Forming and Opening the Socio-spatial Logic of Constraint

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Abstract: While policy makers seek to realign socio-technical infrastructures and institutions based on the urgency of climate crisis and environmental degradation, civil society groups and community-based organizations enable ecologically informed practices every day. Focusing on the ways in which people interact with the local physical built and unbuilt environment, this theoretical paper explores the lingering social, spatial, and psychic implications of an anthropocentric logic of constraint that has dominated the design of institutions and spaces in the United States. Attention to the interactional dynamics of constraint reveals that even as institutions pave-over or displace vibrant social and ecological life there is an unevenness filled with cracks or openings that creates the conditions for socio-technical transition. Particular attention is given to the emerging people-plant interaction rituals, related to biophilic design or therapeutic gardens, that are enacted in-between conventional top-down and bottom-up processes. The potential of ritual interactions and collective consciousness in the design of plant environments is emphasized as a pathway to reconfiguring social-ecological relationships at multiple scales.

Keywords: social and environmental psychology; symbolic interaction; socio-technical transitions and practices; therapeutic horticulture and green care; biophilic design.

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1. Introduction

This paper explores the notion of constraint as it relates to socio-technical transitions and the practice-level dynamics of people-plant interactions. It overall seeks to understand how an underlying anthropocen-

tric logic of constraint comes to permeate socio-spatial relationships – and how this logic is potentially, or partially, opened up in people-plant interactions.

In one sense, it may seem that constraints are imposed by economic calculations or operational management, and that constraints prevent transition from happening. For example, in the literature on a multi-level approach to socio-technical transitions, radical innovations are conventionally said to develop in "niche" level. Niches are "embedded" within the larger dominant socio-technical regime, and at the same time they are insulated from typical market forces in the current regime. In this portrayal of socio-technical systems, the logic of the dominant socio-technical regime constrains the ability for innovations to "break out of the niche level" (Geels 2002). Such language is especially relevant in "sustainability transitions," where the presumed necessity of economic growth has historically been at odds with environmental protection and green innovation (Smith, Voß and Grin 2010).

While there has been much focus on technical management possibilities and constraints for achieving sustainability goals, others (e.g., Shove and Walker 2007) suggest that there is need to focus on the "everyday politics" of transition management. With consideration of the everyday or practice-level, sustainability is no longer a purely technical achievement; it becomes about understanding the "shaping of subjectivities" (Avelino et al. 2016) or generating a "culture of care" (Gottschlich and Bellina 2017). Such conceptions of sustainability move beyond potentially simplistic notions of green cities, institutions or economies to understand the potential emotional, interpersonal, and affective openings for more environmentally sustainable societies – especially in terms of how humans experience and make meaning as part of vibrant ecological webs of life (e.g., Bennett 2010). More generally, notions of sustainability transitions also encourage consideration of how constraints in a socio-technical system can become disconnected from the wider constraints of living ecologies on Earth – through recognition of the accelerating extinctions and ecosystem collapses that threaten the very foundations of life.

The importance of different forms of constraint became especially evident as I began to study and practice therapeutic horticulture. I found that practitioners and researchers in emerging fields of therapeutic horticulture (cf., Straus and Simson 1998) and biophilic design (cf., Kellert et al. 2013) often focus on stories of transformation – at the personal, institutional, or community level. This focus on the transformative role of people-plant interactions is evident in stories of young children whose diagnosed mental limitations are overcome with people-plant interactions (Louv 2009), prisoners and correctional officers who find stress relief and new meaning in prison gardens (Jiler 2006), hospital patients whose healing is accelerated when exposed to plant environments and activities (Cooper-Marcus and Sachs 2014), urban community gardens that are used as sites of healing or urban activism (White 2011; Mares and Peña

2010), in addition to many other stories and settings of transformation (e.g., Sternberg 2010; Gallis 2013). Yet, much less is clear about how these emerging realizations, related to the transformative potential of people-plant interactions, might be connected to wider socio-technical transitions—that is, how interactional dynamics within sustainability niches could open up possibilities for transition to different forms of social organization.

In order to investigate the contributions that people-plant interactions might make to the emergence of sustainability niches for social-technical transition in highly urbanized and stratified societies, the paper proceeds in the following way.

First, it explores some of the implications of the dominant anthropocentric logic of constraint in the United States – where 20th century architectures constrained community and ecological interactions, and people were "sorted out" as they became secluded from each other and cut off from wider living ecologies (i.e., Fullilove 2013). It traces the ways that dominant socio-technical regimes form a socio-spatial logic that constrains bodies and lives. From an interactional and practice lens, constraint is conceptualized as an effect of economic or political calculation, which individual people or organizations may co-create, internalize, or push against. Attention is given to how constraint is related to the social-emotional qualities of spaces or institutions – for example, in the underestimation of human possibility, lurking melancholy, profound doubt, fearful withdrawal, or heightened suspicion.

Secondly, the paper explores how people-plant interactions can open up dominant human-centered logics of constraint. It theorizes about the ongoing design of people-plant interactions as a practice that can work from the inside-out to unfold new political capacities (i.e., Domínguez Rubio and Fogué 2017). This is not to argue that human connection to living plant ecologies creates a constraint-free environment, but rather that it potentially attunes social life to different ways of being together – perhaps more in alignment with inclusive, dynamic, reciprocal, or ecological constraints.

Finally, concluding insights are offered on how the intentional design and facilitation of people-plant interactions may be a key practice for socio-technical transitions. Although the focus in this paper is primarily on social and spatial processes in the United States, the emergence of people-plant interactions as transformative and therapeutic practice in Canada, Western Europe, Hong Kong, Japan, Australia or Korea (Haller, Kennedy and Capra 2019) indicates potential relevance for other contexts. Because nonhuman life uses forms of signification that are different from human signification, or even "more-than-human" (e.g., Kohn 2013), engagement with these practices requires attention to the ways people relate to society and space that are potentially behind, before, or beyond the dominant frames of social interaction.

2. Forming the Socio-spatial Logic of Constraint

Michel Callon (1998, 249) explains that "framing" and "overflowing" are inherent to economic and socio-technical systems. If framing is the process of establishing, "a boundary within which interactions – the significance and content of which are self-evident to the protagonists – take place more or less independently of their surrounding context," then overflowing includes the externalities that are not accounted for in the frame. Overall, Callon pays particular attention to externalities or overflows – in terms of how they are identified and measured in different disciplines or perspectives. From the more traditionally economic line of analysis, it may seem like "framing is the norm," and that "overflows are exceptions which must be contained and channeled with the help of appropriate investments" (Callon 1998, 250). Alternatively, the more constructivist approach sees framing as expensive, incomplete, and imperfect, which points to a need to identify where overflows are happening – or to understand the implications of certain frames, and how different frames might be developed.

In either case, elements of a socio-technical system such as a market or group of organizations does not exist as a finished product. As Callon (1998, 266) notes, the market "never ceases to emerge and reemerge in long and stormy negotiations". Yet when applied to a wider conception of socio-technical systems and transitions, it is also be important to consider the dispersed and uneven distribution of power, and the historical, spatial, or political context that shapes ongoing negotiations and production of socio-technical systems (Avelino et al. 2016).

One clear lingering consequence of an anthropocentric logic of constraint is the objectification and exploitation of both humans and nonhumans (Hodson 2003). In this, it is especially important to consider the emerging phenomenological or ontological turns in STS (e.g., Rod and Kera 2010; Jensen et al. 2017), which explore how socio-technical systems are related to the creation of new life-worlds and ways of being. Particularly in the United States, the calculative anthropocentric logic of constraint – that imagines places and entire groups of people as disposable, or in need of control and coercion – has had lingering implications for the worlds that people inhabit and create.

For example, Michel Foucault (1995) is known for his work on documenting the transition of punishment that occurred with the rise of modernity, from the punishment of body, to the coercive "disciplinary technologies," which use detailed classifications to govern human institutions and constrain behavior. In addition to the detailed record systems of modern institutions, Foucault also notes the spatial techniques for management or control that permeate society. While his analysis of Bentham's panopticon receives much attention, he also comments more generally on the cultural significance of emerging architectural and spatial forms that prison construction represented following the era of the Enlightenment:

> The whole problematic then develops: that of an architecture that is no longer built simply to be seen (as with the ostentation of palaces), or to observe the external space (cf. the geometry of fortresses), but to permit an internal, articulated and detailed control . . . in more general terms, an architecture that would operate to transform individuals: to act on those it shelters, to provide a hold on their conduct, to carry the effects of power right to them, to make it possible to know them, to alter them. (Foucault 1995, 172)

It is in this sense that the social and spatial organization of prisons is a lens that makes it possible to analyze industrialized and urbanized society more generally – especially the United States, which embarked on a massive prison building project at the end of the 20th century to incarcerate at the highest rate of any country in the world (Mauer 2006).

Sociologist Norman Johnston more specifically explores how this aspect of Foucault's theory is revealed in practice (Johnson 2000). Johnston traces what he calls the "administrative practice" of prisons – actual plans and built forms, goals of these forms, methods, policies, successes and failures. His central intent is to explore how the forms achieved the explicit and implicit logics that designers, architects, leaders, and the wider culture were constructing. For example, in the middle ages a duel system of courts, ecclesiastical and secular, led to different forms of constraint. Most notably, the ecclesiastical prisons held people for long periods of penitence that were meant to emotionally and physically coerce and control human bodies with orderly concrete and steel forms.

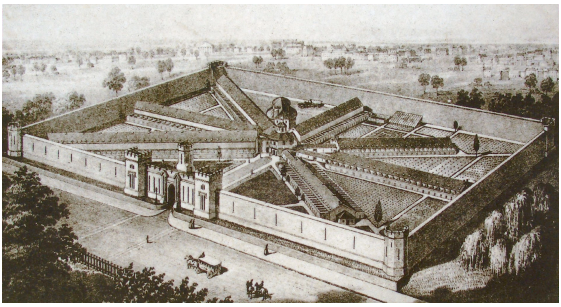

Figure 1: This 19th century historical drawing of Eastern State Penitentiary shows the early developing socio-spatial logic of constraint, where architecture is designed to change prisoner behavior through deliberate isolation, constraint, and seclusion. (Image Source: Wikimedia Commons)

In addition to being located at religious sites, and offering consistent views of an alter for those confined, these prisons set an architectural precedent of isolated cells where prisoners were constrained so that they would seek forgiveness for their behavior through penitence (Johnson 2000, 17-28). Here, architectural forms are quite literally considered as a strategy for managing or constraining human behavior. Overall, for Johnston the practice-level is especially important because it reveals the contradictions of purely top-down transition management. While social reformers of the 19th and 20th century imagined the prison as a technical solution to the "problem" of social disorder – a transition to a new kind of society with less violence and crime – they did not consider the potential long-term impacts that their form of socio-spatial constraint might have on daily interactional dynamics. Above all, this model of prison focused on isolating or removing individuals the living dynamics of social and ecological life, which has social and psychological effects that resonate within and beyond prison walls.

Loïc Wacquant builds on this in his analysis of the more contemporary implications of spatial and social forms of constraint in the twenty-first century beyond actual prison buildings – as he explores the ways that spatial confinement is a "technique for managing problem categories and territories" more broadly. Following the argument in his two books Urban Outcasts and Punishing the Poor, Wacquant develops matrix or continuum of socio-spatial seclusion that includes reservations, labor camps, prisons, ghettos, ethnic clusters, elite enclaves, and gated communities. These are forms of social closure and socio-spatial seclusion "whereby particular social categories and activities are corralled, hemmed in, and isolated in a reserved and restricted quadrant of physical and social space" (Wacquant 2009, 165). In this sense, socio-spatial forms of constraint are reflective of sociopolitical context and penal philosophy, and as Johnson, Foucault, and Wacquant suggest, the constructed forms take on a life of their own – as they constrain possibilities for social life. Moreover, the seclusion of poor and marginalized neighborhoods has also been connected to disproportionately high rates arrests and imprisonment in the United States, such that seclusion can be spatially mapped and observed (see Figure 2).

In the United States or institutions influenced by Western culture, this socio-spatial logic that focused on human-centered calculation and constraint permeated the 20th century more generally: hospitals where design and technology creates additional stresses for patients (Ulrich 2008); urban housing where "concrete machines for living" alienate residents (Blake 1977); schools where rows of students, isolated from the dynamic movement of the world, become passive containers to be filled with

knowledge (Freire 1968); offices that segment space in efficient linear order but reduce productivity (Oommen, Knowles and Zaho 2008); or prisons where extreme punishment and isolation can cause social and psychological harm (Söderlund and Newman 2017).

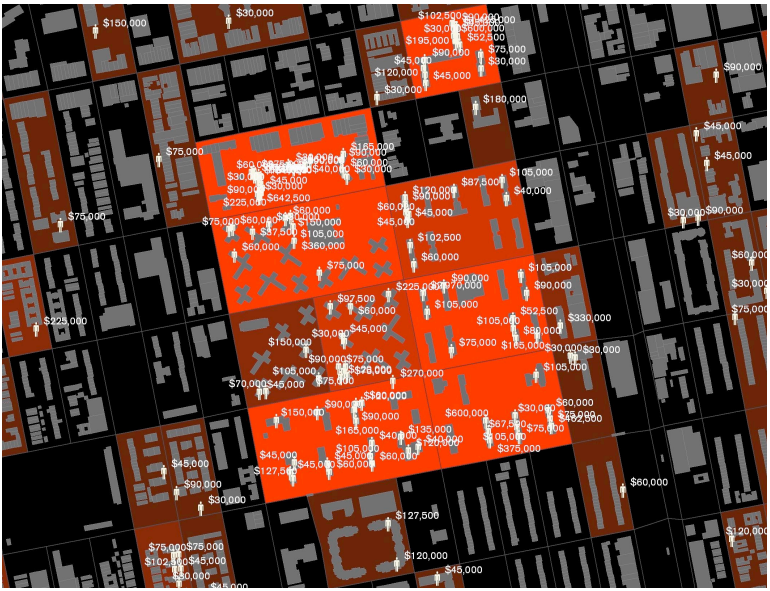

Figure 2: "Million Dollar Block" spatial analysis (Cadora et al. 2006) presents visual evidence of socio-spatial seclusion, showing each block in New York City where the State of New York spends more than one million dollars to imprison residents. Each human figure on the map represents where real person who is imprisoned used to live, and the dollar value represents how much the state is spending to imprison that person. (Image Source: Spatial Information Design Lab)

In this sense, an anthropocentric socio-spatial logic of constraint permeates the aesthetic and cultural foundations across many modern institutions, where people, things, and spaces are turned into objects. What can be constrained in human-centered forms of calculation and constraint is not simply the bodies of people or architectural forms; the creative capabilities of human activity are extinguished as living energetic matter is boxed-in or channeled towards fragmented systems of classification and instrumental rationality.

Figures 3-6: The architecture that dominated 20th century institutions (clockwise from bottom left: workplace, prison, hospital, school) prioritized efficient management of its subjects – where technological advancements often overshadow human life and the surrounding local environment. (Image source: Wikimedia Commons)

Overall, an implication of the dominant socio-spatial logic of constraint is that people are transformed into problems to be managed – the sick, the student, the prisoner, the mentally compromised, or the poor – through architectures, policies, and practices that have deep psychic implications. For example, W.E.B Du Bois (1903) became well-known for his writings about how racism is not merely about the misguided technical management of resources or intentional legal marginalization; but rather, for him, such forms of seclusion have profound psychic and interpersonal effects. He powerfully explores the question he was forced to grapple with wherever he went in the United States: how does it feel to be a problem?

Du Bois goes on to explain how the social scientists who were studying marginalized communities in the late 19th century approached people as problems to be documented in the name of social progress. Rather than seeking to understand people's everyday life and experience, according to Du Bois, these technical methods could contribute to a further social distance as they objectify people in order to fit them analytically into the dominant socio-spatial logic of constraint. An overall potential impact of this particular logic of constraint, which is still ongoing marginalized

communities today, is spatial anguish (i.e., Contreras 2017) whereby people may internalize a deep sense of shame, fear, or doubt about the possibilities for their personal and community life.

3. Openings for More Ecologically-Attuned Constraints

In the midst of human-centered calculative logics of constraint, it is also clear that people continue to creatively innovate in some contexts, as they inhabit what are could be considered "uninhabitable" conditions of social and ecological instability (Simone 2016). Accordingly, the dominant socio-technical regime may not create or allow niches of innovation; but rather innovations may be, "gradually and experimentally created out of discontent with, and in relation to, existing practices" (Hoffman and Lorber 2016, 692). This approach recognizes that the community or grassroots level is an important site of innovative activity in advancing sustainable development outcomes (e.g., Seyfang and Smith 2007). For example, research has shown that grassroots social innovations such as food localization can increase community capacity to address larger sustainability issues (Kirwan et al. 2013), or that people's "aesthetic experiences" in community gardens can create meanings that can lead to further engagements (Hale et al. 2011). This approach directs scholarly attention to the dynamics and interactions that might shape sustainability niches, with attention to power dynamics.

In particular, Gottschlich and Bellina (2017) explore how people's interactions with their local environment may be mediated by uneven distribution of environmental burdens and benefits. In order to open up existing systems and forms that perpetuate injustice, they suggest more attention to environmental justice and care work. While the environmental justice approach points to the need to look for practices and innovations in spaces or communities that have experienced marginalization or seclusion, care work brings attention to a need for transition studies to consider people and communities that directly care for the earth. Moreover, in environments that are mediated by powerful histories of seclusion and constraint, other scholars have pointed to the key importance of "performative connections." For example, Scotti and Minervini (2017) argue that sustainability transitions require multilevel and heterogeneous networks to connect on-the-ground practices with a larger effort for environmental governance.

Accordingly, spaces that reconnect people to each other, and to the local environment, may be important for social transition – especially in institutional or community spaces that have been neglected or abandoned under current or previous logics of constraint. It is in this sense that design can offer opportunities for opening an existing socio-spatial logic of constraint, and "unfolding" new social and political possibilities, as prac-

titioners on-the-ground rework previously designed socio-spatial relationships to include opportunities for different kinds of interactions and practices.

Domínguez Rubio and Fogué (2017) explain that although design is typically considered to be a process that "enfolds" the political, it can also have an "unfolding" capacity. Enfolding points to design's "ability to inscribe political programs into materials, spaces, or bodies" (Rubio and Fogué 2017, 97) – for example, as is evident in the aspirations of prison spaces that use architecture to manage and influence behavior under a political agenda of punishment and discipline. Conversely, unfolding operates as a "propositional mechanism" that points to alternative solutions, questions, and ways of being together. For example, collective community-based efforts to maintain a garden in an institutional space – or design opportunities for ongoing people-plant interactions – can bring people into relationship with each other, and wider plant ecologies, in new ways that may go beyond the prescribed or scripted uses of a space.

Although scripts are typically considered in terms of technological artifacts (i.e., Akrich 1992; Latour 1992), it is important to consider how plants may prescribe a different quality of interactions. In order to successfully grow plants, people need to relate to their environment in new ways. People-plant interactions require unique sensory and tactile engagements that are different from how people engage with more mechanically designed artifacts. The aliveness of plants invites different forms of reciprocity, care and reflection (Abram 1997).

This becomes especially important in spaces such as prisons and jails, where movements are carefully controlled and spaces are highly-scripted with strict demarcation of social roles (Goffman 1961). Accordingly, such institutions are perhaps places that best illustrate how people-plant interactions can begin to rework institutionally established frames, scripts or uses of space. I most powerfully noticed this in my own therapeutic horticulture practice.

For example, the first time that people arrive to a garden in a city jail in the United States, the most immediate reaction is often surprise. It's almost as if the aliveness of the garden allows visitors to see the constraint of taken-for-granted jail spaces surrounding the garden more clearly. There is a surprise from prisoners, officers, and visitors who are at the garden for the first time that "this kind of place" exists in a city jail. When they say "this kind of place," it seems that visitors refer to a certain kind of energy that exists – of uncertainty, openness, and possibility. What creates this kind of energy is a new socio-spatial logic and frame that accounts for plant ecologies. For example, different paths and sections of the garden that are being produced offer some sense of cognitive attention restoration (Kaplan, Kaplan and Ryan 1998) or relief from the highly regimented and ordered concrete and steel that typically constitutes prison environments. Moreover, these spatial forms are produced in the context of certain kinds of social relationships of learning, growth, struggle,

and transformation.

Similarly, community-based organizations or other activist and advocacy groups are co-creating plant-based environments to repurpose urban vacant land, which was previously scripted as "vacant" or in need of some kind of intensive capital investment (DelSesto 2015). These "insurgent spaces" can begin as activist projects and, over time, infuse spaces with memory or identity that leads to long-term community-led development or healing (Mares and Peña 2010; White 2011). Overall, such gardens can operate in contested spaces, and as sustainability niches, they are maintained or expanded through daily practices and interactions.

Repeated, daily and ritualized actions of civil society groups and voluntary organizations can produce social and spatial forms that are anchored in people-plant interactions – often from within spaces or institutions that are overwhelmed with layers of anthropocentric constraint (e.g., Straus and Simson 1998; Krasny and Tidball 2015). Although, ritual often has religious connotations, here it refers to repeated human interactions in the context of plants that has some sort of social meaning or intention.

The social space of gardens is based on shared directed attention towards different kinds of plants that may include: classroom lessons about horticultural topics, collective field observation where program participants can interact with the plant through sensory engagement (seeing, hearing, touching, smelling, or tasting), and activities that aim to produce plant-based products. Garden participants may learn to locate the lavender plant among the hundreds of plants on an expansive landscape, which will be soon be harvested and dried in the small greenhouse, for a lesson and activity about aroma therapy and the making of sachets.

When the lavender plant is flowering it might attract dozens of bees, buzzing with spectacular activity that fascinates many people, immersing them in the activity and sound. The oils generated by the plant linger on the flowers, and they create a powerful scent that can overpower other smells and is associated with relaxation. The ritual of harvesting the flowers requires a certain technique, so as to encourage the growth of future flowers and maintain the shape of the plant. It is in this way that plant environments invite focused psychic attention and bodily co-presence to facilitate the beginning of what Randall Collins (2004) refers to as a ritual interaction chain.

For Collins, social interactions are heuristics for larger structures and systems – in that observations of how people interact and exchange represent or point towards the ritual organization of society (Allen 2011, 101-135). Overall, Collins explains that society is made up of overlapping or multi-dimensional aggregations of interactions, where the situation rather than the individual is the starting point for understanding social life. In formulating his theory of the ritual interaction chain, Collins builds on a tradition of sociology with roots in Durkheim, Mauss, and Bataille that focuses on unconscious, psychic and symbolic aspects of social life (Pfohl 1998). Accordingly, the notion that symbols, unconscious patterns, every-

day practices, and emotional energy can have material consequences is central for understanding how ritual arranges and rearranges dominant modes of power – or provides the openings necessary for reconfiguring power relations.

The ritual interaction chain is especially relevant here as a theory of social-technical openings and transitions. For Collins, a top-down understanding of how change comes about is not the only explanation for how social change happens, and in some instances, it may fail to explain the processes through which society reconfigures. Instead, he argues that cultural forces such as symbolic objects and gestures, mutual focus of attention, and emotional energy may better explain social change, as they are where "the energy of movement and change, the glue of solidarity, and the conservatism of stasis" reside (Collins 2004, 3). It is important to note here that Collins places importance on energy – how it is harnessed, bound up, or transformed through human organization and ritual.

When horticultural practitioners write about the design of therapeutic or healing spaces, they similarly refer to the importance of the energy and rhythm of plant ecologies, especially as it can be experienced in the passage of days or seasons. For example, Rice (2006) explains the role of ceremony and ritual in horticultural therapy spaces and programs – explaining how activities can be purposefully designed to elicit and unfold collective rituals. Ceremonies with plants can teach people that, "life is a process rather than a series of activities that are judged by whether they bring us immediately to our goals," and ceremonies can help us to learn, "how to locate our human experience through metaphorical reflection and actual experience of our natural life cycle" (Rice 2016, 17-18). This may mean linking social goals and growth to plants, or working with groups to "cultivate images" that support a feeling of interconnectedness. Overall, it is evident that the social dynamics of ritual are quite important for plant-environments.

In Collins' formulation, the ritual begins in a moment of co-presence, where people come together to attentively engage with each other or the world (this is the beginning of the interaction), is an important opening where things can be in flux and social organization may be open to new possibilities. Co-presence is not necessarily a fresh start, as the history and power arrangement of previous interaction rituals are likely to influence how people come together, yet it would be impossible to explain away totality of the co-presence with words. Note that from the framework of ritual that Collins provides, interactions with people and plants need to be repeated, sometimes deliberately, to promote solidarity.

While simply being together in a location may not lead to new forms of social organization, moments of congregation can be a stimulant for social life at multiple scales (i.e. the coming together of previously separated energy fields in a way that could generate unknown collective energy) for social organizations and transformations. In addition to co-presence, Collins stipulates three ingredients for the interaction ritual to

gain momentum that include: mutual focus of attention, shared emotional mood, and barriers to outsiders.

These ingredients of the interaction ritual chain can be interpreted through the lens of people-plant interactions – or what might be considered people-plant interaction ritual chains. Such ritual chains unfold new possibilities, even from within the dominant socio-spatial logic of constraint, as they imagine previously unforeseen human possibilities inspired by the flux of living plant worlds. They also require that people learn to work with the unique qualities, movements, needs, and rhythms of particular plants and places.

The first element of mutual focus of attention, is a process at the center of interaction rituals (Collins 2004, 47-101). In this case, people-plant interactions will not serve to disrupt the dominant constraining logic of an institution or urban space if there is not some mutual focus of attention on specific plants, spaces, or environmental symbols. Here, environmental symbols are developed and transmitted as people interact in the context of plants to create shared meanings. Environmental symbols might include garden plantings or arrangements that are designed to invoke a certain feeling or state – such as labyrinths or wandering walking paths – or symbolic additions to a space that may include themed art, writings, or built landscape elements such as gazebo or reflecting pool. These symbols are especially powerful when they connect with group members personal experience and social location (e.g., Cermak 2012). The mutual focus of attention that such symbols can create is developed through discussion, workshop, or guided sensory engagement.

People may gradually come to take on shared moods about different design elements of a horticultural space. For example, Elizabeth Murray (1997) explores the archetypal elements of gardens that appeal to the five human senses. These include focal points that draw at attention through the creative use of paths and sight lines, strategic color-coordination, incorporation of flowing water, stone arrangements, and play with shadows and light. Moreover, these elements help to create many types of color, sound, plant, and flower vibrations. For example, Passion Flower vines are a common garden plant that can grow up to six meters tall with striking flowers that are up to ten centimeters wide. It has an unusual corona that is composed of hundreds of delicate filaments radiating out around the star-like center. On a warm summer afternoon, the flower can be seen opening in a matter of minutes, with the petals vibrating as they dramatically unfurl.

Another ingredient for interaction ritual chains is a shared emotional mood. Here, there needs to be some kind of reckoning with the varying experiences and situations that people may bring to a garden space. This can take the form of group check-ins or a group conversational space (e.g. using therapeutic techniques to promote openness and dialog) that could allow space for people to bring how they are feeling in the moment they arrive to a garden space. In other words, there needs to be some oppor-

tunity in the garden for the possibility of what Collins (2004, 66-67) calls "conversational turn taking." Such conversational turn taking may start off slow and scattered, and slowly pick up pace or fall into a rhythmic entrainment.

Figure 7 and 8: On the left, a passion flower opens. On the right, therapeutic garden design at a hospital in the United States engages patients and staff in healing through its accessible design and incorporation of symbols. (Image sources: Wikimedia Commons and Legacy Health)

Figure 9: A well-designed and programmed garden space can create spaces for group congregation and conversation, shared activities and learning, or individual observations and activities. (Image source: Wikimedia Commons)

A final ingredient is a barrier to outsiders. In the case of people plant interaction rituals, the barrier to outsiders may involve a sense of ownership. For example, people may invest time, energy, and money in growing and caring for plants. There are many contexts where space may be limited, and the inclusion of some people means the exclusion of others. In community garden settings, plots may be assigned to individual people, or in institutional settings a certain organization may be responsible for designing and managing a space. There is also the potential for people who share a space or a particular landscape of plants to protect it from new members who may not have the same knowledge of how to care for plants. In other institutional cases, people may work with plants in the context of an already-closed institution, which limits the degree of inclusivity possible.

Overall, this ingredient is a reminder that even in addressing anthropocentric forms of constraint, some new kind of barrier will need to be assembled in a way that promotes inclusion of new groups and ecologies. For example, plant environments can allow for different degrees of participation – from passive observation to active engagement and long-term cultivation. While bright colors can attract a passerby, it may take some time to fully include a newcomer to all of the collective meanings and practices of a space.

This new barrier could also be considered as a move toward more ecological forms of constraint, with an openness to people and plants that have been previously ignored. From within anthropocentric constraints, it may appear that many life forms are expending themselves uselessly (Bataille 1988, 19-44), like the cherry tree that "uselessly" drops its abundant blossoms (Braungart and McDonough 2002). Yet it is precisely in paying attention to the seemingly useless actions and qualities of plants, that more life sustaining constraints may emerge. In other words, sustained people-plant interaction rituals can nourish qualities of being that, "reject prior calculation of returns as a defining feature of exchange" (Emerson 1976, 341). Note that this orientation towards more ecological constraints does not reject calculation entirely, but rather rejects forms of "prior" human calculation in order to nourish an orientation toward learning, openness, curiosity, or justice – in people and organizations (e.g., Senge 1990; White 2018).

While the dominant socio-spatial logic of constraint tends to ignore the living realities of plant ecologies, the more ecological constraints associated with the practice of people-plant interactions may open up possibilities for new ways of relating to the Earth. In contrast to the development of industrial capitalism, which is said to be characterized by the "domination of nature" (Leiss 1994), people-plant interactions can encourage alternative approaches to a wider ecology that may be referred to as the "wooing of the earth" (Dubos 1980). As Dubos explains, the environmentalist approach of the 20th century typically argued that socio-technical transitions toward a more environmentally-aware society would

require humans to withdraw from their interactions with the environment, because of the damage that society can cause. Yet Dubos advocated the need to learn from the wider ecological constraints of living plant worlds—that may have a logic outside of calculative instrumental rationality – in order to work with nonhuman systems from a place of respect and imagination.

4. People-plant Interactions and Socio-Technical Transition

There is a great significance in considering the dimensions of people-plant interactions in the context of social-technical transitions. An over-emphasis on anthropocentric "prior calculation" has been a defining feature of capitalist industrial development, and this emphasis often ignores interactional dynamics in space, including how inner life shapes the social world. This is to say that the reorganization of society might need to be prefigured by or in tandem with a "reorganization of self" (Macy and Molly 1998) – not as a technical achievement, but as part of an experiential process or "ecology of participation" (Chilvers and Longhurst 2016) in which people need to actively engage.

Policies and architecture can change to promote some vision of sustainability, but how do people actually experience the built and unbuilt environment? When practitioners transform constrained institutions or neglected spaces into intentional sites of repeated people-plant interactions, they are creating conditions for the reorganization of self and society. It is in this sense that the design of people-plant interactions may be a case of how people may re-write given social or spatial scripts (cf., Akrich and Latour 1992) to reflect more ecologically attuned social relations and organization from the practice level.

It is important to note that promising possibilities of people-plant interactions are not a universal outcome of practice-based transition toward a more sustainable life and society. In many ways, plants have historically been part of urbanized societies—for example in the top-down planning of urban parks and recreational spaces. What is new is the intention of practitioners to cultivate healing or therapeutic spaces that are meant to lead to personal, organizational, or community change in settings such as schools, prisons, hospitals, or neighborhoods. In an era where concerns about planetary and human health are increasingly connected, analysis here suggests that it will be increasingly important to consider how interactional dynamics of people-plant interactions can be facilitated in ways that create lasting impacts for personal, institutional and societal transformations.

Overall, an attention towards people-plant interaction ritual chains shifts the focus of people-plant interactions from top-down technical management to presence, which is simultaneously oriented towards an attentive mindfulness of micro-level needs and relaxed awareness of mac-

ro-level conditions. Such an orientation seeks to value the variation and difference that might emerge in situations. Healing garden spaces, with their boundless variety of people-plant interactions, are therefore potentially well-suited to be oriented towards an "interdependence of mutual (non-dominant) difference" (Lordre 1983). This difference can be initially recognized, acknowledged, and welcomed through the senses.

Overall, this paper has explored the ways that, the dynamics of people-plant interactions may illuminate important, previously unconsidered, pathways to socio-technical transition through more ecological forms of constraint. It is long been noted that 20th century institutions and spaces are characterized by widespread sensory deprivation that can constrain social and psychological capacities (cf., Berman 1990; Louv 2009). Accordingly, people-plant interactions may orient social life toward qualities of previously unconsidered plant ecologies through practices, rituals, and a sensory re-orientation that includes the living more-than-human world. It is this way that people-plant interaction rituals might open up new ways for people and organizations to see, act, or be.

The result of this re-orientation is not that people abandon all forms of constraint or discerning judgement; but rather, practices and rituals within plant environments may facilitate a shift – from the linear rhythms of calculative instrumental rationality toward the more cyclical or reciprocal rhythms of the plant world. The opening, or unfolding, potential of people-plant interactions is therefore neither prescriptive nor certain. As an important emerging practice that may contribute to socio-technical transitions, the phenomenon of people-plant interactions calls for further investigation about how socio-spatial interventions can use plants to enable new ways of organizing social life as part of a wider ecological community.

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