through complexity in transformative ways, we suggest, in line with Sharma (2017), Ippolito and Adler (2018), Bentz (2020), Maggs et al. (2020) and others that approaches and concepts from the arts help engage the inner dimensions of feeling and intuition, necessary for societal transformation.

Music helps give form to human feeling in cognitive, emotional and embodied ways. Social psychologist Rentfrow (2012) finds that music impacts how people think, feel and behave, and that music often serves as a vehicle for self-expression. Reviewing music and sustainability relations, Kagan and Kirchberg (2016, p. 1491) describe the process of listening to music as “a multi-sensorial experience involving kinaesthetic contagion through performance” that can lead to “an experience of synaesthesia, the overlapping and merging of sense perceptions.” They argue music in some cases can become “a tool to stimulate a sustainability-sensitive phenomenological process,” in which the listener “engages the self both in the formation of elements of identity and in their deconstruction, disruption and re-assembly” (Kagan and Kirchberg 2016, p. 1492). Other studies support this conception of embodied listening. Integration of the creative and analytic aspects of mind has the ability to shift

mindsets and diffuse conflict, Ippolito and Adler (2018) conclude. They find, “music appears to reconnect people to their creative potential and thus to lead them to see the value of employing creative thinking in professional settings that traditionally over-emphasize analytical and critical thinking.” Equivalently, effective performance in most professions require integrating critical thinking with the development of social intelligence (c.f. Ippolito and Adler 2018; Boyatzis, 2008). The task of shifting mindsets and diffusing conflicts to transform through the SDGs is no exception.

The ability of target- and indicator-based management to induce the care, imagination, and volition to act within our own capacities to practice transformation is questionable (c.f. Sharma 2017). The rich statistical documentation of greenhouse gas and industrial emissions, land and water degradation, and extinction of species have done little more than render with greater precision the already known trend toward an uninhabitable planet (c.f. Olson 2015), and compound grief and anxiety (Cunsolo and Ellis 2018; Gordon et al. 2019). Head and Harada (2017, p. 35) note that, “painful or troubling emotions receive little attention in the western cultural context of the practice of science, which is dominated by the importance of scientific rationality”. They observe that in response, scientists grow ‘thick skin’ and become more committed to data gathering and analysis, a response the SDG targets and indicators are also conducive to. When faced with ontological insecurity, Beck (2009) argued, we come to rely on our most tried and true methods, and become averse to change and experimentation.

The preeminence of scientific rationality has hindered the growth of a language and grammar for narrating the emotional, spiritual, and existential dimensions of researching and living within global environmental crises. “Keeping their brains a long way from the heart,” Head and Harada (2017, p.34) say, climate scientists “mobilize a range of behaviors and strategies to manage their emotions around climate change and the future.” They note very few researchers are ready to speak of their emotional responses to research, drawing out notable exceptions such as Willis (2012) and Dominey-Howes (2015). We agree with the growing call for attention to the emotional dimensions of global change research. There is increasing recognition of trauma as an effect of researching and witnessing disasters, climate change, mass extinction, pollution, and environmental degradation (Head and Harada 2017). Youth also report higher levels of worry and anxiety for the future (c.f. Ojala 2012, Berry et al. 2018; Leichenko et al. 2021).

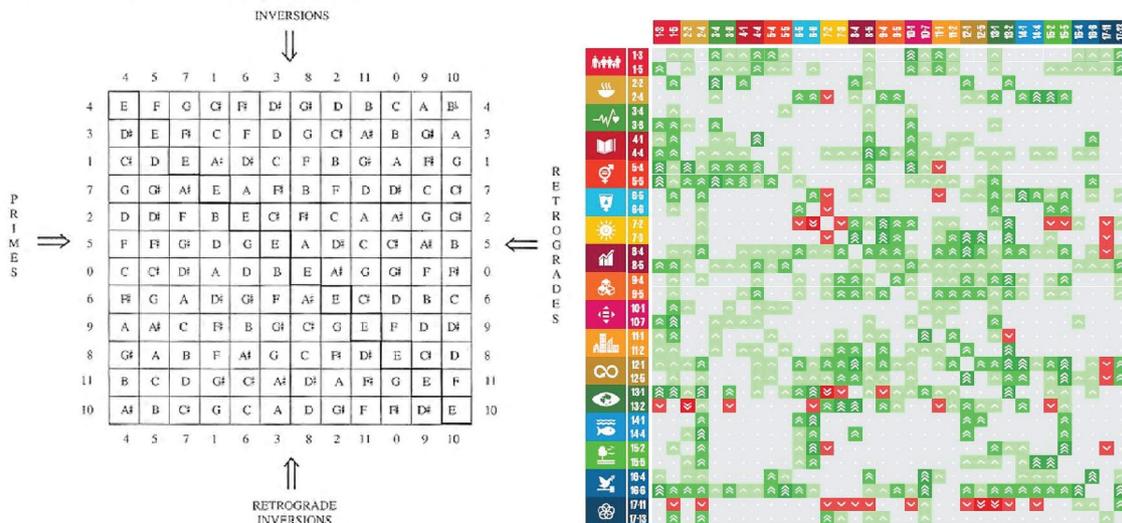
In speaking of healing, clinical professor of psychiatry, Daniel Siegel (2016) suggests traumatized mental states can tend toward chaotic states of emotion, intrusive bodily sensations, images, and memories; or toward a rigid state of avoidance behaviors, numbing, and amnesia. Healing from trauma is a transformative process. A healthy mind,

Siegel argues, achieves a state of integration that avoids the chaos and rigidity, where the ability of the mind to differentiate events and phenomena is balanced with the ability to link these observations into an integrated whole. Siegel (2016, p.78) suggests “optimal self-organization of complex systems arises when the diverse elements of a system are linked optimally.” According to Siegel, this optimal integration happens between the creative and analytic hemispheres of the brain, between the feeling and thinking aspects of mind. He further argues that the work of creating linkages among phenomena in the human mind happens through narrative. Such “integration creates harmony,” Siegel (2016, 83) writes, “like a choir singing together by differentiating their voices and linking together with harmonic intervals.” You may know the feeling, he suggests, “of hearing or singing a song in harmony—it’s exhilarating and full of life” (Siegel 2016, p. 83). Such integration of thinking, feeling, and expressive aspects of human experience may be key for healing and for transformation, from personal and collective trauma to healing planetary disasters.

## Music as metaphor

Metaphors are a kind of cognitive scaffolding that can lend explanatory meaning and offer useful analytical concepts (Howitt 1998). The use of metaphor is universal in language (Lakoff and Johnson 1980), and indeed all language can be understood as metaphorical since the word is not the thing itself (Howitt 1998). Through metaphors, we are invited to connect and lend meaning to otherwise disparate aspects of our lived experiences. Consider, for instance, that metaphors used in the context of sustainability and environmental change are imagery borrowed from other settings, such as ‘ecological footprint,’ ‘spaceship earth,’ ‘safe operating space’ (Rockstrom et al. 2009), ‘keystone species,’ or ‘shifting baselines’ (Olson 2015). Using musical metaphors to examine conflict resolution, Ippolito and Adler (2018) found that “non-musicians in non-musical contexts are able to learn from musical metaphors and concepts related to ensemble music-making,” and that this process helps “shift traditional norms and behaviors.”

Howitt (1998) uses musical metaphor to evocatively broaden scale theory in geography. Drawing on examples of how a particular note, say the ‘absolute’ pitch “A” (440 Hz), will sound different in different musical keys—chromatic, minor, major, etc.—Howitt (1998) shows that a geographic unit (local, national, regional, global) appears differently depending on the context in which it is invoked. On a more political level, how a note or chord ‘sounds,’ or what ‘sounds’ acceptable changes over time and with place, as tonal sensibilities co-evolve with culture and entangle with political and religious myths (Howitt 1998). Equally,



**Fig. 2** 12-tone row matrix for Schoenberg's Suite Op. 25 (from Kostka and Santa 2018). The notes of the musical scale is ordered into primes, inversions, retrogrades, and retrograde inversions. The

there will be variations in how SDG targets combine to create pleasant, interesting, or disharmonious synergies, parallelisms, and tradeoffs. How each is felt may be a matter of one's sensibilities, given one's cultural context, standpoint, and values.

Richard Norgaard (2001) uses musical metaphors as a way to engage with what he defines as “discordant knowledges” in sustainability work. He argues that the dissonance we experience “is a part of the transition from modernity to another phase of human history” (Norgaard, 2001, p. 59), arguing that the assumptions and myths of modernity cannot act as guides for how to navigate these new waters. Norgaard points to the shortcomings of the metaphor of an orchestra, in which each musician plays their individual instrument but to the same tune. “The modern orchestration of environmental economics,” which Norgaard (2001, p. 70) finds to be informed by atomism, mechanism, universalism, monism and objectivism, “has functioned under the myth that growth will take care of equity through a process of ‘trickle down’.” He argues that “Such a musical score simplified achieving harmony and allowed economists to feign objectivity as econocrats and present one right solution” (Norgaard, 2001, p. 70). This invokes the question of how the holistic composition of the SDGs might sound and feel as a musical expression? Is it a composition of econocrats, as Hartley (2020) warns, or could it be something more collaborative, creative and transformative?

In the following section, we use musical composition as a metaphor where the goals and their targets are imagined as musical notes or chords that can be combined in a number of ways to produce different emotionally, relationally, and

result is deliberately a-tonal. On the right an illustration from Weitz et al. (2018) that shows a matrix approach to ranking synergies and trade-offs between select SDG targets

intellectually rewarding outputs. We consider how three key modalities of holistic implementation—technocratic, integrative, and co-creative forms—might ‘sound’ by relating these to the history (politics), composition (practice), and feeling (personal aspects) of 12-tone, contrapuntal, and improvisational music, respectively. We draw on music as a realm in which embodiment, affect, and emotion have always been an integral part of its political and intellectual history, including our current era’s focus on dispassionate observation and objective analysis. In other words, and in keeping with this special issue, we consider *what* methodologies each of these compositional forms rely on, as well as *how* these forms might feel and sound. We use this as a lens to consider *what* different modalities of SDG implementation might evoke, and *how* they might be able to engage transformative outer practices and politics by expressing the inner feeling and emotive as well as the intellectual and technical aspects of the human condition. Below we explore the three musical modalities in turn.

### The technocratic approach: the 12-tone composition

A highly technocratic, modernist, or scientifically managed approach to integrating the SDGs, in which each target or indicator is addressed equally, sequentially, and dispassionately, might sound akin to the 12-tone composition. The 12-tone form accompanied a shift toward modernism in musical theorizing and composition. Working through a systematized compositional framework, the composer ensures each tone of the chromatic scale is attended to equally (see Fig. 2). That is to say, all the keys on the piano between, for

instance, A to G sharp, 12-tone, or serialist music as it is also known, emerged in the 1930s with Arnold Schoenberg (1874–1951) as the driving figure. This approach departed radically from tonality, the familiar musical language of harmonies built around major and minor keys (Tomassini, 2007).

The musical form was relatively obscure until after WWII when Germany and the world came to grips with the Holocaust. With a sense of horror at what was seen to have its roots in a Wagnerian spirit of German Romanticism, there was a drive to ‘restart’ culture disconnected from any historical roots, cultural grounding, or emotional identity. The composers’ dilemma in this space was the need to create music, but feeling unable to ‘trust the human heart’ and therefore needing to disconnect music from emotion. As one of the twentieth century’s most influential composers Luciano Berio describes it, it offered a way of making music “without being personally involved” (Taruskin 2009, p. 18). By 1979, the 12-tone system was seen as the foremost way of writing music. Indeed, serialist composer Jacob Druckman remarked, “not being a serialist on the East Coast of the United States in the sixties was like not being a Catholic in Rome in the thirteenth century” (Gann 1997, p. 220).

This resonates with habitual bureaucratic patterns of scientific management, or modern ways of thinking about how to gather and order knowledge (Hartley 2020, Brunner et al. 2002). Scientific rationality emerged as an antidote to superstition and overzealous religious doctrine by placing demands on observation, experimentation, and replicability to make decisions based on evidence. But as we have observed, rigorous cataloging of flora and fauna populations has not resulted in a reduction in species loss (Zeng et al. 2020), nor has careful objective scientific communication of climate change statistics induced a reduction in greenhouse gases (Olson 2015), but these have instead compounded feelings of anxiety and grief (Consulo and Ellis 2018, Gordon et al. 2019).

Of course, the disembodiment of the scientific narrative is by design. The technocratic approach to SDG implementation is vested in the Enlightenment episteme and its reliance on atomistic thinking, as Hartley (2020) points out. The effort to “clarify basic principles for the description and ordering of knowledge” (Bohr 1963 (1987) p.9) takes hold in the enlightenment era. “The fruits of the so-called scientific revolution are certainly now part of the common cultural background,” wrote Bohr (1963 (1987) p.8). These fruits are also carried in assumptions within this cultural background of what science contributes. Positivism assumes that knowledge can be grown by finely dividing and specializing the scientific labor and then combining their findings in a way where the total is greater than the sum of its parts. This is assumed because positivism expects that methods discover irreducible truths through dispassionate

observation, experimentation, and replication of results (Poon 2003), intendedly free from the affective dimensions of the human condition. Hence, as Gordon et al. (2019) and Head and Harada (2017) show, the means of conducting scientific research has arisen through encouraging a manner of producing knowledge explicitly ‘without the human heart.’

In the history of music, meanwhile, the influence of the 12-tone, and its unmelodic and unemotional musical expression, changed suddenly and drastically upon the reorientation of American composer George Rochberg. Rochberg composed some of the world’s leading 12-tone music, including the *Symphony No. 2* (1955–56) and was thoroughly couched in the aesthetic, though his location on the West Coast of the United States separated him from some of its cultural roots. However, his composition came to a halt upon losing his son to cancer in 1964. Rochberg found the cerebral, technical 12-tone music he was writing unable to contain and express his grief. Rochberg wrote (Gann 1997, p. 218),

*With the loss of my son I was overwhelmed by the realization that death ... could only be overcome by life itself; and to me this meant through art, by practicing my art as a living thing (in my marrow bone)...*

According to composer Kyle Gann (1997, p. 220), Rochberg was perhaps the most articulate at “pinpointing the strict objectivist mindset that underlay” serialist music “that made it taboo to rely on intuition and impulse.” After the loss of his son, “Rochberg argued passionately for a return to subjectivity” (Gann 1997, p. 220). With this, Rochberg swung the pendulum back toward the experiential value-based expression. Composers, Rochberg asserted, “had fallen prey to worship of a superficial view of the scientist and had, unlike the scientists themselves, relinquished intuition and inspiration to chase after physical and quantifiable paradigms” (Gann 1997, p. 220). In music, the return was to melody, to culture, to value, and, indeed, to humanity.

The unmelodic and deliberately unemotional compositions of serialist music, we venture to claim, is what the positivist techno-bureaucratic narratives of SDG implementation might ‘sound’ like. Building on scientific management (see Taylor (1903), (2004)) or Wagner-Tsukamoto 2008), researchers might devise a blueprint for implementation and data analysis, bureaucrats might adhere to existing structures of target- and indicator-based decision-making, and policy-makers might work on the assumption that directing policy at monitoring indicators sufficiently directs and captures goal attainment. If it is transformative, it is in the form of mass extinctions and climate emergency. The means and measures of target- and indicator-based management may aspire to be analytically ‘correct’ but are jarring to the spirit. Having swung from one polarity to another, from affect to cerebral modes of being, we now find ourselves—culturally—at a



**Fig. 3** Bach's Art of the Fugue Contrapunctus 1 (public domain), and a figure by Sachs et al. (2019) illustrating how transformation can be achieved through six key modules as starting points for weaving together elements of the 17 SDGs

loss for words and narratives to transform out of this period of mass extinction and climate inaction (Veland and Lynch 2016; Lynch and Veland 2018). There is a need for initiatives that do not swing towards model-driven pursuits of either the techno-bureaucratic or the romantic pole, but that balance and integrate the inner and outer dimensions of human transformation.

### Seeking harmonious integration: the Art of the Fugue

Planning implementation of the SDG agenda holistically while attending to both intellectual and feeling aspects of transformation might be comparable to a fugal composition. Fugues differ from most of the music we are familiar with today. Most music is built with a structure of melody and accompaniment. That is, a tune carried by a single voice (the lead singer, for example), with other voices (rhythm guitar, bass, drums) providing accompanying material (harmony, rhythm, texture, volume, etc.). Most of the music we listen to, from Mozart to Queen, is structurally hierarchical in this fashion. Fugues, generally speaking, do not have a hierarchical structure such as this. They are built from multiple semi-autonomous voices (i.e. soprano, alto, tenor, bass) all sharing the same thematic material (the tune or 'subject', as it is called). As these interdependent melodic lines are woven together, the rhythm, harmony, and structure of the work emerges through their interactions. Interactions among these themes earn fugal compositions the name 'counterpoint', to contrast it from 'melody and accompaniment.' The master of contrapuntal composition is J.S. Bach, and perhaps his most famous fugal work is found in his *Art of the Fugue*, a series of about 20 fugues exploring common thematic material in four voices (Fig. 3).

Fugues and counterpoint have long held great appeal as metaphor. This emergent musical expression that interweaves semi-autonomous voices finds its 'counterpoint'

in interwoven semi-autonomous political and cultural processes. Consider, for instance, (c.f. Said's (1979) exploration of colonial brutality in Jane Austen's *Mansfield Park*). What might be contrapuntal or fugal approaches to the SDGs? (Jiménes-Aceituno et al. 2020) describe an approach to SDG integration that engages the full suite of SDGs by interpreting them through a few targets or goals (which we might imagine as the notes that comprise the 'subject' or our melody of the fugue) deemed relevant to a region, sector, or industry (which we might consider to be the 'key' in which the music develops, e.g. C Major, B minor, etc.). Another example is Sachs et al. (2019), who propose six key 'modules' of transformation by which the 17 SDGs are integrated (where the modules represent the 'subject' of the fugue). Similarly, Stafford-Smith et al. (2017) suggest the three key areas (or 'keys' in our musical metaphor) that are particularly relevant for developing this integration are sectors, actors, and countries. Relatedly, the UN suggests to focus on seven key categories by which to integrate all 17 goals: finance, technology, capacity building, trade, policy coherence, partnerships, and data, monitoring and accountability (Goal 17). This melody of particular SDG commitments must then be 'sung' by a diverse collection of 'voices' (sectors, levels of governance, nations) which gives rise to coherent musical composition as each voice interacts with the others in that region.

With the goals, targets, and indicators as the notes that shape the melody, planners must guide stakeholders to sing this same melody even though certain of its notes will be harder or easier for the different stakeholders to 'hit'. The natural, social, and economic environment in which they live and operate is expressed as a key signature in which the work unfolds, where the counterpoint among stakeholders becomes an act of emergent, co-discovered interdependence. The goals must be in the key of 'place', singable by all voices, and yet the voices must respond to each other in order for a larger harmony to unfold.

Given this lack of hierarchy, there is a sense of infinite complexity to counterpoint, that is, the possibility of continuing to add more and more interdependent voices to the polyphony, if only the composer could manage them all sufficiently. While many Baroque artists, including Bach sought counterpoint as a divine pursuit, there was a feeling amongst many contemporaries that ultimate counterpoint would be encountered only in Heaven (Yearsley 2002). The doubt was to the ability of a composer to achieve the divine oversight and emergent harmony needed to integrate holistically without sounding belabored and forced—as indeed one might doubt this divine oversight and harmony in the implementation of the SDGs across sectors, places and scales. Does this humble our expectations for the global counterpoint of 17 goals, 169 targets, and almost 200 countries? *Soli Deo Gloria* (SDG)—glory to God alone—may be an appropriate response. In one sense, the counterpoint metaphor offers an image of carefully managed interdependence among sectors, scales, and places that can yield coherent emergent complexity in implementation of the SDGs. In another sense, the metaphor is a humbling reminder of the challenge of integrating and scaling SDG implementation beyond simpler harmonies, to practical and political resolutions of competing and conflicting SDG targets.

### The co-creation approach: improvisational approaches to the SDGs

Given the shortcomings of target- and indicator-based management of societal transformation, the room for filling each goal with emergent and contextual meaning, and the infinite complexity of ultimate goal integration, we further explore opening co-creative spaces for SDG implementation. Transformation can be a space of inherent unknowability and unfamiliarity, as well as a space of healing through integration, as we have discussed above. In the following, we explore the ways in which the concept of improvisation (Latin root *improvisus*, meaning "unforeseen" or "unexpected") might help move the spontaneous and creative 'co-motion' (Muller 2014) to move from the commotion of apathy and anxiety of inaction toward shifting mindsets and resolving conflicts to transform through the SDGs, without the express guidance of a composer.

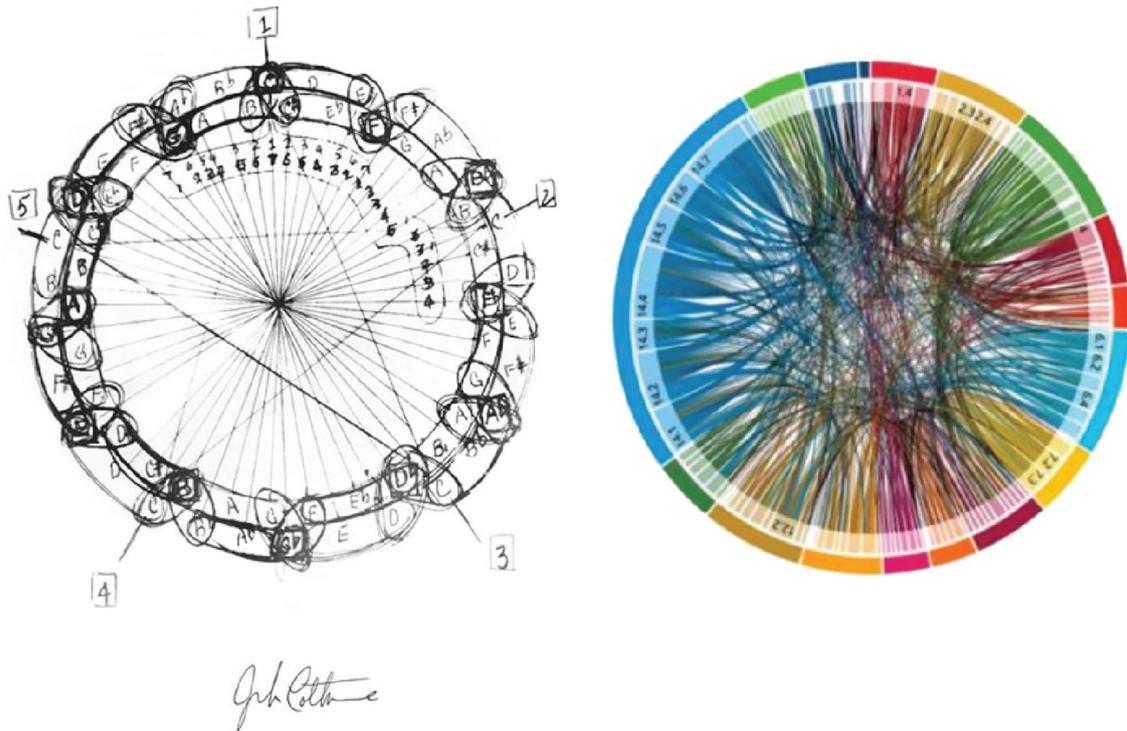
Improvisation is central to the process of learning to master an instrument. As with all learning, learning how to improvise involves making mistakes and therefore requires a willingness to take risks. Hence, Azzara (1999, p. 24) highlights the importance of providing a psychologically safe environment for students to try out new ideas, and suggests "think[ing] of mistakes as a means of understanding individual differences." Thus, while hitting a note outside the harmonic progression can be perceived as 'wrong,' it may also be "the unconscious thoughts trying to get through," or

the student "hearing more advanced ideas" (Azzara 1999, p. 24). Rather than being a playground where 'everything goes,' however, skillful improvisation requires that musicians adopt specific cognitive processes, such as anticipation, emotive communication, flow, feedback and repertoire, as well as practice basic skills (Biasutti and Frezza, 2009).

As with other musical metaphors, improvisation is not new in sustainability science. Scholars from diverse fields such as education (Aoki 2005; Grange, 2016), ecological economics (Norgaard, 2001), information systems (Ali and Bailur, 2007) organizational studies (Hatch, 1999; Humphreys et al., 2003) and leadership studies (Raelin, 2016) have drawn upon this metaphor. Describing the qualities of collaborative leadership, Raelin (2016, p. 143) uses improvisation as a metaphor for the emergence of leadership within a collective as a "collaborative agency in deciding on the course of action." Similarly, approaching curriculum development through the metaphor of improvisation opens up new spaces in the teacher/student relationship and confronts the homogenizing effects of instrumental rationality (Grange 2016). Improvisation is 'anti-correlationist', Grange (2016, p. 26) argues, and "involves being attuned to the reverberations of the earth, to its materials flows, rhythms and intensities."

Improvisational approaches to the SDGs do not involve rejecting the indicators, nor the expertise of individuals or the insights of disciplines. On the contrary, musical improvisation points to the need for as much skill as the technocratic and integrative approaches, but with an added ability to play with structures, surprise, and dissonance, and to deeply listen to and engage with others. For illustration of this point, consider the improvisational skills of John Coltrane. One of the most accomplished improvisational saxophonists of the twentieth century, Coltrane's dizzyingly rapid and complex songs, like *Giant Steps*, *Transitions* or *Love Supreme*, teeters on the balance between complexity and disorder. Coltrane built on rare technique and deep mastery of musical theory and structure (Fig. 4). The manner in which he improvised upon these structures, interspersing with dissonant notes at the right intervals to achieve evocative musical expression, can only be achieved through mastery of both theory and skill, as well as the deep engagement of the spirit (c.f. Porter 1985). According to Sawyer (1999), improvisation engages with a tension between unpredictability and structure, which exist on opposite ends of a continuum. Speaking specifically about improvising in a group, he argues that "[t]he most salient characteristic of group improvisation is its unpredictability" (Sawyer, 1999, p. 193).

There is a lesson here for integrating the targets and indicators of the SDGs. Playfulness and deep skill is required to imagine more than the scientific and technocratic approaches to transformation, and finding new ways of problem-solving at the intersections of environmental,



**Fig. 4** John Coltrane's Circle of Fifths, illustrating the deep handle on musical theory needed to achieve his improvisational expression (from Alexander 2016). The technique draws together and at different times the cyclical movement around the circle of fifths (denoting the distance between notes on a circular representation of scale), chromaticism (using a scale comprising all 12 notes of Western music,

societal, and economic sustainability priorities. Transformation comes from integrating the right elements of surprise, dissonance, and intrusion upon implementation of competing and conflicting priorities. Co-creative improvisation, based on skill and insight in theory and praxis, might offer a helpful metaphor for undertaking that paradoxical journey to transformation. Harnessing the SDGs for transformation presents the challenge of going towards a destination when we do not know where that destination is, exactly, nor how to get there. The musicians must be willing to begin playing 'the music' without knowing what that music is, how it goes, how long it lasts, what keys it will be in, or when, indeed, it has become 'the music' at all. The 'sustainability improvisers' leading the co-creation must not only be theoretically and technically skilled but also skilled listeners and collaborators. It is crucial that the knowledge and perspective of all stakeholders is given room. The expression of a co-creative approach in practice will depend on the place and time of such work, as well as the personal inclinations of the individuals involved, akin to the deliberately democratic approaches promoted by Dryzek (2006).

Keeping a creative tension between unpredictability and structure might be an essential component of transforming

rather than a selection as for most scales), and triadic shifts (a technique that moves the music between scales by shifting one note in a group of three chords). On the right an illustration by Miola (2018) showing interlinkages among the SDG targets. Miola (2018) asks which interlinkages are universally agreed on, and whether different methods arrive at the same conclusions

through the SDGs, ensuring the players feel secure and supported in the frames of the exercise, as Azzara says (1999). A state of group flow and the development of a 'group mind' is a necessary condition for improvisation, Borgo (2007) argues. "It also involves reaching a certain egoless state in which the actions of individuals and the group perfectly harmonize" (Borgo, 2007, p. 184). This shift in identity, a willingness to be ontologically 'in play', that is, where one's being is part of the variables to be determined by the process, may be as critical to an integrative engagement with the SDGs as it is to musical improvisation. Complex social situations require an ability to improvise with the group to help solve emergent conflicts creatively. Unpredictability is characteristic of all improvisations, but group improvisation is collaborative and emerges through continuous exchange. "Since each performer cannot know what the other performers will do, each has to listen and respond to the others, resulting in a collaborative, and intersubjectively generated, performance" (Sawyer 1999, p. 194). Groups engaged in improvisation need to rehearse together, not to 'plan ahead' but rather, "to learn the process of improvisation—how to listen to each other, how to get their heads into the odd

mindset of not thinking ahead, and yet moving ahead” (Sawyer, 1999, p. 199).

Improvisation is a way of stepping back from a blueprint, or written score and opening spaces for emergent results. If we are just learning to improvise, however, and our habitual instinct is to reproduce pre-existing approaches, ideas, values, truths, etc., then we can expect our improvisations to struggle. Learning to listen to one another, learning to riff off ideas, learning when to speak, when to make space, learning to find the music through an emergent priority, and letting ourselves be transformed and defined by the process itself is the challenge—letting go of the ‘what’ to implement and exploring ‘how’ to co-create pathways to the goals through this moment of transformation. As Norgaard (2001, p. 70) argues, we must accept the potential incongruences between tonalities as “indicative of our limited ability to understand the whole from any particular perspective and [be] methodological pluralists for this reason.” He continues, “We [must] realize that truly different ways of knowing do not merge to a single answer, that atonality is inherent in different ways of knowing.”

Transformation through the 17 sustainable development goals in a co-creative improvisational mode would reject the notion of predetermining or composing integration. Instead, the framework of the 17 goals would be harnessed to engage the creative tension between goals, targets, and indicators, and contextually emergent priorities, process, and outcomes. Transformation requires room for both skill and theoretical mastery, as well as room for co-creating emergent and contextual meaning.

## Discussion and conclusions

This paper has explored a variety of musical metaphors for how the SDGs might or should be integrated holistically, but is there a musical metaphor for how they *are* engaged, at least typically speaking? While the techno-bureaucratic approach illustrated in the 12-tone is perhaps the nearest of our three metaphors, none of them can be said to be widespread, as integration across the 17 goals remains less common than selective approaches. Perhaps a fourth genre of ‘pop music’ is the most appropriate metaphor? Early adopters across industry actors, government initiatives, as well as nonprofit organizations favor selective approaches. A ‘pop’ metaphor speaks to the tendency of simplifying the SDGs down to one or a few goals that ‘play along’ with existing priorities, ensuring a benign and affirmational presence amongst ongoing activities. Such efforts might contribute positively to some targets and indicators, as described in the Norwegian examples earlier. Yet as those examples show, simplistic and selective ‘pop’ approaches ignore the core challenge of resolving conflicting and competing

sustainability priorities, and for this reason entirely sidestep the transformative potential of the SDGs. Simplistic and selective approaches thus might be criticized as ‘SDG-washing’ (c.f. Johnsson et al. 2020).

The drive for technocratic solutions to implementing the SDGs provides an ontologically familiar yet constraining repetition of the tried and true approaches of the past centuries. Yet as scientific interventions are generating the very conditions they are designed to resolve, doubling down on these approaches will continue to prove counterproductive (Hulme, 2009). As Maggs and Robinson (2020, p. 14–15) have argued, “sustainability is not a problem for Modernism, but a problem *about* Modernism.” That is, harnessing the SDGs to transform out of societally-driven mass extinction and climate emergency has to start with recognition of the limitations of the modernist mindset and its scientific and technocratic solutions, to imagine alternatives (Lynch and Veland 2018). The historic (political), compositional (practical), and emotive (personal) dimensions of Western music have been used here to understand the modernist mindset and alternative ways of thinking about the challenge of transformation through the SDGs toward sustainability.

Perhaps instead the metaphor for present sustainability transformations presents itself as a ‘Rochberg moment’ of catharsis? Gordon et al.’s (2019) expression of grief, and Head and Harada’s (2017) thoughts on the emotional labor of scientists beg the question of how we return to the world after scientism and technocracy. That is, how human subjectivity, identities, hopes, values, beliefs, meanings, and sense of purpose might take on substantive presence in shaping what transformation to sustainability entails. This involves calling a halt to the structural isolation and alienation of the scientific and technocratic narrative, built on a premise of excluding human subjectivity, care, and emotion from knowledge and action. To paraphrase Rochberg, we might come to the realization that mass extinction and climate emergency can “only be overcome by life itself” by practicing transformation “as a living thing” (Gann 1997, p.218).

We also see the potential to move beyond metaphor. Involving the humanities and the arts, as Bentz (2020), Kagan and Kirchberg (2016), Bendor et al. (2017), and Maggs and Robinson (2020) have argued, can help move individuals and communities beyond their habitual technocratic mental models. Music can also usher the transformative process of healing from the grief, trauma, and anxiety (Krüger and Stige 2015) that younger generations and scientists in particular experience from planetary disasters (c.f. Ojala 2012, Berry et al. 2018, Leichenko et al. 2021). The UN call to implement the 17 SDGs holistically represents a cultural, indeed an existential disruption to the industrialized societies of the world, and the sixth assessment report of the IPCC (2021) only renders the urgency more acute. The

associated feelings of fear, trauma, anxiety, and grief induce chaotic or rigid states of mind (Siegel 2016) that hinder positive transformation. Siegel (2016) describes the process of healing as creating new meaning by integrating disordered chaotic phenomena into a coherent story, and by disrupting rigid perceptions and systems to integrate new elements and processes. Perhaps transformations to sustainability can be understood as healing the trauma of violent interpersonal and human-nature relations, and perhaps co-creative processes involving music can help this healing.

We have contended that decision-makers are acutely aware that among pressing priorities for societal, economic, and environmental sustainability, the necessity of trade-offs among competing priorities reproduces ongoing crises. The SDGs collate these priorities and trade-offs, but necessarily offer no new blueprints, frameworks, and roadmaps to discover or resolve trade-offs. Taking on the unprecedentedly comprehensive set of aspirations of the SDGs over the course of what is being referred to as ‘the decade that matters’ shows there is a real maturation in the global effort to find transformative pathways toward sustainability. Yet the complexity of this integration across 169 targets quickly overwhelms capacity to scale up. The integration must be improvised, and we invite developers, regulators, and bureaucrats to move beyond habitual technocratic rationalities when balancing needs for sustainability; to see sustainability challenges in new ways and relate differently to the competing social, economic, and environmental sustainability pathways they navigate.

In summary, the SDGs provide neither the means nor the manner of transformation, beyond an explicit international commitment to these most critical needs for human well-being. To harness the transformative potential of the SDGs, the devil is in the details of integrating SDG goals and targets to resolve the complex and conflicting priorities for economic, societal, and environmental sustainability. The cultural nature of transformation demands the inner, personal dimensions be an integral part of practicing co-creation to heal the outer political processes that perpetuate societal, economic, and environmental crises. To achieve the ambitions of the SDGs, not just their targets and indicators, there is a need for ‘sustainability improvisers’ who both understand deeply the technical aspects of the SDG targets and indicators, but who also recognize their inability to replace the goals themselves, and invite co-creative processes to narrate and integrate the goals in context. There is nothing trivial or simple about this challenge. There is need to harness the full spectrum of personal, practical, and political spheres (O’Brien and Sygna 2013) to transform toward sustainability. Through deep embodied listening, skilled improvising, and welcoming arenas of co-creation we can stay with the trouble, lean into the dissonance, and then through it towards its resolution; a resolution that seeks

to resolve our own internal harmonies as much as those we perceive around us.

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