Chapter 13
More than Urban

Carola Moujan

Abstract In his cult 1953 novel *More Than Human*, Theodore Sturgeon portraits the genesis of *Homo Gestalt*, an organic entity envisioned as the next step in humankind evolution. Sturgeon's novel has recently regained interest as a metaphor for alternative ways of envisioning sustainability, less focused on humans alone, aiming to include a broader and more diverse group of actors. Despite being a step forward towards more sustainable urban futures, such approaches, however, often remain substantialist. Following Gilbert Simondon's theory of individuation (Simondon in L'individuation à la lumière des notions de forme et d'information, Jérôme Millon, Grenoble, 2013) and Lucy Suchman's concept of *situated actions* (Suchman in Plans and situated actions: the problem of human-machine communication. Xerox Park Research Center, Palo Alto, 1985) this chapter argues that focusing on diversity is not enough; that achieving a more-than-urban condition requires not only diversity but also, and importantly, entanglement. And that entanglement does not happen randomly, but instead, emerges through processes of individuation supported by concrete forms that enable integration and synergy between discrete components. Entanglement requires starting from pre-individual urban potentialities rather than constituted individuals; which is to say, to shift the focus from 'data as information' to 'data as tension'.

Keywords Data · Design · Smart city · Individuation · Entanglement

13.1 Introduction

How can we envision desirable futures for the digitally augmented city? Urban spaces are living *umwelts*, emerging from a wealth of biological, social, economic, technical, historical, spatial and emotional interactions, which both arise from, and condition, the way places are experienced (Rykwert 2002). Envisaging urban augmentation

C. Moujan (✉)
École Camondo - MAD Paris, Paris, France
e-mail: carola.moujan@ecolecamondo.net

ESAD TALM, Angers, France

under the lens of sustainable development, thus, requires considering such umwelts both as a starting point and an end (Guattari 2000; Younès and Goetz 2010); in other words, to support what Félix Guattari has named *ecosophy*. Ecosophy, as Guattari envisions it, consists on 'an ethico-political articulation between the three ecological registers (the environment, social relations and human subjectivity)', the only response to the ecological crisis able to bring about 'an authentic political, social and cultural revolution'. In order to arise, such a revolution needs not only look at 'visible relations of force at a grand scale', but also consider 'molecular domains of sensibility, intelligence, and desire' (Guattari 2000, p. 28).

Such an approach, however, is in direct contrast with the initial *Smart City* paradigm. The original promise of a performance utopia capable of combining sustainable development and quality of life through optimized metabolism, has proved too simplistic in regard to the complexity of real cities (Mullins 2017). On a social level, the techno-centred approach envisions citizens only as 'consumers' or 'activators' of an otherwise self-referenced system, overlooking important questions of ethics and privacy, as well as issues of ownership of public space (Moujan 2015). On a technical level, it demands huge amounts of infrastructure and maintenance, leading to a de facto transfer of urban management to private actors (Haque 2012). On the aesthetic level, it neglects taking into consideration the impact material forms have on the quality and readability of urban spaces (Moujan 2015).

In response to this state of things, a 'participatory turn' has arisen. From this vantage point, digital technologies are seen as means to gather and amplify capabilities already present within communities. Despite their laudable intentions, however, such visions often remain limited. Focusing solely on the human side, participatory approaches tend to both reduce and idealize technology.

Let us give this issue a closer look. Reducing technology as a mere means for an end (in this case, participation), obscures important factors such as the role *technical concretization* of artefacts plays in the structuring of their *associated technical milieus*. Concretization is the name Gilbert Simondon gives to the evolutionary process every technical object goes through before reaching a state of maturity (Simondon 2017). Such processes are indivisible from the technical, material and social environment that make them possible, which is to say that technical evolution is tightly intertwined with social evolution in ways that are not limited to the direct 'uses' society might make of finished artefacts. Which is to say that, to truly understand potential benefits of technology in society, we must first deepen our understanding of technical processes, of what a technical essence might be and how, through which precise interactions with its associated technical (and human) milieus, an abstract, rudimentary prototype evolves towards a mature artifact.

The reductionist approach to technology brings upon a second problem that I have called idealization. Whilst unexpected behaviours such as bugs, system failures, connection lags and interruptions, uneven access… are extremely common, technical solutions and systems are most often pictured from the vantage point of their theoretical capabilities (Moles 1988). The idealized perspective triggers a continuous, endless struggle to compensate the gap between theoretical and actual performance, undermining the efficiency of the participatory process itself. One can thus wonder

what new, unexpected situations could arise if, instead of idealizing and reducing technology, participatory processes were designed in a way that included irregular behaviour as meaningful elements, an approach that would demand full acknowledgment of technology's agency? Here again, Surgeon's *Homo Gestalt* provides a powerful analogy: whilst every member of the group can be seen as deviant from the norm, such misfits are precisely what make the *gestalt* possible.

But limitations in view do not only concern the technical realm. From a sociological perspective, the participatory approach often fails involving users that are not able or willing to participate (Gooch et al. 2018), and struggles to address implicit aspects of problems that users themselves are not aware of. Much aligned with the rhetoric and ambitions of relational aesthetics (Bourriaud 1998; Bishop 2004), such perspectives, focusing solely on participation as the reason and bases for design, tend to overlook the impact of formal and material agency, reducing it to its merely instrumental aspects, namely, to how 'user friendly' or 'easy to use' the artefact is. Abstract values such as 'user empowerment' and the possibility of democracy often overshadow the importance of the 'how', that is, through which materials, forms, and processes, such a goal is achieved. Getting back to Sturgeon, it is significant to observe that the powerful endeavours of *Homo Gestalt* do not happen anywhere, anytime, but instead require very specific material conditions. The twins, for instance, are capable of teleporting themselves, but only if naked—a seemingly unimportant detail that, yet, considerably constrains their actions and delimits their area of influence. This example illustrates how, far from being interchangeable, cosmetic features, material attributes act instead as 'carriers of forces' (Moholy-Nagy 1947). It is neither the actors nor their special capabilities, nor the material attributes as such, but instead the forces themselves which create the new, augmented, 'more-than-human' condition.

Finally, there is a perhaps even more important blind spot. Based on language and human protocols of conversation and negotiation, 'human centric' approaches tend to overshadow non-human components of the urban *umwelt*. This is why many researchers from disciplines as diverse as HCI, biology, philosophy and geography claim today that abandoning the human-centred approach is essential to achieve sustainable development (Franklin 2017; Haraway 2016). Here again, however, the question remains open, for the sheer act of adding more actors, a more diverse panel of discrete parts to the equation without creating the conditions for their intertwinement is unlikely to achieve a whole that is more than the sum of its parts.

The above examples significantly reveal that, despite their major philosophical and political differences, both techno-centric and human-centric positions converge at several levels. In both cases, 'the public' is envisioned as a pre-existing entity that 'uses' the solution or 'benefits' from it, with design seen as an aid to fulfil the predefined goal. Their common ground can be described using Bernard Waites' words as a vision where 'all problems whether of nature, human nature, or culture, are seen as "technical problems" capable of rational solutions through the accumulation of objective knowledge […], the value of which is to be judged by how well they fulfil their appointed ends' (Waites 1989, p. 31).

This is the reason why, I will argue, neither perspective enables the emergence of a 'More Than Urban' condition, one that will expand the limits of the conceivable,

beyond assistance or automation. As John Dewey has noted (Dewey 2012), publics are dynamically constructed through the wealth of relationships (affective, symbolic, material and physical, as well as functional) that tie them together at a given moment in space-time; a statement that strongly resonates with Guattari's definition of *ecosophy*. On the other hand, 'thinking in relationships' is at the core of any design activity; this is why we need to pay closer attention to form-material interactions and their social, economic, technical, emotional and symbolic implications. 'Such relationships produce a new quality, which is "design"'(Moholy-Nagy 1947, p. 232).

13.2 Digital Design, from 'Data as Information' to 'Data as Tension'

Linking data and physical space is a major trend in contemporary urban design. Data has become a design material, a design tool and a design field. Designers represent it, read it, use it to build services and games, to tell stories and generate forms. The development of ubiquitous computing opens up a whole new realm of design possibilities, and potentially, of enriched urban experiences. Yet, most examples at work today struggle to fulfil such promises due to lack of synergy between the multiple, often conflicting dimensions that are typical of the urban realm. An equipment or service that might well solve a specific problem on a local level for an individual user or target group, often comes at the prize of a new problem (Moujan 2015). Whether we consider the issue from an environmental, social or aesthetic point of view, questions of attention, of ownership, of privacy, of grace inevitably arise, along with street cluttering and energy concerns.

Here again, and in spite of formal diversity and novelty, a substantialist perspective is at work.

Within this 'data as information' approach, focus is placed on specific *readings* of the information concealed within the data. Yet, whether or not such information 'augments' the experience of public space is difficult to assess, for qualities considered as noise in regard to communication efficiency, may well be essential—albeit non-functional—components of urban experience. Fragmentary, information-based approaches are not enough to respond to the magnitude of today's urban challenges. Instead, we should consider public spaces as force fields, data as tension, and aim for radically new, more-than-urban experiences, a condition that can only be achieved through entanglement. Digital technologies are not just tools: they are our *umwelt* (Hoquet 2011). A change of paradigm is required: we need to stop thinking about the physical/digital relationships in terms of juxtaposition, or even hybridity, and begin to embrace *entanglement*, a term from quantum mechanics that describes a state of mixed matter where such apparently contradictory conditions are met; a state of matter where, as in magnetic fields, individual components lose their substantial attributes to become wholes that are more than the sum of the parts.

What Bernard Waites refers to as 'technical problems capable of rational solutions through the accumulation of objective knowledge', is what I call the 'data as information' paradigm. Conversely, the 'data as tension' paradigm goes beyond the solution or the meeting of needs and reaches out to the problem framing level. 'Instead of more gratuitous parametric modelling' writes Shannon Matter, 'we need to think about urban epistemologies that embrace memory and history; that recognize spatial intelligence as sensory and experiential; that consider other species' ways of knowing; […] that aim to integrate forms of distributed cognition paralleling our brains' own distributed cognitive processes' (Matter 2017). In other words: instead of problem-solving or optimization, digital augmentation should help and trigger individuation processes within the urban realm; processes that interlink a multiplicity of spatial, technical, biological, physical, symbolic, historic, ethical and political dimensions.

13.3   Beyond Content

This alternative paradigm can be linked to the concept of 'situated actions' coined by Lucy A. Suchman in 1987. Situated actions are 'ad hoc responses to the actions of others and the contingencies of particular situations. […] Rather than depend upon the reliable recognition of intent, successful interaction consists in the collaborative production of intelligibility through mutual access to situation of resources, and through the detection, repair or exploitation of differences in understanding'. Suchman noted that researchers interested in machine intelligence attempt to remedy the vagueness of plans, with the project of 'substituting plans for actions, and representations of the situation of action, for action's actual circumstances' (Suchman 1985).

SenseCity, a full-scale, reduced city model built by researchers from IFSTTAR can illustrate this last perspective. The installation, spreading over 400 m^2, is a mobile, climatic chamber built over 'mini-cities' and meant for studying urban areas' reaction to climate change. Specific weather conditions can be programmed over predefined time lapses, allowing for study of its effects over materials, soil or vegetation, among other factors. Described by its authors as a 'realistic demonstrator for urban innovations' (SenseCity Press Kit 2018) enabling 'as many tests as required', each mini-city is built in direct response to specific scientific and technological challenges explicitly formulated, which is to say to already known, well-identified problems.

According to Suchman, machine's insensitivity to particular circumstances appears as a 'central design resource and fundamental limitation'. Insensitivity provides reliability: a good technical object ought to function and perform whatever the circumstances. Yet its detachment from the living milieu deprives it from refined and nuanced responses. From this ambivalent starting point, two strategies arise: either you try to bridge the gap, to make machines more 'senstive' through ever bigger amounts of data, of hardware performance and ever more refined artificial

intelligence. Or, as the author suggests, you design structures, objects and systems to support and empower situated actions.

The author illustrates these two alternatives through the example of Trukese and European navigation systems. European navigators follow a predefined route; their navigation efforts mainly consist on 'sticking to the plan'. If unexpected events arise, they will first modify the plan in order to adapt to the new conditions, then act upon it. Conversely, Trukese navigators begin with an objective and respond to the conditions as they arise in an ad hoc fashion. They utilize information provided by the environment as they travel, and steer accordingly. They can point to their objective at any stage of the course, yet are unable to describe their route. The Trukese's plan is necessarily vague 'insofar his actual course is contingent on unique circumstances that he cannot anticipate in advance'. The plan of the European, in contrast, is derived from universal principles of navigation' and 'essentially independent of the exigencies of his particular situation'. Suchman argues that whilst the European navigation model has become reified in the form of new computational artefacts, following what Western science has glorified as 'the correct model of the purposeful actor', 'the essential nature of situated actions […] is Trukese'.

The author urges social scientists to study and begin to find ways to describe the Trukese system, and indeed, much work has been done in this sense in philosophy and the social sciences. Deleuze and Guattari's well-known concept of smooth and striated space (Deleuze and Guattari 1980) come to mind, as do recent developments carried on by Tim Ingold in anthropology (Ingold 2007) or by Andrew Pickering (Pickering 2010) in technology studies, to name just a few. Yet, the highly conceptual nature of this type of work makes it difficult to adopt by scientists working on applied research, especially those coming from STEM fields. But the most important problem lies beyond: whilst the social sciences work mainly with words, through language, an essential part of this type of process cannot be fully described in words without undergoing considerable reduction.

This is the space where art and design can provide the missing link. Somewhere lays a key that cannot be reached through rationality and information, no matter how big the data. Instead of providing fragmentary solutions to isolated problems, which, as we have seen, often bring new problems, we ought to find forms that embody convergence points where such multiplicities meet, which is to say, forms that, through aesthetic experience, *make sense*. In the words of Simondon, 'it is not the object that is perceived, but the world, polarized in such a way that the situation has a meaning' (Simondon 2013, p. 248).

So, how do we achieve this? Iconic Bauhaus artist and designer Laszlo Moholy-Nagy has the answer: through 'the activation of space by means of a dynamic-constructive system of forces […] instead of static material construction (material and form relations) dynamic construction (vital constructivism and force relations) must be evolved in which the material is employed only as the carrier of forces.' (Moholy-Nagy 1947, p. 232). Such an endeavour not only allows contingency and vagueness, but requires it. It is vagueness that permits adjustment, flexibility and permeability, exchange and integration. Preserving vagueness requires focusing less

on the content of the data, on modelling and simulation, which reify situations into predefined outcomes, and more on the forces carried by data.

13.4   Fields of Tension

Beyond the easily measurable physical forces such as traffic flows, air pressure, and noise level, a wealth of other forces, albeit less tangible, is also at play within the social realm. 'Who can deny that desire and belief are forces?' asked Gabriel Tarde over a century ago (Tarde 1893). Five decades later, J. J. Gibson defined affordances as 'invites' or 'attractions' from the environment (Gibson 1979). Connexions between matter and memory (Bergson 1896), as staged in heritage sites and monuments (Riegl 2016), trigger desires and beliefs, as do special events, commercial activity, advertising, social codes… not to mention the force of emotions and personal feelings. There are also specific material parameters such as sound, quality of lighting, presence of trees, of animals, human activity, texture…. level of maintenance… The list is probably endless, and gathering and analysing comprehensive data about all those dimensions is certainly impossible. To complicate the task even further, it is not only forces themselves that are meaningful, but also their interdependence—something even more difficult to measure. This is why, *in lieu* of embracing complexity, considerable funding and effort is placed in 'substituting plans for actions, and representations of the situation of action, for action's actual circumstances' (Suchman 1985).

My contention is that it is through form that the change of scope from the smart city to the more-than-urban city can be achieved. Whilst the positive impact of functional dimensions of urban furniture (such as benches) in place making is now well documented (The bench project 2015), the role of form has been widely overlooked. What if, instead of considering forms merely in terms of beauty or poetry, or as 'solutions' or responses to 'appointed ends', we envisaged them as tools, for problem framing, for 'polarizing the world in a way that the situation has a meaning', for 'revealing new dimensions and new ways of inhabiting space' (Dunne 2008), and even for producing new data that, interpreted under this new lens, could bring about radically new insights and questions?

To illustrate my argument, I will discuss the case of *Luciole*, a practice-based research project that I have been working on since 2015. Comprised of a network of luminous, reactive and connected public benches, *Luciole* started out as a design project in response to an open call for *Lyon City Design Urban Forum*, an urban design biennial event happening in the city of Lyon in France. As many European metropolitan areas, Lyon is undergoing major transformations that will last for decades. During construction works, citizens will face several issues such as public space degradation and potential feelings of insecurity deriving from that, as well as physical and emotional disorientation due to the loss of symbolic landmarks, mobility issues, and general lack of comfort.

My approach was to look at the bigger picture and, instead of aiming at solving issues on a local level, think in terms of urban dynamics. By placing benches that, just like fireflies, attract visual attention, communicate with each other and trigger responses, users escape the hegemony of smartphones, and benefit from the advantages of the connected city without giving up the simple pleasure of 'being there'. Each bench works as an attractor, inviting users, orienting flows, providing shelter and rest. Light communication between the benches triggers a sense of community, of not being alone in a no-go place, whilst still preserving personal space. Communication with the cloud provides visibility beyond local space, fluid access to multi-modal transportation, awareness of surrounding activities and, importantly, rhythm.

Through light modulations, *Luciole* discretely informs users without attracting direct attention, enabling them to chat, read, or just relax while staying conscious of surrounding activities. At night, it wraps users in a reassuring luminous halo. Its cocoon-like shape triggers feelings of intimacy, making *Luciole* a transitional space, in-between public and private realms. Beyond technological obsession, *Luciole* explores the poetic potential of data as a carrier of forces, weaving dynamic relationships with its environment (Fig. 13.1).

A first full-scale, two-unit prototype was developed and installed in La Part-Dieu (a shopping mall in a central neighborhood near Lyon's main train station) for two weeks. This first experience confirmed some of the original hypothesis regarding the form's potential affordances, and triggered many unexpected interactions (Figs. 13.2, 13.3 and 13.4).
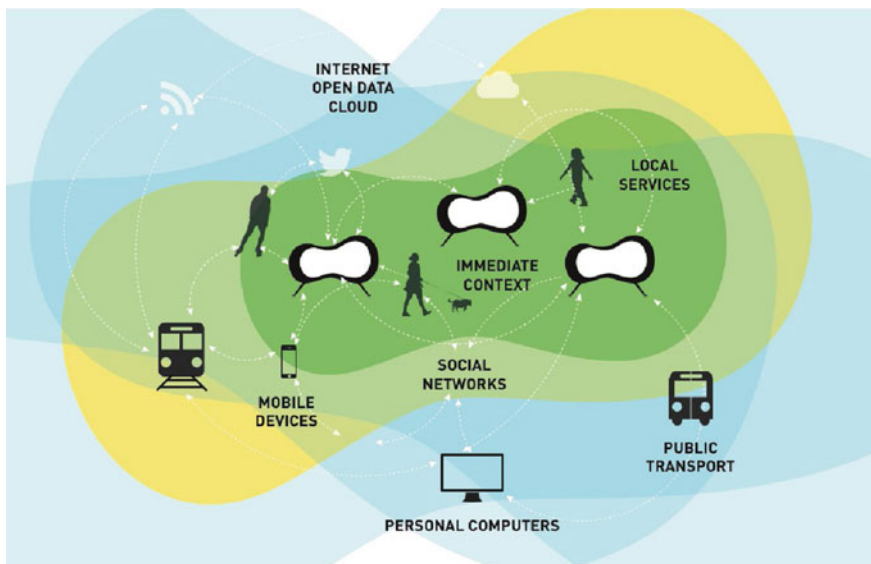

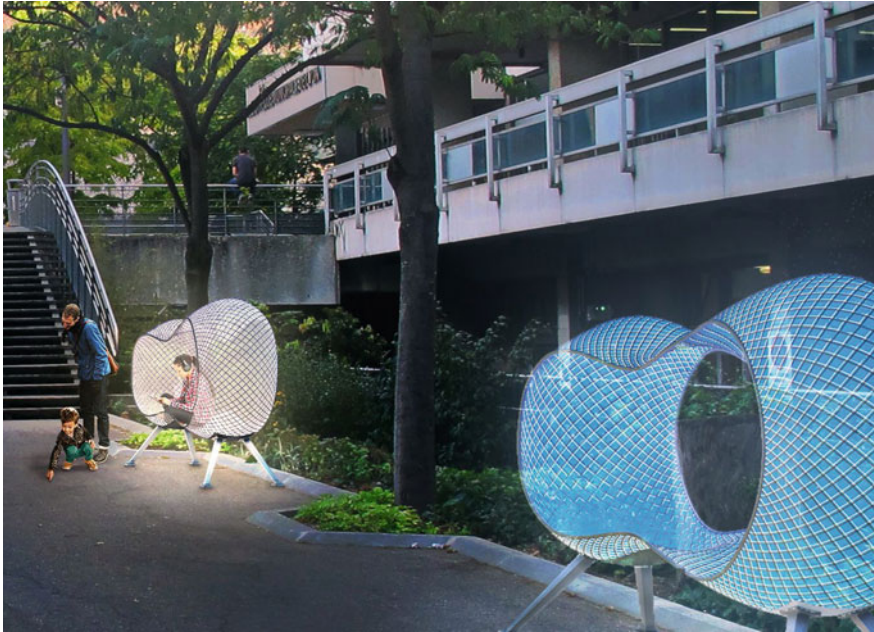**Fig. 13.1** Interaction scheme. Illustration by Carola Moujan

Fig. 13.2 Initial computer render by A43D estudio

Figs. 13.3 and 13.4 Working prototype at La Part Dieu. Images by Carola Moujan

Figs. 13.3 and 13.4 (continued)

Most of the questions raised by the *Luciole* provocation, however, remain open. This is why I have been speaking about a 'paradigm shift', and not simply innovation. The process of implementing a long-term experiment and study on public space beyond the initial two-week exhibition proved to be quite challenging, and revealed the multiple barriers that prevent a project like this one from scaling. What are those barriers? One might things costs are an issue; but if money was the main problem, it would be fairly easy to solve. To develop a fully working prototype, run a study in real conditions and disseminate the results requires 100 times less funding than projects like *SenseCity*. Are the barriers technical, then? Not really: the project can be developed with affordable, open source, widely available components and technologies. The real barriers are cultural. *Luciole* crosses multiple disciplinary lines, mixes diverse professions and fields of expertise that do not usually work together, even within the art and design world.

Moreover, and importantly, conveying the utility of an open-ended platform such as this one without pinning down precise appointed ends can be problematic. The first struggle comes at the engineering stage. *Luciole*'s technical infrastructure not presenting any research challenge, we worked with regular engineers from industry. Communication and mutual understanding with development teams, was difficult, inasmuch as engineers are used to respond to written briefs stating goals and appointed ends in a straightforward and precise manner. With *Luciole* being much more about emergent than given function, this way of working was often in conflict with the very spirit of the project. Not only producing such documents whilst still preserving open-endedness was laborious, but also, many times, aspects that were

not explicitly linked to pre-identified outcomes were deemed gratuitous, often altered or simply neglected, especially when their implementation increased the technical complexity of the whole.

It is tempting here to blame it all on the lack of vagueness inherent to any engineer process, and it is, indeed, an important aspect of the problem, although not of the kind that would be impossible to overcome. The real issue is linked to individuation processes, from both technical and aesthetic standpoints. Whilst production is generally shaped in a sequential manner—first, formulation of needs, second, technical development, and third, implementation—fulfilling the demands of both 'selfs'—the technical and the aesthetic—requires tighter exchange, iteration, collaboration and intertwinement; a way of working that is increasingly well accepted and common within high-tech projects, but less so when complexity does not come primarily from the technical side. Here again, questions of value arise: experimenting in that direction certainly increases direct development costs, and does not necessarily lead to new technical inventions and patents. The fact that, if successful, the project could create value through improved quality of life, falls beyond scope.

This takes us to the second challenge: finding an experimentation site and funding the study. Here is where the problem-framing dimension clearly becomes an issue. In order to justify their need for experimentation before city authorities, private companies, and other stakeholders, design research projects such as *Luciole* ought to prove their innovation potential. Designs are considered innovative when, beyond novelty alone, they deliver value for the intended stakeholders; but value can only be delivered (and measured) after ideas have been implemented. Which is to say that, beyond the artifact, designers are required to design the businesses able to deliver and implement the solution (these days mostly in the form of start-up companies). 'This includes designing business models, strategy and a transformation agenda' (van der Bijl-Brouwer and Dorst 2017). Not only this constraint makes implementation out of reach for many design researchers that do not have the knowledge or the resources to design businesses, or simply do not wish to become entrepreneurs; they may also change the very nature of projects which, in order to comply with standard business model canvases, often derive and lose sight of their original intentions.

In short: innovation injunctions force prototypes that are still in their exploratory phase into sellable products, most of the times before their impact in terms of higher ends such as sense making, urban synergy, and *ecosophy*, has even been explicitly formulated. Here, I am gesturing towards a space for exploration through design practice in its own right, without a preconceived idea of value coming from innovation alone.

Significantly, such cultural barriers seem to have been around for quite a long time. In his account of early British cybernetics (Pickering 2010), Andrew Pickering reports that the *Fun Palace*, a groundbreaking interactive environment designed in 1964 by Cedric Prize in collaboration with Joan Littlewood and Gordon Pask, was never built for similar reasons, in spite of secured funding and considerable political support.

> The Fun Palace failed to fit easily into any of the accepted architectural categories. Not only did it deliberately aim to cut across the usual demarcations – combining the arts, entertainment, education, and sport in all sort of guises […] – the broader aim was to experiment: to see what might emerge from combining these opportunities in an adaptive space. This […] left outsiders to the project free to project their own nightmares on it […] and Littlewood's support dissipated in a fruitless search for a site. (Pickering 2010, p. 369)

Pickering stresses the fact that the designers faced the same problem over and over again: 'the sheer difficulty of saying what the *Fun Palace* was'. This brings us back to the question of language, of its limits, of dimensions of meaning that can be invisible to, or even obscured by, words.

13.5   Form Matters

In *Steps Towards an Ecology of Mind*, Gregory Bateson quotes Isadora Duncan who, in response to a question about the meaning of her work, declares: 'if I could tell you what it meant, there would be no point in dancing it'. Bateson's unpacking of the quote goes as follows: 'If the message were the sort of message that could be communicated in words, there would be no point in dancing it, but it's not that sort of message. It is, in fact, precisely the sort of message that would be falsified if communicated with words' (Bateson 1972, p. 137). The author drives attention here to the non-representative aspects of the work of art embedded in properties such as choice of materials, composition and rhythm. Quite provocatively, he makes his case through the example of Trafalgar Square lions, suggesting that a different choice of animals, such eagles or bulldogs, would not have significantly altered the meanings of imperial grandeur representative of nineteenth century's England idea of culture. But, asks Bateson, would that have been the case if the lions were made of wood instead of cast brass?

To conclude, I would like to update Bateson's language and say that the issue here is not even about message or communication, but instead, about reframing the situation through forms that 'polarize the world', setting the stage for entanglement. And this leads us to a new problem, coming this time from the art and design world. I believe most designers not to be aware of the specifics of their added value in a research context; a situation that makes their contribution far less productive than it could be. The 'data-as-information' paradigm inevitably leads to collapsing design's task into its sole representational dimensions. But design's most valuable potential lies not in the *representation* of data in ways that facilitate *readings* through engaging visuals; nor, as Usman Haque puts it, in 'making another piece of high-tech lobby art that responds to flows of people moving through the space, which is just as representational, metaphor-encumbered and unchallenging as a polite watercolor landscape' (Haque 2007, p. 57). Design's unique contribution lies in its capacity to structure a field of dynamic intertwinement, setting the stage for collective individuation. It is the individuation process itself that leads to new, unforeseeable discoveries.

Designing for the more-than-urban city, thus, is about creating the conditions for unpredictable urban events that reconfigure, renegotiate and reorient a wealth of relationships in such a way that the situation has a meaning. And if we consider meaning as something to be shared by a myriad of selves beyond humans alone, then representation as we, humans, understand it, fails altogether. Following C. S. Pierce and Terrence Deacon, Eduardo Kohn has argued that symbolic representation based on abstract signs such as the lions of Trafalgar Square, eventually go back to simpler, more direct, iconic meanings, and that such meanings, through a myriad of connections with past experience and embodied knowledge, become something larger than the icon itself and the meanings it stands for: clues for action (Kohn 2013). Driving examples from the tropical forest where his own research is situated, the author shows that, unlike symbolic reference which is a uniquely human feature, *iconic* and *indexical* semiotics are not reserved to humans alone, but instead, shared throughout the living realm. This fact suggests that closer attention to form *as form*, uncluttered from predefined meanings and appointed functionalities, could be an important key to building shared, entangled cities beyond the human.

From this perspective, meaning is not embodied, concealed within forms, but instead, emerges from them, in relation and in response to countless factors including the relationships that link forms together. It is in this sense that the digitally augmented city can become more-than-urban: through the setting-up of dynamic-constructive systems of forces, where human and non-human living selves experience 'a heightening of [their] own faculties', and become themselves 'active partners to the forces unfolding themselves' (Moholy-Nagy 1947, p. 238).

A new, constructive way of thinking and designing the augmented city based on what Andrew Pickering has called 'nonmodern ontologies', is needed. And, as the author stresses, to do this type of research work, theory is not enough. Nonmodern ontologies are necessary situated; they emerge from situated knowledge, situated practice and situated actions. Knowledge is situated insofar as, whilst not limited to practice alone, it is generated through practice, allowing for a global reconfiguration of the entire knowledge field, unmaking modern categorizations that conceal them within disciplinary silos and power clusters. Practice is situated insofar as it 'follows the generative flow of materials' and the 'sensitive consciousness of the makers', allowing researchers from diverse backgrounds to learn from each other and from the world, instead of learning *about* it (Ingold 2013). Actions, finally, are situated whenever they actively engage in individuation processes, 'ontological dances' within the field of tensions that makes the pre-individual urban reality. Only then are they truly interactive and conversational; only then they work towards, not against, the emergence of a more-than-urban city, one that takes interspecies communication and collaboration to radically new places.

The more-than-urban city does not end at the limits of what we consider today a great city, only better; it is not just improved urbanism, energy efficiency, or circular economy. It cannot be described through expressions such as 'community empowerment', 'enhanced biodiversity' or 'distributed democracy', for those are effects, not causes. While it is likely that such a city, should it ever come to existence, would provide quality of life and well being for all its inhabitants, measurable indicators

of such improvements will greatly vary from one place to another, for they will also be situated. The forms of such a more-than-urban city will radically differ from that of today's static settlements in ways that are still mostly unconceivable. Responsive to situated actions, regulated by adaptive, entangled living systems rather than by plans, they will bring about new forms of inhabiting space by means of continuous, ever flowing individuation processes, and transform urban life through augmented, entangled, collective consciousness.

References

Bateson G (1972) Steps to an ecology of mind. The University of Chicago Press, Chicago, p 137

Bergson H (1965[1896]) Matière et mémoire. Presses Universitaires de France, Paris

Bishop C (2004) Antagonism and relational aesthetics. October 110:51–79

Bourriaud N (1998) Esthétique relationnelle. Les presses du réel, Paris

Deleuze G, Guattari F (1980) Capitalisme et Schizophrénie 2. Mille plateaux. Les Éditions de Minuit, Paris

Dewey J (2012) The public and its problems: an essay in political inquiry. Penn State Press, University Park

Dunne A (2008) Herzian tales. Electronic products, aesthetic experience, and critical design. The MIT Press, Cambridge

Franklin A (2017) The more-than-human city. Sociol Rev 65(2):202–217

Gibson JJ (1979) The ecological approach to visual perception. Houghton Mifflin, Boston

Gooch D, Barker M, Hudson L, Kelly R et al (2018) Amplifying quiet voices: challenges and opportunities for participatory design at an urban scale. ACM Trans Comput-Hum Interact (TOCHI) 25(1):2. Special Issue on Reimagining Participatory Design

Guattari F (2000) The three ecologies (Translation by Pindar I, Sutton P). The Atholone Press, London. Original French edition (1989). Les trois écologies. Gallilée, Paris

Haque U (2007) The architectural relevance of Gordon Pask. In: Bullivant L (ed) 4D social: interactive design environments. Willey, London, p 57

Haque U (2012) Surely there's a smarter approach to the smart city? https://www.wired.co.uk/article/potential-of-smarter-cities-beyond-ibm-and-cisco. Accessed 5 Oct 2018

Haraway D (2016) Staying with the trouble: making kin in the Chthulucene. Duke University Press, Durham; Forlano L (2016) Decentering the human in the design of collaborative cities. Des Issues 32(3):42–54

Hoquet T (2011) Cyborg philosophie. Seuil, Penser contre les dualismes Paris

Ingold T (2007) Lines. A brief history. Routledge, London

Ingold T (2013) Making: anthropology, archaeology, art and architecture. Routledge, London

Kohn E (2013) How forests think: toward an anthropology beyond the human. University of California Press, Berkeley

Matter S (2017) A city is not a computer. Places J. https://doi.org/10.22269/170207. Accessed 14 Oct 2018

Moholy-Nagy L (1947) Vision in motion. Paul Theobald, Chicago

Moles A (1988) Design and immateriality: what of it in a post industrial society? Des Issues: Des Immater Soc 4(1/2):25–32

Moujan C (2015) Augmenting the bench. Intestices. J Archit Relat Art: Urban Thing 16:47–56

Mullins PD (2017) The ubiquitous-eco-city of Songdo: an urban systems perspective on South Korea ' s green city approach. Urban Plan 2(2):4–12

Pickering A (2010) The cybernetic brain. Sketches for another future. The University of Chicago Press, Chicago

Riegl A (2016) Le culte moderne des monuments. Sa nature et ses origines (French translation by Dumont M, Lochmann A). Allia, Paris. Original German version (1903). Der Moderne Denkmalkultus. W. Braumüller, Vienna

Rykwert J (2002) The seduction of place. The history and future of the city. Verso Books, New York

SenseCity Press Kit. http://www.ifsttar.fr/ressources-en-ligne/la-communication/espace-presse/dossiers-de-presse/. Accessed 13 Oct 2018

Simondon G (2013) L'individuation à la lumière des notions de forme et d'information. Jérôme Millon, Grenoble

Simondon G (2017) On the mode of existence of technical objects. (Translation by Malaspina C, Rogove J). Minneapolis, University of Minnesota Press, New York. Original French edition (1957). Du mode d'existence des objets techniques. Paris: Aubier

Suchman LA (1985) Plans and situated actions: the problem of human-machine communication. Xerox Park Research Center, Palo Alto

Tarde G (1999[1893]) Monadologie et sociologie. Institut Synthélabo, Paris, p 50

The bench project, a multi-stakeholder research project conducted by Clare Rishbert form the University of Sheffield, was devoted to shedding light onto benches' specific agency. Their findings are summarized in a Manifesto for the Good Bench. http://the-bench-project.weebly.com/manifesto.html. Research report. http://youngfoundation.org/wp-content/uploads/2015/11/The-Bench-Project_single-pages.pdf. Accessed 23 Oct 2018

van der Bijl-Brouwer M, Dorst K (2017) Advancing the strategic impact of human-centred design. Des Stud 53:1–23

Waites B (1989) Everyday life and the dynamics of technological change. In: Chant C (ed) Science, technology and everyday life 1870–1950. Routledge, London, p 31

Younès C, Goetz B (2010) Mille milieux. Le Portique, p 25. http://journals.openedition.org/leportique/2471. Accessed 23 Oct 2018

Carola Moujan designer and researcher, Ph.D, teaches digital design and design theory at École Camondo—MAD Paris and ESAD Talm. Her transdiciplinary practice combines commissions and self-initiated projects across diverse mediums and disciplines including graphic & interface design, photography, street furniture, artist books, connected objects, installation, information architecture, art direction and writing.