# Sustainable becoming in time… Time as sustainable becoming: Mycorrhizal inspirations

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## INTRODUCTION

What does it mean to shift mindsets towards sustainability? More importantly, could it be that the notion of fixed 'mindsets' lies at the heart of the problems we encounter in thinking about sustainable organising? How is sustainable organising best approached given the urgency of the environmental threats that we face? In what follows, we explore whether the human mind, 'set' as being isolated, calculative and self-interested, may not lie at the heart of the problem of sustainable organising. In this, we extend the findings and intuitions of various studies in process philosophy (Helin et al., 2014) and articulate how our mycorrhizal explorations may further the literature on sustainability education.

Finding 'solutions' to sustainability challenges lies at the interface between multiple disciplines, and as such, utilizes diverse methodologies with distinct ontological assumptions. It involves bringing together large literatures around the normative aspects of environmental responsibility and the challenges of sustainability education. We also believe that in doing so, it will be helpful to draw on process philosophy in problematising our thinking about agency, while taking the material aspects of time and space seriously. How should we then proceed? In this paper we argue that we may do well to harness the insights that can be gleaned from one of the oldest, and as such most sustainable forms of life, i.e., fungi, and its most visible manifestation, mushrooms. Fungi have survived and thrived much longer than human beings, and even longer than plants. They made their appearance on land 1,300 million years ago, and their thriving is

evident in the fact that a 3.8 km long honey fungus in the Blue Mountains of Oregon is the largest living organism in the world today. We therefore propose a 'mushroom journey' of sorts, as we believe that we may glean much from the functioning of these mycorrhizal structures.

Understanding the time-space dynamics that characterise ecological ontology is crucial for thinking through sustainable organising. Ecology, (derived from the Greek word 'oikos' or home), refers to the biological and non-biological systems that allow for species survival in a spatial location during a period of time (Fonseca & Martin, 2004). In what follows, we argue that understanding mycorrhizal networks and their pharmacological effects may hold the key to understanding survival, but more importantly, to sustained flourishing. As Tsing (2015) argues, contemporary commerce, with its assumptions of growth, has promoted an authoritative view of people and things in isolation, and pursues linear perspectives on space and time. However, developing an understanding of entanglement and the heterogeneity of space and time from mycorrhizal structures may offer an alternative appreciation of the unpredictable times in which we live.

In pursuing a deeper understanding of what fungi may teach us, we therefore join Ergene, et al. (2021) in calling for a critical interrogation of sustainability discourses, drawing on relational ontologies and interdisciplinary perspectives. In our investigation, we employ a critical orientation towards hierarchical organisational structures, linear timeframes and short-term motivations, pursuing instead a relational ontology that acknowledges the networked nature of anyone or anything that thrives, and playfully engaging with biophilosophy, mycology and organisation studies. Our approach is to develop a conceptual framework for thinking about sustainability mindshifts by drawing on Deleuze & Guattari's (1987) bio-philosophical musings in *A Thousand Plateaus* (ATP), their 'rhizomatic' book (Patton, 1994). These conceptual resources are then brought into conversation with the research on mycelium and mycorrhizal structures, as it emerged in and through our engagement with a specific documentary entitled, '*Fantastic Fungi*' [https://fantasticfungi.com], and our reading of written accounts of psychedelic experiences (we employ the term 'psychedelic', aware of its potentially negative connotations associated with 1960s counterculture, but also mindful of its origins a neologism coined by the scientist Humphrey Osmond to combine the Greek words 'psyche' [mind] and 'delos' [manifest]; 'mind manifesting'). On the latter, we are conscious of the published research and trials currently taking place (and starting in the early 2000s) in the USA to use psilocybin to help, among others, terminal cancer

patients deal with their distress at the prospect of death (see for example Griffiths et al., 2016), or to treat depression (see for example Watts et al., 2017) and alcohol dependence (see for example Bogenschutz et al., 2015). These studies have highlighted that high doses of psilocybin lead to what has been described as: "…the dissolution of one's ego followed by a sense of merging with nature or the universe" (Pollan, 2018, p. 10). Could it be possible that such experiences could invoke an ontological changing of minds, which may lead to an environmental awakening and an appreciation of the heterogeneity of space and time which could inform new directions for thinking about sustainable organising? We are intrigued, and believe that we should not shy away from these accounts, which may tell us more.

## LITERATURE REVIEW

Our paper's contribution lies at the interface of a number of literatures, in particular sustainability education, process philosophy in organisation studies, and scientific studies of the physical and behavioural effects of psilocybin, which includes perspectives arising from multiple medical and natural sciences (e.g., Bogenschutz et al., 2015; Griffiths et al., 2016; Lowe et al., 2021; McCulloch et al, 2022; Watts et al, 2017). This in and of itself poses problems and opportunities. On the one hand it makes it impossible to delve very deeply into any of these literatures, but on the other hand affords us a unique opportunity to cast a birds-eye view of the shared preoccupations of many literatures and to ponder their implications for sustainable organising.

In our explorations of the research on fungi, it seemed striking how much of our findings resonate with the insights of the research emerging from the work of organisational theorists committed to process philosophy (Carolan, 2008; Helin et al., 2014). Related themes include rethinking human agency, with the help of Deleuze (Lawley, 2005; Jeanes, 2006; Painter-Morland, 2012) and considering its implications for the development of relational responsibility, with the help of Levinas (Rhodes, 2012, 2020). Scholars have also explored the role of embodied affect with the help of Henry (Painter et al., 2021), embodied memory, time and creativity, taking inspiration from Bergson (Linstead & Mullarkey, 2003), and further exploring his thinking on temporality in the context of life-style advice (Robson and Riley, 2019). Applications of process philosophy to workplaces include: re-engineering organisational behaviour inspired by Dewey (Rodick, 2015), rethinking gender with Deleuze (Maart, 2015; Painter-Morland and Deslandes,

2014); critiques of representationalist approaches to environmentalism with Heidegger (Painter-Morland & ten Bos, 2016) and multiplicity and change in organising with Deleuze (Linstead & Thanem, 2007), to name but a few studies. The resemblances in the insights were so striking that one was tempted to wonder if Dewey, Heidegger, Bergson, Henry and Deleuze were all mushroom-users![1] On a more serious note though, it seems strange that organisational theorists have not drawn lines between all mycorrhizal research and the learnings from process philosophy. What seem to be consistent themes in process philosophical accounts within organisation studies include: 1) in terms of agency: the notion of a distributed or relational self, instead of the transcendental subject as isolated individual; 2) in terms of epistemology: an emphasis on embodied and affective experiential learning and understanding in and across time; and 3) problem-solving as networked activities of an experimental and open-ended nature. As we will see from our engagement with both the literature on and practice-accounts of the effects of psilocybin, all three of these themes are addressed.

When considering the literature on sustainable organising, and more specifically on sustainability education, one can consider both the literature explaining persistent blockages or impasses in terms of enabling sustainable organising. In addition, as the literature on difficulties faced in designing management education that could enable sustainable organising suggests, a persistent issue that has been mentioned is the existence of contradictory timeframes, i.e., short-term corporate orientations that do not align well with the long-term time-horizons needed for sustainable organising (Slawinski & Basal, 2012). Other blockages to sustainable organising include the instrumental preoccupations of most organisational practices aimed at improving sustainability. Efficiency strategies are, in Slawinski & Bansal's (2015, pp. 538-540) words: "quantitative in its measurements and planning, one-directional in terms of its stakeholder engagement, and prone to 'going it alone'", i.e., it does not value collaborations with peers or across industries. Related problems seem to emerge from the way in which organisations and their agents frame sustainability discourses in terms of their own goals and interests. Defensive discursive frames are used to legitimise the actions of experts in service of organisations, or to delegitimise their opponents in the public domain (Lefsrud & Meyer, 2012).

[1] Certainly Dewey's fellow pragmatist, William James (1917, p. 87) recognised the potential for alternative forms of 'mystical consciousness', which could be stimulated in particular through the use of nitrous oxide.

In their analysis of the hegemonic tendencies that organisations employ in defending their lack of climate action or their limited efforts, Lefsrud & Meyer (2012, p.1481) highlight five main discursive strategies: authorisation, rationalisation, moral evaluation, mythopoesis, and normalisation. Characteristics of such strategies are words (logos) that create a specific ethos (moral evaluations) and (lack of) pathos, or rather (in)capacities for empathy, which serve to maintain or 'shore-up' professionals' own sense of identity and agency. Paradoxically, such explicit defensive strategies and identity constructions are no more damaging than the persistent argumentation regarding finding win-win situations, which allows hegemonic constructions to become fixed over time (Ferns & Amaeshi, 2021). The main characteristic of such hegemonising is its tendency to unify or temporarily fix signifiers in stable configurations that serve instrumental purposes. Critique is neatly incorporated into business-as-usual rather that to disrupt prevailing logics. Prevalent in both defensive and win-win strategies, are the tendencies to cast organisational self-interest as central to any organising and to build fixed identities and framings to sustain such strategies. Again, the blockages seem to relate to 1) an isolated and fixed sense of organisation and individual selves, rather than relationality; 2) instrumental action within short-term linear time horizons and 3) self-interested, isolated organisational problem-solving and hegemonic communication.

In the literature on sustainability education some of the blockages that have been identified are the difficulties in bridging theory and practice, which result from the science-envy that shapes many business schools' curricula, and approaches the learner as the rational, isolated transcendental subject (Painter et al., 2019). Similarly, a further blockage is the hegemony of the neoclassical worldview in curricula which views growth as infinite and which takes an instrumental perspective on nature, rather than an eco-centric view which acknowledges that infinite growth cannot occur in a finite environment and which takes an intrinsic view of nature (Stubbs & Cocklin, 2008). The tendency of such curricula to attempt to address complex and turbulent sustainability issues requiring exploratory skills with reductionist rational-analytical approaches (often through the use of case studies) do not prepare future managers for new ways of thinking (Earle & Leyva-de la Hiz, 2020) and often prioritise economic efficiencies over social and environmental factors (Dianati & Banfield, 2020). Some helpful distinctions emerge from the analysis that Allen et al., (2019) offer. Firstly, unreflective management education positions learners as detached from the natural environment which itself is positioned as an absent presence.

Reflective approaches aim at a logical analysis of external situations and events, where the environment is seen as an exogenous force, distances learners from their environment. Finally, reflexive approaches view the environment as emergent from human and material interaction, although an ontology of separateness remains. Such approaches can be contrasted from radically reflexive approaches that view people and the environment as embedded in socio-material practices of lived experience, which embrace a relational ontology and follow an eco-centric approach (Allen et al., 2019). As Millar & Price (2018) note, transformative critical reflexivity requires a consideration of the extent to which social actors have the agency to rethink social structures. In looking at the alternatives presented in the literature on sustainability organising, that is, ways to remove the blockages by bringing about shifts in thinking to promote more sustainable mindsets, the importance of affective experiences and processes of self-construction (Millar & Price, 2018) in changing the conceptual structures of what is already known therefore become paramount. Desired strategies therefore include experiential learning (Shephard, 2008), reflexive practice (Dianati & Banfield, 2020; Hibbert and Cunliffe, 2015 Millar and Price, 2018), emotional awareness (Wilson, 2007), systems thinking (Earle & Leyva-de la Hiz, 2020; Painter-Morland et al., 2016), democratic pedagogy (Tarrant & Thiele, 2016) and transdisciplinary practices (Baumber, 2022). Such strategies recognise the need to acknowledge that a critical assessment of how any individual views the world is not best served by thinking shaped by economic rationality, and in particular that "a tolerance of unusual approaches" (Wilson, 2007, p.10) is necessary to deal with complex sustainability problems.

## 'METHODOLOGY' AND 'FINDINGS': MYCORRHIZAL INSPIRATIONS

What follows is an experimental approach to data that brings together bio-philosophy (Styhre, 2010) and empirical experience: first through phenomenological reflections on a specific cinematographic experience (marked A in the findings and discussion below), i.e., watching the documentary *Fantastic Fungi* a number of times, and in a second phase of the research, analysing published accounts of psychedelic mushroom journeys. Themes emergent from the documentary experiences are tentatively articulated below [all the facts and scientific perspectives emerging from the documentary are credited to the writer of the documentary script, Mark Monroe, the various experts interviewed, mycologist Paul Stamets, and cinematographer, Louie Schwartzberg.]

Further substantiation was sought in Paul Stamets' (2005) book '*Mycelium running: How mushrooms can help save the world*'.

As a second step (marked B in the findings and discussion below), we sought to analyse published accounts of psychedelic experiences involving psilocybin because, as Sheldrake (2021) observes, its effects have been reported to include powerful shifts in perspective (both emotional and cognitive), the dissolution of time, space and the ego (or sense of oneself), as well as a feeling of unity with the natural world. These consciousness-expanding effects may therefore tell us something about shifting mindsets. McKenna (2021) has argued that at least as early as the agricultural revolution, humans have had a dynamic relationship with hallucinogenic mushrooms which has contributed to the development of higher levels of cultural- and self-awareness and a sense of harmony with nature which has since been forgotten in homo sapiens, and asks: "If the expansion of consciousness does not loom large in the human future, what kind of future is it going to be?" (p.297). Here we have sought only to analyse accounts of experiences undertaken under 'controlled' or 'guided' conditions so as to preserve the integrity of the findings. Although as Pollan (2018) notes, the effects of psychedelic experiences are enduring and keenly felt (sometimes daily) many years after the event. One should also acknowledge that the descriptions of experiences captured afterwards can tend towards the banal in putting the enormity of the event into words.

We therefore contend that documented experiences are likely to produce richer descriptions 'in the moment'. As Pollan (2018) also notes, the importance of 'set' (entering the experience in a healthy frame of mind) and 'setting' (the physical location in which the experience takes place) are critical to the wellbeing of the subject. Further, Russ et al., (2019) report that 'set' in terms of mental states of surrender or preoccupation at the time of ingestion is an important determinant in variance in or adverse reactions to psilocybin experiences. We consider that 'guides' are more likely to facilitate the conditions for the journey with these factors in mind, and often 'guides' operate to an internal code of ethics; as Stamets (2005) warns, recreational users of psylocibin are often not prepared for its effects, and caution is advised. We draw in particular from accounts in Aldous Huxley's (1954/1994) seminal *Doors of Perception* (although Huxley's account is based on his ingestion of mescalin, its effects are considered to be comparable to those of psilocybin); Michael Pollen's (2018) *How to Change Your Mind;* Merlin Sheldrake's (2021) *Entangled Life;* and two published qualitative studies of psylocibin trials (McCulloch et al., 2022 and Watts et al.,

2017) which have sought to understand the potential of psylocibin for treating depression, anxiety and promoting well-being.

Based on these documentary and written accounts, we undertook a quadri-hermeneutic analysis based on a reflexive interpretation of emerging themes, with a focus on creative ideas (Alvesson & Sköldberg, 2000). In this analysis we sequenced our interpretation into distinct phases, with initial themes emerging during and after 'step A' described above. This then guided our analysis under 'step B', during and after which we 'listened to' and asked questions of the texts in front of us (moving between whole and part) in consultation with the literatures described above to revisit our pre-understanding of themes, challenge our assumptions, and through a process of abduction look for emerging patterns and connections. Through this process we identified three emergent themes which we believe are salient to the question of shifting mindsets towards sustainability: states of interconnectedness, ego-dissolution and problem-solving and learning as networked sharing. Both steps in the research are presented thematically as follows.

## FINDINGS:

### *States of interconnectedness*

A. During the first viewing of the film '*Fantastic Fungi*', the overall experience was one of wonderment and awe, and a deep sense of actually belonging to something larger than oneself. The aesthetic experience facilitated a certain sense of knowing that went beyond the cerebral, or at the very least, stimulated other parts of the brain. The cinematographic use of time-lapse technology (https://fantasticfungi.com/education/) allowed one to see beyond typical time-space constraints. That which the eye can typically not see becomes spectacularly visible. Time becomes visible in and through the rendering of networked becomings. What this perspective affords us in terms of cinematographic experience, and how this may change the way in which 'sustainable mindsets' are stimulated, which raises questions regarding the neuropathways need to be (re)opened for new connections to be formed, or different timings to become visible. As McKenna (2021) argues, nature maximises mutual cooperation through signal processing (communication), and it may be that hallucinogens function as "…interspecies chemical messengers" (p. 48) which reveals nature outside of the ordinary boundaries of time, space and causality. He suggests that it may be plant hallucinogens such as psilocybin which may have had an early developmental impact

on human consciousness. In his description of what actually happens to the brain during psychedelic experiences, Pollan (2018) explains that psychedelics allow the brain to return to a state of entropy that allows new connections to emerge. Yet perhaps not altogether 'new'… instead an awareness of expansive material connections not otherwise accessible to typical cause-and-effect, linear thinking.

The documentary also alerted us to the possibility that sustainability might be all about erasing ends and beginnings, or as Ingold (2021, p. 151) would phrase it: "*There is no extinction, then, without distinction".* From this perspective, the opposite of sustainability may be our proclivity to think in terms of distinctions, or linear progressions with fixed ends. Fungi are described as the ultimate recyclers, decomposing the dead and redistributing nutrients: they seem to be right at the end and right at the beginning of life-cycles. In many ways therefore, they erase ends and beginnings. Their existence illustrates becomings that lie between things, entities and structures, as they are not vegetable, nor animal. Though associated with decay and provoking disgust, it animates so much of what is tasty: the yeast that gives us beer, the fermentation that yields wine, the mould that ages our cheese. Fungi can do much more… they can decompose anything that is hydro-carbon based – also toxic oils, and as such, they may offer solutions to oil-spills and other man-made disasters. As fungi seem to be organisms that sustain us in so many ways, it seems inevitable that our relationship with them has to be sustained in maintaining any sense of flourishing.

B. Connection – both to nature and interconnectedness to others is a common theme in the written accounts of psychedelic experiences. Huxley's (1994) attempts at describing the infinite beauty in nature he experienced during his journey, made him aware of the limitations of language in deciphering the mystery of the natural world. His accounts suggest that we must find ways to look beyond the labels or abstraction : "…how the gravity of nature and her silence startle you, when you stand face to face with her, undistracted… we must… intensify our ability to look at the world directly…" (pp.51-52). Here we see the potential parallels with the debates around the limits of sustainability discourses in communicating the scale and breadth of actions required to avert the environmental crisis. Sheldrake (2021) describes his confusion in completing a psychometric questionnaire after his journey, and asks: "How can one measure the experience of timelessness? How can one measure the experience of unity with an ultimate reality?" (p.106). Could it be that

such material connections can only be made possible from the 'dismantling' of neural networks to 'unleash' the brain? In clinical accounts, those suffering from treatment-resistant depression report a sense of disconnection – being 'trapped in their minds' or in a 'mental prison', disconnected from the self and the senses (Watts et al., 2017). As Watts et al. (2017) observe, during/after psilocybin treatment, patients reported an 'opening up' of the mind and 'mental freedom', offering both connection to the senses and connection to the self. As one participant commented:

> *The reset switch had been pressed so everything could run properly, thoughts could run more freely, all these networks could work again. It unlocked certain parts which were restricted before. (p.529).*

Watts et al. (2017) also note how many patients described a deeper connection, to everyone and everything, helping them adopt a wider perspective. As one participant observed: "This connection, it's just a lovely feeling . . . this sense of connectedness, we are all interconnected, it's like a miracle!" (p.534). Similar themes can be seen in McCulloch et al. (2022):

> *The trip was mostly concerned with the love pertaining to the different relations in my life, but also the love that exists between human beings in general, to the planet and to the universe.* (p.7)

One respondent described this sense, drawing an explicit parallel with the mycelial structures described earlier:

> *The light of love brings clarity to everything. I get a deep feeling of purity and feel that everything is beautiful, and that love is what makes up the world and the universe and connects everything like a network of roots.* (p.8)

Recalling Traherne, for Huxley (1994), a sense of connectedness raises moral questions following a transcendent 'cleansing' of the perception which may have much to tell us about sustainability mindsets:

> *When we feel ourselves to be the sole heirs of the universe, when 'the sea flows in our veins… and the stars are our jewels,' when all things are perceived as infinite and holy,*

> *what motive can we have for covetousness or self-assertion, for the pursuit of power or the drearier forms of pleasure?* (pp.27-28)

***Ego-dissolution***

As highlighted above, another common theme is that of the dissolution of the ego – the dismantling of the 'personal' and sense of self. As Nour et al. (2016) observe, ego-dissolution is a key feature of the psychedelic experience, causing them to validate an ego-dissolution inventory (EDI) for use in experimental studies for psychedelic-assisted psychotherapy (see, for example, Russ et al., 2019). As Pollan (2018, pp.264-265) observed:

> *The sovereign ego, with all its armaments and fears, its backward-looking resentments and forward-looking worries, was simply no more, and there was none left to mourn its passing. Yet something had succeeded it… I was present to reality, but as something other than myself… this by itself strikes me as a remarkable gift: that we can let go of so much – the desires, fears, and defences of a lifetime – without suffering complete annihilation.*

Pollan (2018) notes in his account, that he discovers that there may be an alternative way of seeing reality and its interconnectedness, having been 'temporarily freed' from the ego:

> *"…a psychedelic could help us to… move, from the first-person singular to the plural and beyond. Under its influence, a sense of our interconnectedness – that platitude – is felt, becomes flesh.* (p.271).

Huxley (1994) further observed a shift in thinking in placing less importance on time and space; that perception had somehow been 'reordered' to place emphasis on 'higher order' concerns. As he wrote:

> *Place and distance cease to be of much interest. The mind does its experiencing in terms of intensity of experience, profundity of significance, relationships within a pattern... Space was*

*still there but it had lost its predominance. The mind was primarily concerned, not with measures and locations, but with being and meaning*. (pp.9-10)

Huxley (1994) refers to the 'Mind at Large'; that people only know and perceive what the brain has conditioned them to know and perceive to make sense of the world as it is presented to them through language. Each individual has potential to be 'Mind at Large', however, if neural networks can be by-passed to allow to flow: "…something more than, and above all something different from, the carefully selected utilitarian material which our narrowed, individual minds regard as a complete, or at least sufficient, picture of reality" (p.13). As further reported in McCulloch et al. (2022), there is a direct potential for psilocybin experiences to create new mindsets towards sustainability as individuals reflect on the nature of their consciousness. As one participant reported:

*The feeling of joy and love was the energy in the universe, completely intense and multiplied by 100… When I was soaring through the soundwaves with this energy, I could see all the people close to me in my life appear... I felt immensely privileged to be part of this universe / community, to be able to feel those feelings in such a pure form, to have such deep emotions in my body—and I was overwhelmed with gratitude for this world. That everything simply is. And with that I was overtaken by a desire to protect it all, to show the world how beautiful it is and to take care of it.* (pp.9-10)

***Problem-solving and learning as networked sharing***

A. If solving problems is key to the definition of intelligence, mycelium is certainly the most intelligent organism alive. For instance, it seems skilled in solving problems of scarcity - trees use mycelium pathways to swap nutrients with each other, spreading around resources to maintain flourishing forests. It is not that scarcity logics don't apply… in fact, it seems that some bartering around 'price' still occurs… but instead of it being the dominant logic, there seems to be the possibility of a co-existence of somewhat contradictory logics, i.e., of both abundance and scarcity. Trees also support their weaker neighbours in their surroundings – via mycelium networks, competition can be increased in certain places, to allow others who are weaker to thrive again. Interestingly, kin recognition is not just human – trees recognise, nurture and support their offspring and siblings through mycelium networks. Another interesting fact relates to the role of

fungi in managing carbon: 70 percent of carbon is in fact contained underground – fungal walls store and are therefore central to stabilising carbon in soil. If there is 300 miles of mycelium under each footstep you take, we are literally walking on and below a massive problem-solving machine of intricate links, big rhizomatic webs, and trillions of branches.

As Wasson (1957) observed in his landmark article in *Life* magazine, one can either love (mycophilia) or fear (mycophobia) mushrooms (and this may be culturally determined), as they can feed and heal, but also debilitate and kill. They are, in this way, the ultimate pharmakon. Fungi have enzymes that engage in chemical warfare to ward off bacteria, and have been central to the development of penicillin. The Lion's mane mushroom's potential to treat Alzheimer's is now the focus of scientific study, as it is believed to facilitate neurogenesis, through which new neurological pathways can be developed. In seeking life-affirming relationships, nourishment for next leg of our often inappropriately timed journey into maturing and aging, mycorrhizal lessons seem invaluable. Healing seems to start with the sense of being part of a larger network, connected in some meaningful way with every aspect of the universe. It flies in the face of views of the life as determined by individualism and competition.

A documentary like *Fantastic Fungi* allows one to experience oneself as part of a larger whole, rather than at the top of the food pyramid. Each 'agent' is merely a temporary stabilisation within this complex network, and we need each other to sustain a beautiful resilient community. In this, time is material and cosmic, rather than linear. It affords an evolution that never stops, and in this continual process of becoming, communities that operate for mutual benefit and generosity survive better than individuals. As vast networks of molecules and energies, interconnectedness of being is who we are. This insight is one of radical paradigmatic change – it is more than a mindset; it is a becoming.

As Sheldrake (2021) notes, there are many examples of intoxication in the animal world, and a number of fungi have mind-altering properties which have been known and employed by humans since earliest man began to experiment with vegetation. Whilst many insect-manipulating fungi often cause harm to the animals they affect, psilocybin mushrooms are increasingly recognised for their ability to cure a wide range of human problems, with the ability to cause profound changes in minds and personalities (Pollan, 2018; Stamets, 2005), including their increased recognition as treatments for depression and death-related anxiety and enhancing general well-being (Russ et al., 2019). Psylocibin affects our nervous systems by converting to psilocin

once in the body, and stimulating receptors in the brain normally stimulated by the neurotransmitter serotonin. This reduces the activity of the default mode network (DMN) in the brain. The DMN acts to keep control of cerebral activity, and if it is reduced, the brain is unleashed into an 'unconstrained state of cognition' (Sheldrake, 2021, p.122). Though many may have reservations about psylocibin causing 'intoxication' as an impairment of 'rationality', it is by now common knowledge that some of history's greatest inventions, which required scientists to connect multiple ideas, emerged in and through the use of mind-altering substances. For example, as noted by Pollan (2018), many of the electronic engineers working in Ampex (located in the area which would go on to be known as Silicon Valley) who would go on to revolutionise computing, took part in the LSD trials administered by James Fadman and Willis Harmon in the early 1960s. Steve Jobs and Bill Gates have also both publicly acknowledged using LSD, and Kary Mullis, who made major improvements to polymerase chain reaction (PCR) techniques, credited his achievements at least in part to his use of LSD (Love, 2013).

Psilocybin induced 'mindshifts' do not only occur in humans – the power of fungi to cause 'mindshifts' in the animal kingdom offers a fascinating insight into how 'intelligently' they affect the spatial orientation of other organisms to ensure their own survival. Sheldrake (2021) reports on fungi that live in the bodies of insects, known as 'zombie fungi', which inhabit a host in order to disperse their spores. One of the most studied is the fungus *Ophiocordyceps unilateralis*, which infects carpenter ants to control their behaviour with extremely creative precision. Once the ants ingest the spores, the fungus causes a shift in spatial thinking and the ants lose their fear of heights, leaving their nests to climb the nearest plant. Once there, the fungus causes the ant to clamp its jaws around the plant, and then grows from the ant's feet to stick it to the plant's surface, then digests the ant's body and grows a stalk from its head, from which spores shower on the ants below. The fungus orients ants towards the sun and the infected ants clamp in synchronicity at noon. This mind-altering behaviour has been traced back 48 million years. The ability of the fungus (which bears close relation to the ergot fungi, from which the compounds to make LSD were derived) to alter the perception of the spatial awareness of carpenter ants, is our point of departure for an examination of how another type of fungus, psilocybin, may cause similar shifts in time-space awareness in humans.

B. Whilst psychedelic experiences may not reveal much about the ecological ability of fungi to repair and sustain, the ability of psilocybin to resolve problems, as in the natural world, is a persistent theme in accounts of its use. Its role in problem solving is evidenced in studies showing how psilocybin can help individuals overcome anxieties, depression or addictions (such as alcohol or tobacco). In reflecting on the similarities between psilocybin and other treatments for depression, one participant in Watt's et al's (2017) study reported:

> *My previous treatments, talking therapy and meds, were next to useless, utterly useless. My experience of psilocybin has been very positive. I believe there is an unknown physiological and neurochemical change in me, I am absolutely convinced of that.* (p.552)

We previously suggested that healing may start with the sense of being part of a larger network, connected with every aspect of the universe. As Pollan (2018) describes in his experience, the 'universal mind' (p. 264) reveals a shareable form of consciousness, unbounded by an accustomed sense of self:

> *And then I looked and saw myself out there again, but this time spread over the landscape like paint, or butter, thinly coating a wide expanse of the world with a substance I recognised as me.* (p.263)

Similarly in Watts et al's (2017) study, a sense of expanding connection was experienced by participants during and after the dosing sessions, resulting in a life-affirming and unifying sense of well-being. As one participant noted during the psychedelic experience:

> *I was everybody, unity, one life with 6 billion faces, I was the one asking for love and giving love, I was swimming in the sea, and the sea was me.* (p.535)

This often endured for weeks or months after the dosing sessions, with one participant reporting that for weeks afterwards: "Like Google Earth I had zoomed out. [For weeks afterwards] I was absolutely connected to myself, to every living thing, to the universe" (p.535). This sense of well-being was often described as a cathartic experience, with participants confronting trauma and

becoming more open to accepting or surrendering to emotions. Participants in McCulloch et al's (2022) study reported similar experiences. One participant stated: "The tears run down my cheeks as I feel an enormous sense of closeness and connectedness" (p.9), expressing how he wished he could share the experience with his father.

Nour et al. (2016) also find a positive correlation between ego-dissolution during psychedelic experiences and participants' sense of personal well-being or life satisfaction. The sense that 'I felt at one with the universe' was particularly strongly loaded on the EDI (Nour et al., 2016 p.9). We also find evidence of this factor in the accounts we studied, not only through a sense of being part of something larger, but also with feelings of self-forgiveness and compassion. As one participant in Watts et al. (2017) reported:

> *I had an encounter with a being, with a strong feeling that that was myself, telling me it's alright, I don't need to be sorry for all the things I've done. I had an experience of tenderness towards myself. During that experience, there was a feeling of true compassion I had never felt before* (p.531).

## DISCUSSION:
## CHANGING ONE'S MIND…SUSTAINABLE ORGANISING AS TIMELY BECOMINGS

Fungi challenge our mind-body distinctions and refract our horizons. In fact, mushrooms can therefore be agents that change our perspective, expand our consciousness, facilitate correspondences and reveal deep connections. Their consumption may in fact lie at the origin of our development as a human species. In the documentary, the hypothesis is put forward that consuming mushrooms may have been key to tripling our human ancestors' brain-size over the brief evolutionary period of 2 million years. What is however clear, is that the (mostly illegal) substance 'psilocybin' is responsible for the psychedelic mushroom journey experience. Its use in psychiatric research has therefore been halted for many decades, and one can only marvel at the stupidity of this… But are we now in fact suggesting that we would be wise to introduce psilocybin dosing into business schools' sustainability curricula as a way to facilitate the desired mind-shifts towards sustainability? We are very mindful that it is a criminal offence in many countries to manufacture, possess or supply psilocybin, and we would not encourage any individual to break

the law or to use psilocybin for any purpose. Instead, we hope to bring the insights gained from our exploration of psilocybin in conversation with process philosophical insights into agency and problem-solving, as to suggest some of the 'shifts' required.

Though it would have been possible to bring any number of 'process philosophers' into our conversation with our data, our initial intuition was to draw on the materialist philosophy of Gilles Deleuze and Felix Guattari, in order to explore in more depth what the investigation of mycorrhizal organisations could teach us about changing minds in the direction of sustainable organising. Our choice of Deleuzo-Guattarian concepts has been informed by the clues that mycology provides in terms of articulating relational ontologies, specifically its implications for agency, interconnectedness and problem-solving. These three ideas are also so intimately interrelated that discussing them in some kind of linear sequence in and of itself seems problematic – such are the limits of academic language. However, in doing so, we hope to articulate the contributions it could make to articulating a meaningful ontology for sustainable organising and to consider how we might rethink sustainability education in the light of these insights.

***From agency to agencing: ego-dissolution***

Deleuze & Guatari's (1987) discussion of the differences between rhizomatic and arboreal root-tree structures have provided inspiration for organisational scholars to think differently about agency, decision-making and organising in corporate contexts (Linstead & Thanem, 2007; Fouweather & Bosma, 2021). The unspecifiable, unpredictable and uncapturable activity which characterises the rhizome is especially relevant in thinking about organising in and across time, in conditions of uncertainty or unprecedented change. Yet interestingly, mycelium and mycorrhizal structures do not feature amongst the examples that Deleuze & Guattari (1987) discuss in *A Thousand Plateaus,* allowing us, perhaps, to experiment with new avenues of exploration. In ATP they use the biological term "rhizome" to refer to a form of plant that extends itself through horizontal tube-like root system and can in this way create endless new organisms. Examples of rhizomes that they mention include ferns, grapevines, the brain, the internet and even terrorist organisations.

In thinking through sustainable organising, it allows us to account for the fact that there are strange connections between events, people, and objects. This allows us to think very differently about agency. Bonta & Protevi (2004) argue that Deleuze and Guattari allow us to recognise the

subject as "an emergent functional structure embedded in a series of structures". In a real sense, it is a temporary stabilisation rather than any fixed structure, and as such, it may allow for the type of autogenesis that does not only allow for repair, but for active regeneration. This would mean that both the individual and the "corporate" agency of groups, are emergent properties of the interactions, priorities, shifts and challenges that are part of organisational life. The implications of understanding the 'self' as a temporary stabilisation, and as intimately interconnected to others and to material becomings in and through time, means that management education that aims at simply improving the rational decision-making of individual learners or empowering them with facts and figures, will most likely not succeed in changing minds. From our learnings about the experiences of the self in mushroom journeys, the notion of ego-dissolution emerged as extremely prominent. The processes of ego-dissolution allow one to truly experience the affects of the Other, whether human, animate or inanimate. The Deleuzian idea of becoming-animal becomes a very real experience, as psilocybin allows for fusion of objects and bodies, causing animate and inanimate distinctions disappear.

How to facilitate 'ego-dissolution' in a classroom is by no means clear, and some may even argue that it is not entirely desirable. Surely we want our students to have a sense of self and to know themselves and their capacities for agency. What does however seem clear is that too much of a strong sense of self, and its egoistical inclinations, act as a blockage in creating sustainability mindsets. Therefore, a purely cerebral attempt at redrawing the stakeholder map or 'introducing names and faces' of stakeholders as a way to connect to distant others who may be affected by business actions, will not suffice. What is needed, is an *experience* of connectedness, to literally 'feel' it. The role of art, music, theatre, have all been explored, but somehow they still don't manage to 'connect' us and our students with others and with animate and inanimate realities. Could this perhaps have something to do with the constraints of time and space, which under the influence of psilocybin seem to dissolve or at least be refracted?

***Networked problem-solving***

It was clear, both from our experience of the documentary and from our readings of accounts of mushroom journeys, that a networked approach to solving problems seems to be key to generating sustainable solutions. Yet solving problems in isolation persists in the prevalence of organisational silos, in professional and disciplinary boundaries, in the protections of intellectual property and

patentable innovations, etc. At the heart of this perhaps lies the human fascination with order, measurement and predictability. Our organisational landscapes are littered with truisms like 'measure what you treasure', 'that which cannot be measured cannot be managed'. In terms of sustainability agendas, metrics and reporting standards seem to dominate the conversation. But from the perspective of our mycorrhizal explorations, such efforts may be precisely how we miss the ability to nurture sustainable mindsets. In this respect, revisiting the distinction Deleuze and Guattari (1987) make between 'molar' and 'molecular' orders, is helpful. The mechanistic rules that we often witness in organisational structures function as a "molar order", which hides or covers over what is happening on a molecular level. Molecular flows of belief and desire escape the molar categories that metrics and instrumental corporate agenda-setting are focused on. Though it is indeed tempting to fall back on the security of assigning number-crunching exercises to our students in designing exercises and assessments, it may in fact be undermining the type of experience that could actually nurture sustainability mindsets.

In thinking about strategies that may get us beyond molar orders and the instrumentality that linear thinking typically imply, it may be helpful to remind ourselves of Deleuze & Guattari's notion of 'a body without organs'(BWO). The BwO refers to the virtual realm of possibilities which, though already 'real', has to continually unfold or be actualised, which requires the ongoing practice of disturbing the organism's typical functional patterns. Matter, energy, desire must be able to flow without centralised or hierarchical control. Organisational theorists have drawn on Deleuze and Guattari's creative pluralism of organisations, based on enfoldedness, relational connections and becoming, to argue against binary thinking and governmental ordering based on positions and interests (Linstead & Thanem, 2007). The emergence of 'solutions' is indeed evident in all the various ways in which fungi develop symbiotic relationships across mesh-works of networks. The significance of becomings, as Patton (1994, p, 167) explains it, is that it entails a creative process by which the powers of one body is carried out in relation to the powers of another, but without any appropriation of that body. Networked sharing is therefore life-enhancing rather than competitive or depleting – successful partnerships towards sustainability must therefore be assessed by the lives it affords, rather than through the generation of a 'competitive advantage'.

From a Deleuzo-Guattarian perspective, problem-solving, involves a site of potentiality, a constantly moving set of potential connections, a "permanent inventiveness" (Lawley, 2005). The challenge in sustainable organising lies in a constant evaluation of all of the various "assemblages"

that we are involved in. The only criteria that Deleuze & Guattari (1987) offer us to guide this evaluation is whether assemblages are life-affirming or life-denying. Literally, one knows a poison mushroom from its effects… Again, we are not arguing for the experimental consumption of mushrooms. But what does seem to be key to sustainable organisations and to the 'learning' that may yield sustainable mindsets, is the opportunity to experiment with affects, to fail, and to iterate in order to stimulate positive affects, which allows to identity creative solutions.

The issue of ethical 'judgment' and normative questions emerging around sustainable organising is particularly interesting when taking one's lessons from an organism of which the use is in many cases still illegal in most countries. It truly challenges what we understand by concepts such as 'moral imagination' (Werhane, 2015). The role of normative judgment may therefore need to be reconsidered. Abstract principles and rational ethical decision-making, or utilitarian 'trade-off' may be less effective. The one normative value that however does seem central is that of loving and caring connection. Yet in many business school contexts and business organisations, we are encouraged to 'leave our emotions at the door', and to steer clear on any 'contamination' that caring relationships may entail (consider conflict of interest policies, as an example).

***'Knowing' sustainable timing***

What process philosophy and studies of psychedelics have in common is that it challenges our epistemological assumptions. 'Knowing' is understood as experience in and across time, which also means that our understanding of time has to be reframed. Linear conceptions of time constrain the insights that may emerge in and through non-linear, emergent interactions, and is often defined in terms of short horizons (Slawinski & Bansal, 2015), which are not particularly helpful in the pursuit of sustainable organising. In discussing the differences between firms that manage according to short-term time horizons (focused on efficiency) and those who manage to consider both short- and long-term horizons ('diversity' approaches), it becomes clear that efficiency approaches have many of the problems highlighted in the literatures we consulted (process philosophy and sustainability education literatures), and none of the elements that our mycorrhizal explorations revealed. Robson & Riley (2019) discuss the importance of understanding time as multiple and parallel, affective, and embodied. By drawing on Bergson, they argue that time, as the process of differentiation and change itself, is the continual upsurge of novelty operating across

multiple timeframes. Models that can help assess sustainability across different time-frames, in real and through the assessment of material conditions, would need to be considered.

Our mycorrhizal inspirations also suggest that we may do well draw on Hernes et al's., (2021) notion of 'material time' in designing educational experiences. Materiality, from their perspective, becomes constitutive of time, rather than being measured by time. Taking our cues from the material organising within mycorrhizal networks may allow us to reframe and rethink how to make learners aware of (un)sustainable organising. One such an exercise that one of the authors experimented with, is to offer extra credit to students who were willing to carry all the trash they personally generated with them in a black bag for 48 hours – this included collecting and carrying all packaging of food consumed or other purchases made, etc., so as to allow them to experience the material 'weight' of their own consumption. 48 hours were never quite so long…

We may need to rethink how 'sustainability' in experienced, long before it is 'measured'. Within mushroom journeys, time never seems constrained, which may invoke the combination of processual and epochal time, as developed by Hernes et al. (2021). Processual time may allow the subject's sense of agency in imagining distant futures to be understood as material becomings in and through time. Exploring what this may mean in terms of organizing sustainably, may challenge us to engage imaginatively with the material realities of certain periods, or time-space equations – and perhaps to even go beyond imagining, to literally 'feeling' it. It is in and through material becomings that time becomes visible, and effects become evident. This may challenge us to engage in a different relationship to time than the strategies of forecasting and back-casting utilized in traditional models such as the 'Natural Step', which arguably embrace a very simple, linear version of 'epochal' time.

**Tentative conclusions**

Ultimately, thinking about sustainable timeframes, and timing, begs the question: how quickly can and should we move to 'solve' the sustainability challenges facing us at this juncture? Then again, perhaps this would be the wrong question… As inheritors of the Enlightenment, our modern brain patterns simply don't seem wired towards sustainable thinking. Our agency constructs, linear problem-solving models, and fascination with metrics, all seem to contribute to mindsets that are not conducive to sustainable organising. The hope of this project, which is still in its infancy, is

that learning about alternative ways of organising from mycorrhizal networks may allow for our sustainable becoming(s), in time (and maybe JUST in time).

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