Foreword

I awake at 5 AM, sparked by birdsong, when, with weathered familiarity, I arch my right hand over my head to my bedside table where, on a pile of books I read nightly, I grasp my glasses, lifting them up and onto my face. I tiptoe from the bedroom so as not to disturb my partner's sleep and make for the kitchen, where I run water into a kettle and press its button to boil. Today is Friday, April 28, 2017.

A priority on my to-do list is writing the Foreword to this fiftieth and last book to appear in the thirty years of our Cambridge University *Learning in Doing* book series. LSE Professor Saadi Lahlou's *Installation Theory* brings a fresh framework to analyse behaviour, and a theory of societal evolution; it connects the minute gestures of action as-we-live-it to aggregate historical change.

Installation theory (IT) is a synthetic theory explaining how humans construct systems that support and format behaviour. 'How is it', he asks, 'that we creatures of free will, despite our differences, despite our biographic differences, all comply to "behave" in society as expected? And how is it that we manage so easily to behave adequately even in new contexts?' To provide detailed answers to these perennial questions, he has 'installations' serve as our unit of analysis for the nexus of societies, cultures and individuals. This focus on installations then enables coordinated answers to the two classical research questions for human development at the heart of the social sciences: How does society regulate the behaviour of its members? How do individuals choose their behavioural path in a situation? Answering each, the reader finds, enlightens the other.

Because focus on detail is essential to understand the determinants of behaviour, which is a sum of details, because understanding what an installation is requires getting into the nitty-gritty of everyday actions, let me describe what I do while the kettle heats the water. Please bear with me.

I interweave other activities as the water is boiling; I grab a blood pressure cuff, collect my smartphone, turn on Bluetooth as I sit, mounting the

cuff; I press the Start button on my iHealth app, which channels my take-blood-pressure activity. After the cuff inflates and the reading is produced, I take it off and return it to its charger. The water is boiling now.

I place three tablespoons of coffee into a filter (from a nearby jar in which I keep a tablespoon), pouring the boiling water languorously into a Japanese coffee-dripping device, savouring each burst of its dark-roasted scent. I flip over a five-minute sand clock I installed on the kitchen counter the night before in anticipation of this morning's caffeination ritual. There is then time to walk across the kitchen, don my slippers, walk down the twelve steps to the front door, unlock and open it and walk the sixty steps to the street curb of my home, where the morning papers have arrived. I collect them and return to the house, bounding up the steps. Ready to enable the coffee now brewed to drip, I lift the clear plastic device and sit it upon my cup. As the bottom rim of the device touches the coffee cup's rim, the cleverly engineered bottom of the coffee dripper rises, and the coffee fills my cup. I dump the grounds for recycling and rinse and reset the coffee-filtering device into a sink-side draining rack. I open the fridge, the filled coffee cup in my other hand, pour a dollop of cream from the fridge, and now the calm I have been seeking to launch the morning can begin.

In all that just happened, my home and kitchen installations, including me as a key component, have performed several activities cooperatively; I was acting, but I was also guided and scaffolded by the rest of the installation's components.

Now I settle myself into my habitual right corner of the black couch, turning on my nearby lamp, and my day can start. I pull a bound leather journal from my side table. I sketch the day's arc in a list: it must set out my priorities and primary time chunks of the day and estimate where I will devote my energies. I check the weather forecast hour by hour by launching my iPhone's Accuweather app. It tells me it will get quite warm today, 78 F, by 2 PM. This will affect my schedule planning, as I expect to run to the gym I use 1.5 miles away, do a weight workout, and then run home, where I will continue writing.

I have learned to avoid the pull of checking email before setting priorities, so I've placed my phone facedown so I will not be tempted to open it up before I have completed my list-making. In the journal itself I create an installation (keep reading …); I sketch a list of what I hope to achieve in the day. I estimate the hours I wish to spend on each task. For each I envision the percentage of my energy expenditures for the day which I imagine it will consume. This is a new habit, begun in 2013 after I suffered a massive stroke which reduced my available mental energies each

day and impaired my left inferior peripheral vision so that I can no longer drive or ride bicycles for safety's sake. Otherwise fine, I walk everywhere for exercise and for contemplation. The need for energy estimates for the day is so I'll avoid my prestroke tendencies to be captured in each of the things I begin doing each day, running my clock out by making progress toward all of them that I pursue. With less overall energy to expend, I must be more strategic, so tranching my energies, guided by a priority queue and scribed time estimates, is key. Because of this increased awareness of detail, I am especially sensitive to Lahlou's description of how the context scaffolds and constrains behaviour, and how I create as well as use the installations I live in.

To begin, I look around the table and the floor for cues I have left myself to the things I'll need to do today. Last night I sketched a few words on each of several coloured sticky notes about things to do, and I have four different stacks of papers on the floor by the couch, each representing a major cluster of tasks: materials for a course I'm teaching on media multitasking, learning and the brain, the IT book manuscript, Stanford University long-range-planning documents, student papers and journal manuscripts needing attention. These assets I scan, filtered by my emerging priorities from the knowledge integrations and values-sifting my brain engages in during the prerising times of consciousness. The items that still matter make it onto my evolving list of today's to-dos. Any items needing calendaring I render on my smartphone calendar app, which synchs to my desktop calendar.

What exactly is an installation as Lahlou defines them? Installations are smaller units than society is; they are specific, local, societal settings in which humans are funnelled to and expected to behave in a predictable way (such as the aforementioned bedroom, kitchen, roadways, gym and, shortly, the restaurant). Installations are ubiquitous; collectively, they are the main loci and devices through which the continuous reproduction of society and culture occurs at a micro-level through daily practice. But installations are not reducible to or to be confused with physical settings. Those in a culture spontaneously identify them and, because they have been socialized to do so, know what to do in them. Installations, you see, have three component layers – distributed at physical, psychological and social levels – that are linked into a single functional bundle. Lahlou explains that although installations have a functional coherence and are a deliberate production of societies, they are distributed in their nature and assemble only at the moment and point of delivery of activity, just as ingredients assemble and transform as expected in a chemical reaction.

For envisioning the redundancy of installations, consider the customs installation of an airport, an assemblage of our embodied competences in queueing behaviours upon arrival, the material physical barrier channels and the customs agents and associated authority and regulatory apparatus. I presume your competency in airport customs using this example. Yet installations, although channelling, are nonetheless nondeterministic – variabilities in behaviours occur with the leeway of caprice. An agent's free will make its way into installations through selecting goals, in choosing which installation one will participate in and in performing the details of action inside socially allowable limits for the installation (e.g., which dish I order in a restaurant). Furthermore, agents do not only use standard installations; they also create their own and use them to frame their own behaviour, as I do in my home or with my arrangements to sort out priorities and organize my day, as I have described earlier.

Continuing my saga, after writing the first part of this introduction, weightlifting at the gym and musing over the morning's ethnographic notes, I walk to a fish market to order a dish. While waiting, I use my phone's Notes app to draft a series of reflections on how my morning's observations relate to IT. The three layers of Lahlou's IT framework are affordances, embodied competences and social regulation. Layer 1 deals with the *Objective Material Environment*, made up of affordances in the material environment (which scaffold behaviour); Layer 2 is *Embodied Interpretive Systems*, the competences expressing the embarked agency of the subject, who is part and parcel of the installation (which produces behaviour); and Layer 3, *Social Regulation,* is made up of institutions and formal and informal rules (which regulate behaviour).

A first observation on the beginning of my day is how intertwined in the behaviours of my account are the first two layers: getting and donning my glasses from the bedside, preparing the coffee with its multiple steps and devices, taking a trip outside to collect a morning paper, rummaging my stacks, establishing my priorities for the day in my work journal, writing these very words on my computer. Less obvious but no less channelling my behaviours were five different instances of social regulation in this brief, dramaless morning: my tiptoeing out of the bedroom – so as not to wake my partner; my putting away both the blood pressure cuff and the coffee filter system – to avoid clutter; adhering to the social norm of recycling my coffee grounds – to provide biodegradable waste; and my calendar synching – which is socially regulated in how I am making accessible to others I need to be coordinating with when it is that I am occupied and when I might be available. The combination of these three layers of components,

at the point of delivery of action, naturally channels my behaviour. And I could be sharing scores of other event sequences that unfolded in my running, road crossings with traffic lights, gym entry, workout and locker room procedures, restaurant ordering and eating scripts; all analysable and redesignable with the guidance provided in this IT book.

In Lahlou's book, indeed, the three layers shaping human behaviour and their operationalization in research and practice are used for analysing installations to understand, manage or redesign them. That these three layers of installations coalesce to function with momentum as a single system provides redundancies and produces their resilience.

With installations at the centre of the theory for understanding and intervening in how humans construct systems to support and format behaviour, how do installations work as what Lahlou calls 'a behavioural backbone architecture for society'? They 'channel' behaviour by offering users a restricted choice of alternatives, limited by three distributed layers of determinants at material, embodied interpretive and social levels, which provide behavioural feedforward and feedback. Each installation layer induces or allows specific behaviours and provides limited degrees of freedom to act. The guiding path is continuously produced as action unfolds. Thus, installations operate as a behavioural attractor where choices left to the person are often minor. The combination of the three layers makes this channelling system resilient and enduring. If we can understand how installations have their effects, we should be enabled to modify behaviour, collectively and individually. We could then intervene by reframing components singly or in combination: redesigning material contexts, educating participants, modifying institutional or regulatory systems.

The reader will find upon inquiry into the text that IT uniquely integrates a phenomenal range of theories, across the social science disciplines of psychology, sociology, anthropology and economics, and further incorporates the already interdisciplinary cognitive sciences. IT has been informed and iteratively developed through its grounding in extensive analyses of video-recorded activities produced in natural settings, of users of technology, broadly defined, and professionals in a diversity of occupations, so as to understand their decision-making and actions. At the root of this richness lay multilayered analyses of the digital ethnographic data of human activities and interactions that Lahlou and colleagues have captured in situ with the aid of 'subcams' – miniature subjective cameras worn by research participants as they conduct their everyday life, thus yielding first-person perspectives on action in situ and enabling replay interviews where participants who wore the camera comment on their own film.

These data on how and why people act in real-world situations have been used to provide unprecedentedly detailed and insightful accounts into the psychological states of participants as they are interacting with the physical, social and representational stuff of their environments.

Installation theory is ambitious in intent and fine-grained in execution, seeking to be nothing less than a simple and robust framework for both analysing all manner of behaviours and changing them using design and policy interventions. The framework is connected to many other current accounts of similarly vexing issues, such as activity theory, distributed cognition, ecological psychology, situated action, social constructionism, actor-network theory, social representations and the like (which are also presented in the book). Yet it provides a unique vantage point in its integrative powers and range of examples from which it has been constructed. The dozens of real-world examples encompassed in the book illustrate the value of IT. The behaviour settings studied range from shopping and family meals to cycling on the urban street, changing a flat tire, getting a dental filling, white-collar work, waiting restaurant tables, surgery, nurses dispensing medications, master chef apprenticing, and nuclear plant operations.

The pluripotent nature of IT should yield generative fruits for many disciplines and societal roles, including designers, engineers, managers, consultants, policymakers, social scientists, educators and students. Perhaps even more fundamentally, anyone concerned with the real-world contexts of cognition and action, their own and those of others, will benefit from reading this book.

IT is also an ambitious academic theory, whose delicious intricacies await the reader, of the stability yet continual evolution of societies, culture and their constitutive installations, emboldened with particularities I can say little about here. Lahlou provides a vision of the endurance and evolution of societies as reproducing piecemeal and in a distributed manner by means of installations. This academic theory of societal evolution – its spawning of variants and its selection mechanisms – is advanced by study of the examples of scientific progress and innovation processes in industry.

Such evolution combines endurance (day-to-day reproduction) and change (longer-term continuously modifying form). Lahlou argues that installations not only channel behaviour but are essential to reproducing society and culture, since they are the very devices by which culture reproduces through daily practice. The resilience of installations, coming from their redundant threefold structure, is key in socializing novices, who find themselves induced into the correct practice and therefore learn how to

behave while participating in installations. IT shows how installations, in practice, enable people to *learn in doing*.

Lahlou describes the reproduction cycles of embodied competences, of material objects in the physical layer and of institutional rules emerging from power struggles among stakeholders. Participants in and stakeholders of installations change them in betterment loops for improved experience and satisfaction. He shows how the construction and endurance of installations reflects power struggles and compromises of interests, how they evolve spontaneously and how their evolution can be channelled by deliberate design. He articulates several mechanisms that select from the variants which are produced, from thought experiments to reality trials to the power struggles of competition. His account provides for dual aspects of the mechanisms for the long-term evolution of installations in society – the three semiautonomous component layers of installations evolve independently with their own technical (re)production logics and constraints, but the installations also evolve conjointly, in the composite splendour of their entirety. There may also be crossed effects, where design of one layer may be influenced by what happens in another layer, since individual humans circulate between installations and their embodied competences are constructed within and for diverse installations.

Satisfyingly, the IT book itself is organized as an installation; it provides different levels of structure to align with different reading goals: browsing mode and reading mode. Takeaways and abstracts appear in bold font to capture browsing attention, much like the copasetic page summaries in the text margins popular in philosophy books in the nineteenth century.

Lahlou avers that IT has pragmatic value. He provides some examples of application for behavioural change, which is his main goal, and that will likely become a core application of IT. As a learning scientist trained in developmental psychology, philosophy and the cognitive sciences, working on the complexities of K–12 STEM education and learning with technologies for thirty-six years, I am especially keen to bring IT into close contact with the interdisciplinary learning sciences and technology design. I foresee three specific strategies for that enablement.

The first will be to employ IT for describing and analyzing the situated experiences of people learning in the many different contexts in which learning scientists investigate learning processes and outcomes, from schools and universities to museums, communities and homes. While unsurprisingly, echoes of Dewey, Piaget, Vygotsky, Bruner and Situated Learning are manifest in IT, I have legions of reasons to anticipate that

Lahlou's IT brings unique leverage to tackling these issues in powerfully new ways.

The second strategy is leveraging IT as a design and intervention framework for creating and researching the processes in use and consequences of learning technologies and learning environments of every kind more broadly over the life course, not only for formal education but in informal learning and for learning online.

A third approach will be analyzing the ways in which IT aligns or conflicts with extant learning theories, pedagogical frameworks, and educational policymaking for building equitable learning opportunities and adaptive capacities in educational systems for learners and teachers. I eagerly anticipate these activities with a large community of colleagues keen for such an encompassing and generative theory as Lahlou has developed.

In short, as an explanatory and intervention-ready account of how installations, in practice, enable people to learn in doing, I believe Lahlou's IT serves as a fitting crown to the Cambridge University Press's *Learning in Doing* series.

I hope you grant me forbearance for exposing in this Foreword the skins of my installations du jour when you also find resonance, as you are reading Professor Lahlou's book, with your reflections on the installations you use and build throughout your own daily living. As you will experience, IT is a handy toolkit for sharpening our awareness and understanding of the fine-grained fabric of how we act-in-the-world – and how we can design for change.

Roy Pea
Stanford University