

13 Enacting ontological design

A vocabulary of change from organisms to organizations

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1 Introduction

In this chapter, the frameworks of enactive cognitive science (e.g., Barandiaran 2008, 2017; Di Paolo et al. 2018) and ontological design, particularly the work of Tony Fry (e.g., 2009), are synthesized to give a general account of how humans act toward change at multiple scales. According to this synthesis, design is understood as a spatiotemporally extended form of adaptive self-regulation, or *adaptivity* in the enactive vocabulary (Di Paolo 2005). When we design, we regulate ourselves in the local-present to resource our future selves in ways that make certain regulations either possible or easier, and thus, desired outcomes more probable. Adaptivity, here, entails an ongoing redirection of the individuating tendencies of person-world systems either for maintaining some existing trajectories or for stabilizing new ones. This happens predominantly through modifying constraints at what Secchi and Cowley (2018, 2021) term the meso-scale of *social organizing*. This chapter considers different types of design (maintenance, habit, identity) operative across scales, from organisms to organizations. It concludes with some indications for how this perspective might be valuable in facing current ecological and environmental challenges and the obvious demands they put on the need for change across all scales of human living.

2 Enaction

The enactive framework emerged with the publication of *The Embodied Mind* (Varela et al. 1993) almost three decades ago. Since, it has matured in multiple directions, forging alliances with various philosophical and scientific perspectives (e.g., O'Regan & Noë 2001; Thompson 2007; Chemero 2009; Friston 2010; Hutto & Myin 2013; Bruineberg & Reitveld 2014; Cummins & De Jesus 2016; Di Paolo et al. 2017; 2018), not all of them perfectly compatible (e.g., see Di Paolo et al. 2021). However, one idea these perspectives share – one also shared by the others in this text – is that cognition is not an internal brain event, but best understood as distributed

across body–environment systems. Cognition is the self-regulatory activity of an agent that serves either the maintenance, or modification, or production of some habitual order.

In general, this self-regulatory activity is referred to as *adaptivity* (Di Paolo 2005). At its most basic it concerns processes relevant to the constitution of organic life. Di Paolo et al. define adaptivity as, “the system’s capacity to regulate its states and relations to the environment in ways that result in the avoidance of trajectories that move towards the loss of viability” (2021, p.17). These regulatory interventions act through “the modulation of parameters and constraints of the agent–environment coupling” (*ibid.*, p.1). This is not a mere moment-to-moment reactionary process, but also embeds a more comprehensive capacity: The agent can “anticipate ... threatening circumstance and... act in order to avoid them or revert them” (Fuchs 2017, p.86). And it can do so, if necessary, “by changing its own structure and dispositions over time” (*ibid.*, p.224). This more temporally distributed capacity is not well elaborated within existing enactive theorizing but is implicit in the account that follows.

Crucially, adaptivity not only concerns biochemical regulation, but psychosocial too, i.e., the regulation of what Di Paolo et al. (2017) call *sensorimotor life*: An ecology of interdependent *habits* that organize behavior at various timescales. Habit, then, is a central notion within enaction. Barandiaran defines a habit as a “self-sustaining pattern of sensorimotor coordination that is formed when the stability of a particular mode of sensorimotor engagement is dynamically coupled with the stability of the mechanisms generating it” (Barandiaran 2008, p.281). My interactions with the world organize me in ways that make similar interactions more probable in the future (given certain conditions of course). What emerges within such a recursive dynamical organization is a minimal sensorimotor identity, a locus of action ostensibly concerned with its own maintenance: Our habits tend to draw us in to their reproduction. Given that the reproduction of the habit relies on certain conditions – rate of repetition, the presence of certain environmental constraints, etc. – boundaries of viability are enacted, specifying certain activities or conditions as necessary if the habitual organization is to be kept alive, the norms of its ongoing reproduction. And so, the norms that shape our adaptive regulations concern the maintenance and regulation not only of our organic life, but our ways-of-life also (Froese & Di Paolo 2011).

The ontogenesis of such ways-of-life entails the construction, maintenance, and inter-regulation of a myriad of intersecting habits in an ecology in which they compete, cooperate, nest, sequence, etc. (Barandiaran 2017; Di Paolo et al. 2017; James 2021). Any such ecology can be decomposed according to nested timescales. For instance, a *simple habit* like picking up the soap in one’s right hand may be nested in a *sensorimotor scheme* of hand washing; which, in turn, might be embedded in the *micro identity* of preparing for bed; all of which reflects and reproduces a *personal identity*

of being hygienic, which may hold across a variety of situations (Di Paolo et al. 2017; James 2021). At each more encompassing scale some relatively invariant habitual organization is operative, providing a normative frame for one's activities and prefiguring a course of action under some set of conditions.

Crucially, though such habits have some autonomy they are not mindless automatons or procedural processes at odds with more deliberative intelligences. Rather, they are concealed sensorimotor resources that self-organize in the context of enacting a particular skill to form transient coordinative structures (or synergies) that are more-or-less adequate to the situated demands of a given practice.¹ An illustrative example here is musical improvisation. Any talented improviser will have a well-developed repertoire of habits to draw upon when performing, even if when doing so they are also reaching beyond it. The habit repertoire provides a metastable readiness to engage in multiple likely courses of action, but also gives momentum to a particular course once initiated. Lines and phrases, runs and licks, emerge from the performer in a way that serves the performance, but they are not fully under the control of the performer. Indeed, often performers are themselves surprised by how well, or how poorly, their habits serve their aims.²

One interesting feature of this account, and that is germane to our concerns about design also, is that this type of patterning relates to social life too, particularly social interactions that take on the feature of recurrence, e.g., a friendship, romantic relationship, shared household or workspace (Bedia et al. 2019; James 2020a, 2021). The details of this are too complex to rehearse here (see De Jaegher & Di Paolo 2007; Aguilera 2015; James & Loaiza 2020). However, the basic contention is that the structuring of the habit ecology that flexibly attunes individual to world is continuous with the structuring of the collective habit ecologies that attune us to each other and our shared worlds. Consider the following.

O and T begin working together and their job is lifting furniture onto trucks for an event hire firm. T is much smaller than O and after lifting several chairs onto the truck, coordinative activities that produce favorable outcomes begin to stabilize as habitual patterns of inter-bodily coordination. These habits embed spatiotemporalized sensitivities to discrepancies in size, strength, pace of action and so on. O and T come to anticipate the unfolding of each other's actions and with repetition get to a point of more-or-less synchronized actions throughout the task. The stabilizing habits support the emergent coordinative structures (or synergies) that are progressively attuned to the demands of the situation. Through ongoing interactions under varying conditions (lifting tables, couches etc. onto and off various sized trucks) repertoires of shared habits sediment, engendering a network of interrelated patterns that support a form of collective skill (Dwyer 2019). Of course, here again we are not talking about automata, but mutually attuned metastable patterns that subtend capacities for

improvisation toward shared ends. Nevertheless, much like in the individual case such patterns will demonstrate conservation tendencies as the norms of their own self-regulation, motivating activities that sustain their organization as such, sometimes pulling interactants into patterns of being together. We often experience this as a kind of ‘falling into’ familiar patterns when present with someone with whom we have a history of interacting (Fuchs 2017; James 2021).³

These shared habit ecologies decompose in a manner similar to what was observed at the individual scale, i.e., nested habitual organizations at various timescales. These will include, for instance, simple *shared habits*, like the use of particular forms of languaging that prove useful to the coordination of the task; *shared routines*, such as the manner in which they prep the chairs and hoist them onto the truck; situationally specific *inter-identities*, like a general mode of being together when engaged in this particular practice; or more complex *interpersonal inter-identities*, such as being ‘workmates’ that embed certain relationship-specific norms that obtain and are transformed across a variety of interactive situations, including lifting chairs onto the truck (James 2021). Of course, each scale embeds elements of those that it encompasses and is both shaping of and shaped by such elements.

Previously I have referred to these habitual social organizations collectively as *participatory sense-making frames*, or *participatory frames* (PFs) for short (James 2020a, 2021). PFs enable us to attune to each other in ways that reflect histories of interacting together and carry much of the normative dimensions of where they came into being. PFs, in other words, in combination with the sociomaterial niches that enable them, are the primary carriers of human culture and convention and it is through their (re)production that ‘the social’ takes root in the bodies of individual embodied human subjects. PFs are thus a refinement of the Bourdieusian notion of *habitus* (Bourdieu 1984).⁴ These frames are the primary targets of our designs.

A final point already implicit but worth making plain, is that adaptivity is a feature of human social systems too (James 2021).⁵ Individuals – or groups of individuals acting together – within an organization, will monitor and regulate their activities to ensure that essential variables relevant to the sustenance of the organization are maintained within limits of viability. Crucially, however, this type of social adaptivity can be found to be operative even in the absence of real-time social interaction, e.g., when an individual sits alone and strategizes for the long-term success of their organization. In such instances, the adaptivity of the organization and the adaptivity of the individual are tightly coupled and they may respond to threats to the viability of the organization as threats to their own person. The nature of this coupling is worth briefly elaborating. Recall Barandiaran’s definition of habit as patterns of sensorimotor coordination ‘formed when the stability of a particular mode of sensorimotor engagement is

dynamically coupled with the stability of the mechanisms generating it” (Barandiaran 2008, p.281). Here the organizational dynamics have become part of the generating ‘mechanisms’ of the habitual activity of the individual agent and are, however modestly, sustained by such activity in turn. It may then be more than just a metaphor to speak of the individual agent as being ‘animated by’ or ‘lived through’ by the organization.

2.1 Ontological design

When non-designers reflect on design we might think of celebrated figures from the ‘world of design’, such as a famous fashion designer or architect, or maybe a particular designed object or technology. But as Fry writes, such associations “tells us little about the fundamental character of design” (Fry 2009, p.29). One thing to note about this fundamental character is its ubiquity. As design anthropologist Arturo Escobar puts it, “it is literally everywhere; from the largest structures to the humblest aspects of everyday life, modern lives are thoroughly designed lives” (2018, p.2). Beyond its impact, it is equally ubiquitous in its practice. To design is part of what it is to be human. For Fry, “... the ability to prefigure (to design) is one of the distinguishing characteristics of our being human” (ibid., p.223). Indeed, a recent text by a leading figure in this field is organized around this insight, entitled *Design. When Everybody is a Designer* (Manzini 2015). Therein, Manzini defines design as a “culture and a practice concerning how things ought to be in order to attain desired functions and meanings” (2015, p.53). Far from being practiced only by highly trained professionals, the culture and practice of design infuses all of us (to varying degrees maybe) and disposes us in ways that support ameliorative interventions.⁶ For Fry, this is a form of empowerment: “At its most basic design is power – to absolutely lack an ability to design (which is the ability to prefigure in some way the world in which one finds oneself) is to be absolutely powerless” (2009, p.233). In sum, design is an empowered mode of relating to our worlds whereby we act on the conditions within which act to prefigure them in line with preferable outcomes. Design is not merely a process of material reconfiguration, but a process of reconfiguring our being-in-the-world through the modification of material constraints. Design, thus, has an ontological dimension. Indeed, such positions gather under the framework of ontological design.

Informed by the philosophy of Martin Heidegger, ontological design was first articulated by Winograd and Flores in their 1986 text, *Understanding Computers and Cognition: A New Framework for Design* (Winograd and Flores, 1986) Their insight is one already implicit above, i.e., when we design, whether we are designing ‘objects, structures, policies, expert systems, discourses, even narratives’ we are ‘creating ways of being’ (Escobar 2018, p.4). This is what Willis calls “the double movement of ontological designing” (2006, p.80). We design our worlds, and they design us back

(Escobar 2018, p.4). For Fry, this understanding is elaborated using the previously mentioned notion of *habitus*. Despite no authoritative definition of *habitus* in Bourdieu's work, it is generally agreed that *habitus* captures what Eriksen and Nielsen describe as, "the permanent internalization of the social order in the human body" (2001, p.131). This is not a conscious effort, but reproduced unconsciously, 'without any deliberate pursuit of coherence... without any conscious concentration' (Bourdieu 1984; p.170). Still, one's *habitus* is thought to shape many fundamental aspects of their being, from posture and gait to cultural dispositions and tastes. And so, according to Fry, our design activities entail an ongoing "restructuring of *habitus* by design" (*ibid.*, p.47).

As suggested previously, the account of participatory frames is intended to redress some perceived limitations with the notion of *habitus* (see James & Loaiza 2020, or James 2021 for elaborate discussion). Notably, that the individual actor is overly determined by their *habitus* (King 2002), and that there is no satisfactory account of how *habitus* might develop in social interaction (Crossley 2013). Likely Fry too would see some value in critiquing such elements and welcoming their opposites. Thus, he may concur that the account of participatory frames – which both retains some sense of individual autonomy and sees social interaction as a primary mechanism for habitual production – might usefully supplant the notion of *habitus*. And so, I contend, PFs make a valuable focal point for ontological design, as both the structuring background of our design practices and the primary targets of our designs.

2.2 *Enacting ontological design*

Given that a common starting point for enaction is organismic self-production, one might wonder whether this offers a useful starting point to consider the intersection of enaction and design practice. Indeed, there are very obviously designs that serve organismic self-production, e.g., one might prepare a trap to capture food, or reconfigure some piece of material into a shelter. Adopting this starting point helpfully puts these design aspects of human life on par with other animals: The otters who build their dams or the birds who construct their nests. All these activities might happily be conceived as forms of adaptivity, and they are all manifestations of a power to design, if understood as a capacity for prefiguration. But our interest in design here is as a capacity for redirecting habitual lifeworlds. Consequently, considerations at the organismic level, while important to acknowledge, are less helpful to develop at any length here. And so, although continuous and often intersecting with these forms of what one might call *organismic design*⁷ the focus hereafter is on forms of adaptivity that aim at the regulation of habitual lifeworlds. To state it clearly, design is a spatiotemporally extended form of adaptivity, whereby an agent (individual or collective) regulates their own activity in the present with the intention

of supporting the regulation of some variable(s) at longer timescales.⁸ As we will see, each instance of design explored below is a particular realization of this general dynamic within the habitual lifeworlds of human agents.

2.3 Maintenance design

Maintenance design describes how an agent relates to themselves and the world around them to *maintain* the meshwork of metastable dynamics (habits, shared habits, identities, inter-identities, etc.) characteristic of their existing lifeworld. This comprises a spatiotemporally extended form of adaptivity, whereby an agent acts upon their own states to redirect them to some prior stability, but also on the world around them to maintain those states within range across some duration. This type of design is operative in multiple scales of human life and is a substantive part of the everyday activities of organizations and the people that comprise them. At the individual level, this will include things like configuring my desk in the morning to start a day's tasks or preparing and packing my lunch each evening so I can make it to work on time. At a dyadic or group level, such as within a work team, it might include returning lab resources to their proper storage, replenishing the supply of candies in the office,⁹ scheduling weekly meetings, and so on. At a more encompassing organizational scale, such as within the managerial ranks of a university, it can manifest as formalized practices like carrying out evaluations, procuring financial resources, or curating cultural events.¹⁰

Something that becomes obvious here is the extent which any real independence of individuals and organizations is something of a fabrication, as is locating the 'true cause' of any particular outcome at either the micro scale of the individual or the macro-scale of the organizational structure. The habit ecology of the individual takes shape within the more encompassing ecology of the organization, while the organizational ecology too depends upon the habits of individuals. The activity of design, whether individual or collective, tends to take place at what Secchi and Cowley (2021) term the *mesoscale* of social organizing. The agent designs for outcomes through the modification of constraints that largely have the modulating capacities they do because of their status in a social lifeworld. Maintenance design is more concerned with managing change to maintain existing orientations than it is with 'making change' per se. As such, it can be helpfully described as a form of design that supports the ongoing individuation of trajectories that already have some momentum.¹¹ In the following section, however, it is making change that is of concern.

2.4 Habit design

To develop this notion, it will first be helpful to say something about how the dynamics of the habit ecology evolve. There are several enactive

accounts concerning how best to understand this evolution (e.g., Di Paolo et al. 2017; Di Paolo 2020; James 2021). What they share is the conviction that stabilizing new habits entails a process of individuation, with novel structure emerging from the resolution of tensions between an embodied subject and their world.¹² In short, when acting toward a novel end, the system will have many components that are not yet coordinated toward that end. In the language of Gilbert Simondon (1992), these are *pre-individual potentialities* and will include everything from existing habits to biophysiological and sociomaterial constraints of all kinds. This results in some tension within the system. If the system can hold this tension and maintain its course, it will resolve into a novel form – the seed of a new habit – that functions more adequately toward the desired ends. I have previously referred to this process of individuating novel habitual organizations in terms of *enhabiting* (James 2020a, 2020b). However, if the tensions are too great the system will abandon its new ends and revert to old habits. When we make design interventions at any scale, it is precisely these *enhabiting* processes we wish to engage. Habit design then, involves constraining the individuating tendencies of person-world systems by modifying what comprises their pre-individual potentialities in ways that support the stabilization of novel trajectories. One immediate challenge when thinking about habit design is specifying what precisely constitutes a habit. We tend to use the term somewhat loosely and refer to everything from bodily ticks to one’s ‘exercise habits’. For our purposes, we can think of the target of our habit designs as behaviors that reflect relatively minor deviations from one’s existing repertoire of actions, generally confined to a specific time and place or form of practice. We will consider this type of design through examples at the level of, for instance, caring for one’s teeth at either end of the day. I will rehearse just such a personal example now to prime our intuitions.

2.5 Individual habit design

I recently visited the dentist for a routine treatment and was instructed that I need to take better care of certain aspects of my dental health. However, due to some language barriers I was not clear on the instructions for doing that. What resulted was an orientation (what Simondon would call a *problematic*) with no immediately obvious route to its realization, and thus a lingering tension. The dentist’s pronouncement here might itself be considered part of a design, in the form of a task constraint, but for the purposes of clarity I will focus on the personal activity that followed. Googling my ailment and reading that so-called ‘oil pulling’ had some benefit, I decided to give that a try. I bought the necessary materials, followed the instructions, and proceeded with the ten minutes of suggested swilling of a horrible oily slush each morning and evening. I made it through all of two days before packing it in. Nothing resembling a novel

habit at the scale we are concerned with was individuated, and I defaulted for a time to the absence of any intervention while the general tension remained.

The need to respond adaptively motivated an exploratory effort, but tensions introduced by the resulting design – do oil pulling for ten minutes twice a day, which required special receptacles and making an oily mess – were even greater than those they set out to resolve. In negating the more immediate tensions I defaulted back to a previous set of habits and the original orientation and its attendant tensions remained.¹³ However, some days later, when in the supermarket and browsing the toiletries aisle, I happened upon some mouthwash. I wondered if it might serve as a good alternative to the oil pulling and decided to try it. Now two months in, and two bottles of mouthwash later, I can confirm that it did: I carry out the habit daily after brushing my teeth with the same habitual ease.

The redirection eventually resulted when the design worked in sympathy with the existing habit repertoire and individuating tendencies of the person-world system. The design, of buying the bottle of mouthwash, placing it at the sink, and following the instructions, became part of the pre-individual potentialities of the system in a way that generated just the right amount of tension that the system could individuate a novel habit of mouth washing with relative ease. The habit, then, is a kind of compromise that reflects the resolution of various tensions of the person-world system, e.g., its aims, its existing habits, environmental affordances, and so on.¹⁴

Of course, this is an isolated anecdotal example and likely somewhat caricatured, so not a basis for making general claims. But many of us will be familiar with how when our habits change without any drastic change of circumstances, they tend to follow such dynamics.¹⁵ Moreover, the general approach here is at least sympathetic with an empirically validated principle of successful behavior change as championed by B.J. Fogg, the founder of Stanford's *Behavior Design Lab*. The principle is basically this, if you want to develop a new habit, make it small (Lieber 2016; Fogg 2019; Fogg & Euchner 2019; see James 2021 for important distinctions between such approaches and the present account).

One might now intuit individual changes in the context of an organization as more likely if happening in accord with the principles outlined. Consider it is not your dentist making suggestions, but your department head about your compliance with some required practice. She brings to your attention some variable (e.g., punctual submission of reports) that you have been insufficiently sensitive to. A new aim emerges, generating tensions between the various relevant components. The extent to which you can regulate your action with respect to this new variable will be contingent on the extent to which your design provides you with the resources to do that.

Given the hierarchical nature of organizations such as universities, the instructions of the department head are task constraints that are already

part of the design of your new habit, and indeed, may even be sufficient for redirecting your individuating tendencies in line with the novel aim. More likely, however, is they will be part of a larger design effort that follows. This may include any combination of making lists, scheduling calendars, organization folders, and so on, producing just the right amount of tension for an adequate habit to take root. Of course, any such aim will be weighed against the array of aims that characterizes your work-life. The same logic expressed earlier applies: If the tensions that result from your design are greater than those it sets out to resolve, you will likely learn to live with the problem and default to some existing habits.¹⁶

A few points to make before exploring shared habit design. First, some justification for this type of design as a spatiotemporally extended form of adaptivity. From the moment the dentist offered the recommendation, and a novel aim arose, the states of the system deviated from some prior stability producing a tension that was maintained – although maybe not always at the forefront of consciousness – until it was resolved by the emergence of the novel habit. Moreover, as designs proved to be inadequate, they nevertheless framed the more adequate response that followed, i.e., the mouthwash was encountered as a *more adequate* design solution. And so, the monitoring and regulation that is endemic to adaptivity can be seen to be temporally extended, as the system learns how to better regulate toward its preferred outcome. This is in line with a recent proposal by Mojica and Froese who argue for the spatiotemporal extensiveness of sense-making, writing that

The history of past selection shapes the possible responses of the agent and their normative constraints, while the peculiarities of the current situation would allow the agent to perform the right response and, when it is not possible, to learn novel responses.

(2019, p.12)

However, such forms of adaptivity are not only temporally extended from past to present, but also aim toward the future. Habit design entails an anticipatory dimension, whereby we act in the local-present in ways that aim at resourcing future regulatory efforts intuited to be preferable.

Second, the process of enhabiting is not limited to the stabilization of ostensibly procedural sensorimotor patterns but might equally be applied to the realization of novel modes of attention, or even of languaging or thought. What is consistent across these instances is that when one acts toward a particular end and their existing capacities are not adequate, they will experience some tension. In maintaining the tension-filled space and continuing toward their ends something novel will emerge as a development of their habit ecology, which will entail a resolution of some of said tensions. At such a point, a novel person-world relation emerges which then becomes available for reinforcement. Thereafter, it is more likely to

show up in their improvisations. This is as true in learning or creative contexts as it is in professional or any other contexts that require novel insights, decisions and actions in service of some imagined preferable outcome. If reinforced sufficiently, it may develop enough autonomy that it pulls one into courses of action not always perfectly aligned with one's immediate aims. Of course, many factors will play into whether and to what degree any novel trajectory is subsequently reinforced. Our designs then, can support the emergence of such novelty and its reinforcement and can do so in relatively reliable ways when we design them to evoke the right tensions, at the right times, in the right ways.

Finally, regarding such evocations, consider the Vygotskian notion of the *zone of proximal development* (Vygotsky, 1962). This describes a process in which the enculturation of a child advances by scaffolding their activities to allow them to perform skills that they would not be able to perform on their own. A caregiver or teacher maintains a tension-filled zone by soliciting certain forms of action from the child – e.g., by holding out a toy or repeating a word – in a way that is attuned to their present capacities while also inviting their expansion. The child, acting to reduce the tension, ultimately sediments habits that embed resolutions to the problems they were presented with. Crucially, the tension must be just right. Too much and it breaks down, too little and nothing novel is evoked. Habit design is a process of configuring and maintaining analogous zones. In sum, it entails the modification of constraints that support certain regulatory activities over durations adequate to the emergence and reinforcement of novel patterns.

2.6 Shared habit design

In social systems the objects of concern are shared habits (one instance of PFs): Relatively invariant patterns in recurrent social interactions that enable coordination toward shared ends at timescales in the region of seconds to tens of seconds. These will include patterns of languaging specific to tasks, to the routines of lab mates who must, for instance, regularly cooperate in the running of experiments across multiple trials. In line with the individual account, when we think about designs at this scale, we are referring to relatively minor developments in a shared repertoire, generally confined to specific times, places, and forms of practice.

Changing such patterns presents some unique challenges. First, there may not be a shared orientation toward something different or agreement upon what that is. And even when there is, there are two loci of adaptivity monitoring and regulating with different strategies. Still, such relationships regularly do manage to resolve the tensions that manifest in working toward shared ends, and in doing so, stabilize shared habits that attune them to each other in more enduring ways, and them collectively to the larger wholes they help comprise. Second, the monitoring

and regulation is both self and other-directed. Thus, modifications to constraints (material, symbolic etc.) within a shared space become the primary means by which inter-regulatory dynamics unfold.¹⁷ For adult (multi-)person-world systems, dialog is the primary means of this regulation. But depending on situational demands, an endless manifold of bodily and sociomaterial design constraints can be deployed: The specification of task constraints, ways of configuring bodies and spaces, bodily gestures and ways of languaging, objects, digital technologies, and so on. Crucially, at this scale, supporting individual habits will be necessary too: Drinking a coffee before overseeing experimental trials, preparing certain materials or other resources in advance of some collaborative effort, etc. Thus, we can see how a dyadic change effort is supported by ongoing inhabiting at the individual scale.

Of course, at this point, even if we wish to maintain the distinction, the boundaries between individual and social habits are getting rather fuzzy. Indeed, precisely in such instances we see the value of Secchi and Cowley's account of the mesoscale of social organizing. As Gahrn-Andersen puts it, the "meso domain comprises an interim domain that coconstitutes the micro and the macro and, therefore, affects their relation" (2021, p.7). One cannot limit the activities of the individual agent to the individual, nor is the individual utterly determined by the dynamics of the organization. Rather, they adapt within structures and with resources that have the impacts they do precisely because of their status within a shared lifeworld, e.g., an organization. It was previously suggested that social adaptivity is operative in individuals, at times, quite apart from ongoing social interactions. Acknowledging this meso domain or scale can also help us make sense of this insight. Indeed, Garhn-Anderson reflects compatible insights when he writes "the meso domain is also implicated as individuals in solitude perform actions, decide on how to solve a problem or initiate communication with others" (*ibid*). There is not space to develop this here, but such insights have deep implications for what it means to say that we, in the colloquial sense, "identify with" a particular group, cause, idea, place, person, etc. They may even open an exciting new frontier for embodied cognitive science, offering insights into phenomena like tribalism, partisanship, sectarianism, religiosity, ideological commitment and so on.

The individuating processes in social interactions are continuous with the individual account (see James & Loaiza 2020, James 2021 for more elaborate discussion). Designs engender and maintain a zone in which the tensions that emerge while acting toward mutual ends can resolve into shared habits that support those ends. Here, the importance of maintaining the proper tensions – at least in relationships with relatively equal power dynamics – is even more apparent. Any attempts to resolve the tension on one party's behalf by overdetermining the activity of the other are not only unlikely to lead to the desired change but is likely to result in additional tensions and possibly even the breakdown of the system.

At the managerial level within an organization, the spatial distribution of adaptivity is even more pronounced. All sorts of roles, instruments and processes support monitoring and regulation to help move important variables in accordance with desired outcome. The language of *key performance indicators*, or KPIs (e.g., participation rates, retention rates, employment outcomes, rankings) is common to refer to such variables. Typically, such organizations will have many design constraints at their disposal (e.g., monetary, holiday, positional, and reputational incentives) for redirecting the habitual dynamics of members. But much like at the other scales, designs that evoke the right amount of tension are more likely to redirect the individuating tendencies of the organization to open new trajectories.¹⁸ Again, blurring the boundaries, this will typically require designs and attendant changes at more local scales by individuals or teams who are properly resourced to bring about the kinds of tensions necessary for more organizational wide change.

One important – though still rather speculative – point to keep in mind is that, at least in the enactive framing, the primary ‘mechanism’ of cultural production/reproduction is relatively small, typically dyadic social interactions (James 2021; see Gahrn-Andersen 2021 for empirical support of such claims). Even change under authoritarian decree is ultimately realized through such mechanisms, accumulating its finer details therein. Thus, care-full organizational design asks that to the extent that it is possible, individuating processes at each level of respective change be acknowledged and ideally informative of relevant designs.

2.7 Identity design

As the type of beings whose identities are comprised of intertwining habitual forms, it is not surprising that some events can impact these ecologies in ways that lead to significant redirections. Such experiences can be both challenging (e.g., a global pandemic) and/or rewarding (e.g., securing a major grant), and their aftermath typically entails a period of uncertainty, disorientation, reevaluation, and so on. With time the sense of settling into a new identity stabilizes, with habits at various timescales adjusting to the novel regime. Typically, such events are sudden or unexpected: The imposition of constraints that cannot be avoided serve as a forcing function for the disruption of existing habitual forms and, with time, the cohering of new ones. Most mature individuals and organizations will have experienced several such events. On occasion, however, events with comparable impacts may be designed. The outcome of any design is unpredictable, but even more so here. Because of this, in hopes of managing contingencies, they tend to be highly structured, include strict facilitation, and are often ritualized within traditional settings. I refer to such designs in terms of *identity design*.

In contrast to the mundanity of maintenance or habit design, identity design is relatively rare, the kinds of events we refer to as ‘last resorts’,

'turning points', 'rites of passage', 'once in a lifetime', and so on. Such designs will generally only be employed in times of crisis or deep need. They come with higher risks and potentially offer higher rewards. In contrast to habit design, here a higher-order change takes root in the person-world system rather quickly, often in an instant, which subsequently gets filled out in terms of habits. These have such results because they are of an intensity adequate to displace an existing identity and/or sediment new ones. In the general population, intense individual examples might include the ingestion of psychedelic substances in ritualized contexts, extreme physical events, intensive retreats, relocating, body modifications, religious rituals, taking vows in a religious order, entering a rehabilitation center, undergoing a course of psychotherapy, embarking on an apprenticeship or extended period of study, and so on. They are less common for individuals in organizational contexts, but might include, for instance, a promotion, relocating to another office, or acquiring a large grant.

At dyadic and team scales, such designs commonly concern the consolidation of a relationship or resolution of conflict. Having children, getting married, or building a home together, are examples in long-term romantic pairings. Externally imposed constraints such as shared responsibilities, legally binding contracts, and public commitments to certain norms, are welcomed into the relationship and orient it in a general direction for extended periods. Such designs increase the probability that interactants can resolve conflicting tensions across long timescales. Comparable organizational examples include, for instance, establishing a team, undergoing group mediation, signing contracts, and so on.

We observe something similar at more administrative levels also. Consider Froese's (2018) writings on what he terms 'ritual anti-structure'. Froese describes how Mesoamerican tribal leaders would ingest psychedelic mushrooms together when entering negotiations in special enclosures. The states enabled by the psychedelics and the setting aid the tensions between them to reconfigure into some generative form and possible shared paths forward to emerge as solutions to their shared problems. In other words, the design facilitates the individuation of inter-identities that embed a consensual orientation that may subsequently be propagated throughout the tribes. Contemporary analogs within organizations might be group retreats or intensive workshops during which, for instance, a new direction for the organization might be agreed upon.

Here again we can see how various levels of change intersect, e.g., the tribal leaders negotiate an outcome and subsequently must convey it in ways that make it probable that the tribes people will enact efforts toward it. In extremely hierarchical organizations, although authority may permit it, sudden dictates from on high may want to be avoided in all but the most unavoidable of circumstances. Of course, sometimes they may be the only means for the survival of the organization. But as previously suggested, the specifics of change necessarily emerge from the outcome

Table 13.1 The grid intersects the various types of designs elaborated in this chapter with the scales at which they might be used to make interventions. At each intersection point a design is included to illustrate the kinds of interventions that might be exemplary

Type of design	Individual example	Dyad/team example	Collective example
Maintenance design	Set up your desk in the morning for certain types of actions	Replace lab resources in their proper place after use	Personnel with assigned roles organizing cultural events
(shared-)Habit design	Decide upon workflow and set reminders to be more punctual with submission of reports	Provide time and space for dialog	Personnel with assigned roles highlight performance on relevant KPIs and incentivize relevant actions
(inter-)Identity design	Promotion	Team retreat	Personnel with assigned roles share the insights from team retreat – ideally in conjunction with other types and scales of design

of interactions, largely dialogs, between individuals in dyadic and small groupings. Change that reflects alignment between organizational concerns and the concerns of the individuals and groupings that comprise it, is very different from change that is imposed by authority. Consequently, more localized design within the various subgroups and collectives that comprise the whole will likely be valuable both before and after any organization wide efforts. Organizational change is always a multiscale effort and the design skills that support that change should be distributed to the extent that they can. Table 13.1 includes a grid that intersects the various types of design elaborated with the various levels of intervention and offers examples at each intersection.

3 Conclusion

I want to wind down by saying something about the larger aims of this line of conceptual development and the contributions it might make. Crucially, for Fry, design as redirection should serve the ultimate value of redirecting the human planetary order toward what he terms the *Sustainability*: A planetary order under which we can “secure and maintain a qualitative condition of being over time” (2009, p.43). As such, redirection is a normative interpretation of design activity and its practice. This account

shares in this spirit. As an earthbound species interdependent with the rest of life on this planet and the fragile ecosystems that support it, there is an unprecedented need for behavioral changes at all scales that move us away from the edges of our viability.¹⁹ To coordinate such efforts effectively and do so without reverting to ultimately overdetermining or even totalitarian measures, will require skills of change that are themselves unprecedented. Such skills will come in many forms and from many domains, from artists and researchers to businesses and organizations. What an enactive ontological design can contribute to this process of enskillment is an appreciation for the role of agent–environment relations in such processes, but also for the habitual constitution of person–world systems and the principles of individuation that should be kept in mind when attempting design interventions at any scale. This would be a valued contribution to what Fry calls a *design intelligence*. For Fry this needs to become a basic life skill as we work toward developing real sustainability, he defines it as “having the ability to read the qualities of the form and content of the designed environment in which one exists ...” (2009, p.12). In what space there is left, I wish to make obvious some characteristics of the above account that can add to such an intelligence.

For one, it helps develop a relational sensitivity to how both spatial and temporal conditions of an acting agent (individual or social) enable their own emergent possibilities and thus can help develop sensitivities to how to do so even better. That is, we can become perceptive to both what kinds of constraints have what kind of modulating effects and how we can engage with ourselves and the world around us in a temporal order that can make best use those effects. We can, in other words, develop a feel for what might be called the dance of individuation. I have written and spoken about this as an individual practice elsewhere, under the banner of *Ecobehavioural Design* (James 2018). However, the focus in such cases is largely on the individual. The future of this work, and what I believe is its ultimate value, is that it supports integrating such practices with efforts toward more collective forms of change also.

A second point is that in practicing such forms of design, a corollary to growing sensitivities is a growing sense of care for the conditions of one’s experience. When we genuinely acknowledge our action as substantially a reflection of our conditions, we identify with them, and our circle of care expands to include them. There is no reason to believe that the same might not be true at dyadic and collective levels. When we are attuned to organizations and social groupings by virtue of our habitual dynamics, our sensitivities reflect the concerns of the larger wholes of which we are part, we come to sense and act on their behalf (at least partially), to be lived through by them, to be animated by them. Moreover, we grow sensitive to how our designs and actions provide the conditions for other’s ways-of-life also. Thus, one could speculate that such practices might support the emergence of more empathic identities, in which we are animated by the

concerns of larger and larger ecologies, potentially even realizing a planetary identity, which some believe to be an important dimension in the transition to long-term sustainability (Macy 2013).²⁰

Additionally, this account can provide scientifically rooted justification for some guiding norms already emerging around how to design for change in a way that is sensitive to the dynamics of the designed, e.g., *participatory design* processes, in which those being designed for are part of the design process; or notions of *autonomous design* (Escobar 2018), an eco-political framework that sees community-centered design as a core operational logic in the transition to more equitable and sustainable futures and which emphasizes that every community needs to practice the design of itself. The spirit of such approaches is in moving away from a stance of control and manipulation to an ethic of listening, of ‘designing with’, whereby as both individuals and collectives we engage ourselves and our relationships in the spirit of what the philosopher Hanna De Jaeger (2019) terms of ‘letting be’, i.e., neither over-determining nor under-determining that which is being designed for. Kuepers (2015) employs the notion of ‘Gelassenheit’ (an ‘engaged letting be’) to evoke a similar stance when referring to processes of co-designing within an organization, writing that “A design-practice by ‘Gelassenheit’ no longer strives for mastering and controlling the world, but follows a responsive and careful way of an unfolding being and becoming” (2015, p.1443). It may seem naive to think about such gallant ideas in the context of something so mundane as a mouth washing habit. But it is out of our habits, each one on its own utterly mundane, that all that we become comes to be. Thus, a sense for how we can relate to the unfolding of our own being and becoming with responsiveness and care can serve as a valuable guide for how we can extend those sensitivities beyond ourselves also.²¹

Of course, all this needs to be enacted in sociocultural practices and through alliances with the stakeholders, institutions and organizations that have the motivations and capacities to enact the kinds of designs necessary for large-scale redirection toward sustainability. Some recent work by Kaaronen and Rietveld (2021) reflects on lessons learned from several case studies in what they call *strategic design interventions*. Such interventions aim at leveraging an understanding of embodied cognitive science in conjunction with more formal design practices, such as urban design, to make strategic interventions “where it matters the most” to inspire “new ways of living”, or influence “new or established policy measures” that support the transition to sustainability (Kaaronen & Rietveld 2021). The insights from such a perspective, along with the position developed in this chapter, point to the potential value of intersecting embodied cognitive science and design in service of redirecting the activity of individuals and collectives – particularly organizations – toward genuine sustainability. Political scientist Herbert Simon famously wrote that, “The natural sciences are concerned with how things are. Design, on the other hand, is

concerned with how things ought to be” (Simon 1997, p.111). This work takes some early steps toward bringing an embodied cognitive scientific understanding of behavior and its changing together with an appreciation of design, in the hopes of getting clearer about the futures we want, realistic about the challenges we face in getting there, and sensitive to the potential harms we might do along the way.

Notes

- 1 Of course, this coordinative structure may itself become habituated with repetition and the right conditions.
- 2 It is important to acknowledge instances in which a habit may indeed appear to function like a purely procedural process. When animated by such habits, one may have a sense of a kind of decentering of their agency, of being lived through by their habits. This might be particularly true in the case of so-called ‘bad habits’. In such instances, possibly even for what were once adaptive reasons, the autonomy of a given habitual reaction may be overdetermining a particular outcome and out of balance with the other habits in the ecology (Ramírez-Vizcaya & Froese 2019), leading to much of the tensions we associate with addictions.
- 3 Paralleling the individual case also, sometimes such patterns may have an overdetermining effect, pulling us into patterns that are in tension with some other aims. Abusive relationships might be examples of such patterning.
- 4 See James (2021) for a discussion of the limitations of this account and why the notion of PFs was a necessary development to this line of theorizing.
- 5 Much like the spatiotemporal dimensions of adaptivity, the social extension of adaptivity (which is one aspect of its spatial extension), is presently underdeveloped within enaction. The present account can be seen as some preliminary steps in that direction.
- 6 This understanding of design also echoes the view by the economist-come-design-theorist Herbert A. Simon, who famously claimed that “To design is to devise courses of action aimed at changing existing conditions, into preferred ones” (2019).
- 7 Of course, the name for such forms of design within some approaches to evolutionary biology would be *niche construction*.
- 8 To reassert, this account of design is applicable at all scales, but the focus in this chapter is its impacts on the habitual lifeworld.
- 9 In our office at OIST, and Japanese offices more generally, traditional Japanese mochi (steamed sweet rice balls) are a favorite – a helpful piece of Japanese culture for any visitors wishing to make a good impression.
- 10 Of course, there are numerous dimensions along which these basic insights might be refined further, e.g., power relations, distribution of roles, different types of organizational configurations. The objective of the present account is to make some initial steps in the development of a basic vocabulary, which might thereafter be refined in accordance with such concerns.
- 11 The notion of maintenance design has much in common with what the design theorist Ron Wakkary refers to as *everyday design*, understood as “appropriating or modifying everyday objects or spaces or situations in order to create a new object, space or situation which is more suitable for the person doing the appropriating or modifying (Wakkary & Maestri 2007)” (quoted in Waddington & Wakkary 2010, p. 1). The ‘new’ here does not denote a novel trajectory in the lifeworld per se, but rather the outcome of a process of design whereby some set

- of material constraints is reconfigured (e.g., the items on my desk), to redirect the flow of that situation to support the enactment of some existing aim.
- 12 For a more substantive rendering of the account developed here only briefly, see James (2021).
 - 13 Using an economic metaphor to illuminate the basic logic here, we might put it: If the cost of a proposed solution to a problem is greater than the ongoing cost of living with the problem, living with it is actually an adaptive trade-off.
 - 14 To continue the economic metaphor initiated in endnote 13, the solution to the problem here is good value for the money, and thus a cost that is happily incurred. Of course, one must be careful with such metaphors, as the intention is not to say here that we are doing some sort of rational cost benefit analysis *a la* homo economicus. Rather, it is a much more affective bodily interpretation, but one with its own intelligence.
 - 15 Of course, such processes will also be highly individualized and utterly contingent upon a whole host of factors, e.g., personal history, genetic makeup, culture, available environmental resources, present motivations.
 - 16 Complicated workflows with too many steps or that demand too much interpersonal communication are common sources of excess tensions in a workplace, as are excessively constrained processes that overdetermine us in ways that we are likely to reject, even if they would in theory be the ‘perfect’ realization of a particular aim. See Snowden (2009) for a humorous example of precisely such overly determined systems.
 - 17 There is at this point significant evidence that, for instance, an infant’s self-regulation is looped through its caregivers (e.g., Atzil & Barrett 2017).
 - 18 All too often, designs needed to maintain such variables within specified viability limits will contrast with the regulation of variables relevant to, for instance, the health of organizational members or ecologies of which the organization is a part.
 - 19 See Linder et al. (2021) for a review of the presently underexplored topic of pro-environmental habits and an argument for why they need to feature as part of our efforts to transition to sustainability.
 - 20 My claim here is not that such identities need to precede our efforts to bring about such changes, but that they are coemergent with them. In other words, although these initial efforts may be difficult, the more we identify as planetary beings the more we will be willing to act toward planetary ends and our actions will come to be pre-reflectively aligned with such ends. Emphatically, when I speak of the intersection of individual and collective change, I am very much concerned with mobilizing individuals to come together and use their collective power to pull on the levers of national and international politics to impose regulatory policies that can enforce the kinds of redirections we need to reach true sustainability.
 - 21 De Jaegher also points to loving relationships as instructive to the development of such sensitivities. In such relationships the need for ‘listening’ and ‘letting’ is more readily apparent than it is elsewhere. We can sensitize ourselves to these dynamics under such conditions, seeing them as opportunities for the observation and practice of relational skills that can be extend into our design efforts also.

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