The Venice Variations: Tracing the Architectural Imagination

We had thought to use a universal category to authenticate a group of particulars, but the category has now been forced to cover such a heterogeneity that it is, itself, in danger of collapsing.

Rosalind Krauss, ‘Sculpture in the Expanded Field’

Venice outlived

For centuries Venice has been the locus of the imagination for architects, artists and writers, the living confirmation of the creativity of a society that, in the most inauspicious location, devised a city of unimaginable elegance and form. Nurturing creative inventiveness, Venice once managed to combine a collective talent for a spontaneous city-craft that could almost effortlessly adapt to unplanned improvisations with a keenly humanistic artistic intelligence that was consciously and precisely controlled. Although the driving forces behind the creativity of the floating city ebbed away centuries ago, it still represents a unique expression of human ingenuity and an enduring source of inspiration for the imagination. In exploring Venice’s urban networks, I proposed that the city invites engagement as much through its audacious siting and outward appearance as through its capacity to embody in its form a memory of the processes through which it evolved over time. As Venice expanded, the requirement for a duality of access by water and over land led to a network of elements amplifying the intensity of its experience. I also suggested that certain properties inherent in Venice’s urban form, such
as modularity, combinability and interconnectedness, are analogically present in Calvino’s *Invisible Cities* and Le Corbusier’s Hospital project. In this final chapter, I return to the fundamental question posed at the outset: What is it, both in Venice and in these other works, that inspires imaginative invention?

As we progress through the twenty-first century subject to totally different forms, requirements and modes of production, are there trans- ferable universal lessons to be learned about the architectural imagin- ation from Venice and its relationships with these other two artefacts? Why does Venice still engage us, in spite of our historical distance from the dynamic processes that drove its cultural and economic life? How did it inspire Calvino and Le Corbusier, enabling a translation and transformation of meaning into very different media? How does Venice reveal itself to the observer so as to so insistently stimulate imaginative engagement?

The discussion addressing these questions is conducted in three parts. The first focuses on a comparative examination of Venice, Calvino’s fiction and Le Corbusier’s Hospital to identify how Venice is revealed to today’s more or less contemporary observer, and how it was cre- atively interpreted through the other two artefacts. To explore these questions, I briefly revisit a key component emerging from the global analysis of Venice’s layout: the urban squares and their connections with the adjoining islands. The analysis of the city revealed that the locations of maximum strength in terms of interconnectivity relations are concentrated on the squares and the associated canal-crossing points. While the earlier analysis looked at the position of the squares in relation to the entire urban landscape, this section explores how the city reveals itself to the pedestrian immersed in Venice from these specific points of intense spatial and functional interaction. This examination can establish the link between the conceptual logic of the city as a whole and the perceptual realm of situated movement, thus explaining the interplay between global spatial cognition, embodied human perception and the material structure of the city itself.

The second part of the chapter opens up a theoretical discussion about the origin of architectural ideas, using the example of Venice and the two artefacts to investigate a crucial question: where do design ideas come from – the built world or the individual imagination? This question is addressed in the context of some conceptual categories that have influenced thinking about authored objects and authorless cities, such as built environments and possible worlds, imaginary and actualised projects. By exploring the association between ideas and places, this
discussion reveals an age-old binary relationship between the designer and their environment.

The third and final part suggests a possible resolution in terms of how to think of architecture and cities as engendering possible and actual worlds in an expanded interactive field, bringing them closer to the creative imagination.

The three artefacts

Venice

I had plunged into a network of little alleys or calli... Packed tightly together, these calli divided in all directions with their furrows a small chunk of Venice carved out between a canal and the lagoon, as if it had crystallised in accordance with these innumerable tenuous and minute patterns. Suddenly at the end of one of the alleys, it seemed as though a distention had occurred in the crystallized matter. A vast and splendid campo, of which in this network of little streets, I should certainly never have guessed the scale, or even found room for it, spread out before me surrounded with charming palaces silvery in the moonlight. It was one of those architectural ensembles towards which, in any other town, the streets converge, lead you and point the way. Here it seemed to be deliberately concealed in an interlacement of alleys...

Marcel Proust, *In Search of Lost Time*

As he explored how time affects memory, Marcel Proust engaged with the intersection between reality and recollection in each present moment. Memory for him was about elaborate fabrications, things that were ceaselessly changing, like his writing process, always being refined in the light of new knowledge. In his *Sojourn in Venice* he expressed this process through the discovery of a square he was led to through a series of alleys. This accidental encounter with the square triggered his imagination like the taste of the madeleine that set off the unfolding chain of associations at the start of the first novel. What in Venice engenders this process of discovery, through which the city with its structure and its history, perception and imagination are continuously formed and re-formed?

Whether newly arrived in Venice or acquainted with the city from previous excursions, the visitor often has to rely on a map, at least for a
part of the journey, to wend their way through the filigree of paths, canals and interlocking islands. Seeking from the multiplicity of possible routes a course to a specific destination, the eye relies on a synoptic view of the city as a whole before moving to topographical particulars, scanning the surface, moving from place to place. From close to, one encounters the interplay of three main constituents that combine in forming the topography of the city fabric: blocks, streets and islands. Yet, to mentally draw a path on the map of Venice by scanning its fabric is an impossible task, often resulting in arriving at a private courtyard, a dead-end alley, the water’s edge or a bridge leading to a private house. This is because the city challenges the typical pattern of a continuous pedestrian surface around blocks separated from vehicular traffic found in conventional urban environments.

Pathways in Venice traverse alleys, circumnavigate blocks, cross bridges and in a few cases trace the outline of islands. Venetian toponymy reflects the complexity and diversity of the urban tissue, often capturing its evolutionary logic: the *fondamenta* is a quayside, a strip of land between houses and canals; the *salizada* is an alley paved with cobblestones; the *calle* a lane, and the *ruga* and *rughetta* streets lined with shops; the *strada* is a wide street (like Strada Nova in Cannaregio); the *riva* is a promenade on the waterside, fronting an expanse of water (Riva dei Schiavoni in the Bacino); the *rio terrà* is a filled-in canal and the *piscina* a former pond. There are also pathway elements called *sottoportego* (a portico passing under houses) and *ramo* (a small branch). In addition to the *campi*, there are inner, more secluded, courtyards called *corte*, and there are of course the *Piazza*, the *Piazzetta* and the *Piazzalle*.

These diverse elements are fused into a network penetrating some 123 islands and interspersed with waterways. The pathways and canals not only comprise a uniquely diverse urban geography, as the extensive list of street names reveals, but also form a complex topology. Venice appears different to the waterborne passenger than to the pedestrian. It is possible to navigate among the islands on water, which gives access to many large buildings and palaces. In contrast with Amsterdam’s leafy canal banks, only two of Venice’s islands have a walkable perimeter. Some islands lack any quaysides at all, while a large number of islands possess only intermittent quays on short stretches of their external façades. Finally, a few islands have quays extending the full length of one, two or three sides. Surrounded by canals, islands in Venice are discrete entities but are rarely recognisable as such by the pedestrian.

This complex topology means that canals and streets are knitted together so that walking routes seamlessly weave between islands and
within islands, creating ambiguity and a multiplicity of borders. With
time, and aided by a map, one might eventually realise that there are
one or more squares on each island. Squares are located at the inter-
section between a canal and one or two primary calli, bisecting the
island from one side to the other in two or more directions. They often
appear suddenly, without warning or intimation; alternatively, the
pedestrian discovers that a square manifesting its presence from a dis-
tance at the far end of a dark alley is on the other side of a waterway.
Yet, as noted in Chapter 1, squares are pervasively connected through
primary pathways into a network (the foreground, consisting of ele-
ments that have the highest values of betweenness centrality or choice)
linking multiple islands. Pedestrians in Venice traverse squares joined
like beads on a string as they unknowingly pass from island to island
(Figure 1.14). The complexity of the city notwithstanding, mediating
between water and land, local neighbourhoods and the city as a whole,
the squares become significant aids to orientation and pedestrian
navigation.

Furthermore, as seen in Chapter 4, squares are situated at the edges
of islands, with one or more sides opening to a canal. They thus act as key
connectors in the entire urban landscape as well as linking islands. If the
urban structure as a whole captures the patterns of relations of all squares
to all others, focusing on the local-scale connections among islands can
explain the way the observer encounters transitions from island to island.
Moreover, examining the role squares play in these transitions can reveal
the link between Venice as an entire morphological construct and the
perceptual field available to the viewer who moves through the city seri-
ally, encountering these elements in a sequence over time.

Starting with the patterns of local connections, we look for notional
city blocks, as the smallest area forming a circuit and constructing
linkages between neighbouring islands. There are six taxonomies of
such notional blocks or island connectors (Figure 5.1a–f): a. Two-block
connectors. These are paths adjacent to the sides of blocks each facing
the interior of a different island (Figure 5.1a); b. Block-quay connectors,
which border the interior side of a block on one island and run along
a quay on the other or a square bordering the canal (Figure 5.1b);
c. Two-quay connectors, which run parallel to two quaysides facing each
other so that a walk covers the opposite banks of a canal (Figure 5.1c);
d. Extended block-quay connectors, paths that stretch from the quayside
of one island to the opposite quayside of another (Figure 5.1d); e. Extended
two-quay connectors, which link two external quaysides (Figure 5.1e);
f. Hybrid connectors, frequently joining several islands (Figure 5.1f). If
a. Two-block connector  
b. Block-quay connector  
c. Two-quay connector  
d. Extended block-quay connector  
e. Extended two-quay connector  
f. A set of different path connectors linking adjoining islands.

**Figure 5.1** Taxonomy of path connectors linking islands. Drawings by the author.
in general cities have a generic topology of walkable space that is physically, topologically and typologically homogeneous (blocks, streets). Venice consists of overlapping topologies (canals, alleys, blocks) which are heterogeneously defined.

This classification of path connectors (Figure 5.1) uses dimensionless elements encompassing all types of connections. Looking at how squares relate to these connectors, we focus on some actual examples. Figure 5.2a–h zooms in on squares selected from those having a strong value of choice in the combined network of streets and canals in Figure 1.15c. Campo San Fantin (5.2a) and Campo San Polo (5.2b) are each joined to their respective opposite island through a two-block connector. Being a waterfront square, Campo San Toma (5.2c) is connected to a neighbouring island through a block-quay connector. While Figures 5.2a–b are examples of single squares, there are cases where more than one squares found on adjoining islands are linked together in sequence. Examples are Campo San Stin and Campo San Agostin (5.2d), joined by a block-quay connector. A more complex arrangement is seen in Campo Santa Maria Nova, Campo dei Miracoli and Campiello dei Miracoli (5.2e). These squares are linked in sequence by two two-quay connectors. Campo Santa Maria Zobenigo, Campiello dei Callengeri and Campo della Feltrina (5.2f) form a series of squares on three neighbouring islands joined by hybrid block-quay and two-quay connectors. Campo San Giacomo dall'Orio, Campo Nazario Sauro and Campo dei Tedeschi are located on two neighbouring islands joined by two-block connectors (5.2g). Finally, Campo San Barnava (5.2h) has two block-quay connectors, each linking to an island on the opposite side of the square.

It is no exaggeration to suggest that one might feel overwhelmed by the sheer variety of paths, squares, buildings and forms multiplying and diversifying perceptions in all directions. Winding between squares, quays and alleys and crossing canals, paths in Venice are variably defined by the back side of a block on one island, the front side of a different block and a canal on another island; or two front sides and a canal; two back sides and no canal, and so on. To this variable perceptual field of routes across islands, we should add variations in length and width of paths and squares, light, shade and sound, all richly communicated by the wide-ranging vocabulary of squares and pathways.

Yet, by virtue of their being integral parts of the global structure and path connectors stitching islands together, squares feature strongly in the perceptual field as people negotiate routes between islands. They can thus be recognised as both local- and global-scale connectors. They are irregular in form, variable in terms of shape, size and orientation, and heterogeneous in terms of the topology of elements joining them.
Figure 5.2  Examples of squares linked by different types of path connectors. Drawings by the author
(a) Campo San Fantin (b) Campo San Polo (c) Campo San Toma (d) Campo San Stin and Campo San Agostin (e) Campo Santa Maria Nova, Campo dei Miracoli and Campiello dei Miracoli (f) Campo Santa Maria Zobenigo, Campiello dei Callengeri and Campo della Feltrina (g) Campo San Giacomo dall’ Orio, Campo Nazario Sauro and Campo dei Tedeschi (h) Campo San Barnava
with the surrounding areas. They also form little communities in their own right. They penetrate the dense urban mass, scooping out a volumetric void next to a waterway. They are adorned by a church front and a tower, one or more wellheads centrally located in the square, one or two bridges on either side arching over the canal, and one or two flights of steps establishing the essential communication with the water. Scattered among these landmarks, lesser, more mundane, activities flourish: cafés, restaurants, shops, newsagents and benches for gossiping locals, children playing, tourists resting on the carved steps of the wellheads, and boats unloading building materials, delivering supplies or collecting garbage (Figure 5.3). From the impressively ceremonial space of the Piazza San Marco to the quietest square in Venice, this choreography of human activities, routines and element-types repeats itself throughout the lagoon city.

Punctuating the intersections of alleys and canals and establishing global-scale connections, the squares of Venice act as crossroads offering alternative ways of moving through the dense urban fabric. They provide rich spatial information and varying perceptual stimulation, as, moving from the inner side of a block, one crosses a campo opening to a canal before launching into the interior of another island and encountering another campo. Squares are also centres of sensual stimulation, contrasting the dark inner alleys with their bright waterfront space where boats slice through water lapping the walls of a palace, church bells chime, passers-by pause to peer over the parapet of the bridge and the sound of steps rebounds on the campo’s hard surface. They awaken a multiplicity of sensations and awaken associations, related to congregations, offerings, time cycles, histories, chronicles, festivals, sadnesses, celebrations and records.

More importantly, the squares are the points where the intersection of the canals and streets meets the same ensemble of immediately recognisable element-types (church-tower-wellhead-palace-canal-bridge-steps-alleys-quays) all linked into a continuous pathway lacing together adjacent islands. Working as spatial, sensual and semantic crossroads and consistently defined through a repeated coalescence of activities, types and forms, the campi perceptually register as a stock of periodic...
composite structures. In the *Art of Memory* Frances Yates explains that ancient orators would aid their memory by visualising a path through a particular space, such as a palace, relating parts of their speech to spatial features and stringing them together in sequence. Venice’s squares act like ‘memory palaces’, recited vocabularies of phrases, a stylised language of repeated beats like units of rhythmic sound. Marking the intersections of the canal and pedestrian networks, they are strategic, at the level of both the global and the local structure. On the other hand, due to restricted vistas, heterogeneous and proliferating connections with other squares and islands, they can be approached from different directions. The memory of how a specific campo can be reached again is thus always altering, poised between poles of orientation and disorientation.

The architectural heritage of Venice is primarily the result of pre-industrial craftsmanship, where urban types, built forms and their relationships were the outcome of rehearsed practices of building and making. These practices constituted the collective competence of craftsmen using proven inherited methods and ‘designs’, collectively producing, and transmitting, the form of the city over time. Unlike standardised industrial processes of production, hand-making practices have a limited range of inputs in terms of rules, but engender a large family of outputs, each form being different from the next, yet similar, as the ‘genotype’ is shared. The genotype of a campo, for example, specifies the same characteristics in terms of spatial networks and the same composite structures, but the results vary in outward appearance. Equally, the genotype of connecting pathways varies from island to island according to local context. Joined in non-identical but repetitive visual formations, canals, streets, buildings and open spaces in Venice provide variations on themes composed from a large range of observed types continually engaging and surprising observers. The Venetian builders did not primarily create their language in an effort to produce an effect; rather they were interested in meeting practical needs. But the resulting schematisation of space, paths and built forms, in all their subtle variations, reveals qualities of artistic creativity, arching over several centuries of collective effort.

*Invisible Cities* and the Venice Hospital

Calvino’s *Invisible Cities* consists of city descriptions, in the form of discrete units linked into a network. The descriptions present cities as variable entities, each one having a different visual texture and appearance from the others. Cities are grouped into five classes based on numbers (from 5 to 1), eleven thematic rubrics (‘Cities and Memory’, ‘Cities and
Desire’ and so on) and nine chapters. However, individual cities are not limited to membership of a single category; for example, Diomira is part of the class of cities numbered 1, the thematic rubric ‘Cities and Memory’ and the first chapter. Furthermore, the thematic rubrics are interspersed among different chapters. ‘Cities and Memory’ for instance, is found in chapters 1 and 2, while ‘Cities and Eyes’ belongs to chapters 3–7. In addition to this pattern of overlapping memberships, thematic rubrics and city descriptions enter into multiple relations by virtue of containing conceptual symmetries, repeated elements, opposites or doubles. Enmeshed in thematic interconnections, the city descriptions evoke conceptual relationships, expressing variations of the four symmetry transformations in a tessellation. They thus activate cognitive operations in a lattice-like configuration, helping readers visualise the structure of the book as network.

By utilising discrete elements and the overlapping membership of elements among different classes, Calvino creates a large set of variable outputs, which, while not explicitly present, are indirectly embedded as possibilities in the system. The plotting of symmetry transformations on a diamond figure captures the construction of the text as a ‘digital’ algorithm, integrating combinatorial possibility with conscious intention (Figure 3.6). Readers of Invisible Cities can grasp the effect of preconceiving the overall structure of the work – available as geometric and numeric notation through the table of contents – but realising an enormous potential in the process of reading that guides and trains their imaginative processes.

Being mindful of limitations in analogic resemblance, we can suggest that, like the two networks in Venice (water and land), the 18 italic sections in Invisible Cities that form the dialogues between Polo and the Khan frame the narrative interspersed between chapters. At the numerical centre of the text – between chapters 5 and 6 – Polo describes a bridge stone by stone. This dialogue, and the one on Venice that follows, allude to Venice’s islands, linked by bridges. If the reader encounters cities through immersive reading, as the pedestrian experiences Venice’s islands, the interstitial material of the dialogues equates to Venice’s canals. It thus provides a foreground network of discourse, framing Polo’s descriptions of cities as expressions of human experience. I noted earlier that through these dialogues Calvino articulates the interaction between emporium and imperium, expressing Venice’s dual personality as both maritime emporium and naval empire; a point at which the respective tenets of multiplicity (Polo) and intelligibility (Kublai) are finally expressed. Calvino’s proposition is that, although the descriptions
of cities have their own independent existence, the dialogues illuminate them. Discourse and language are thus integral parts of the ways cities and architecture are experienced and comprehended.

The city descriptions can be seen as the ‘narrative blocks’, the stones of Venice, which by virtue of overlapping memberships establish multiple connections with other city descriptions across the chapters. In the same way that the squares of Venice comprise recurring urban-types and pathway-types, Calvino’s narrative consists of ‘multiform treasures’ (domes, stairs, springs, water clocks, precious metals) repeating across cities and chapters, and intermeshing connections (chapters, rubrics and numbers). When the reading path reaches Calvino’s cities, it encounters multiple intersecting registers, numerical, conceptual, topological, semantic, sensual and imaginative. Calvino translated the conceptual logic of Venice based on a syntax of topological dualities (canals/streets – chapters/dialogues) that overlap at crossroads (squares – city descriptions) into a work of literature, allowing alternative reading pathways and multiple combinations.

The Venice Hospital also comprises two intersecting structures: voids and walkable surface. I noted in Chapter 4 that Le Corbusier severed the close association between the networks of moving and viewing in classical architecture, creating an effect similar to the interaction between Venice’s pathways and the canals circumscribing the islands. This topological duality generates variable heterogeneous paths located either inside the care units or outside these units or both, like the connecting pathways joining Venice’s islands (Figures 5.1 and 5.4). What this topological duality means is that by virtue of adjacency relations, paths in the Hospital straddle three different categories of elements: voids (canals), solids (blocks) and square-shaped areas (campi). In addition, the networks comprising patients’ cells, square areas and pathways form the pinwheel scheme, a repeating standard configuration, like Venice’s recurring composite structures. The project seems to have the potential to generate a series of variable forms derived from the same local rules that govern its morphogenetic structure, something confirmed by the different design versions produced by Le Corbusier and Guillermo Jullian de la Fuente.6

The three artefacts follow a similar generative logic based on dual networks, composite structures, overlapping memberships of elements in two or more classes and heterogeneous types of connections. Calvino and Le Corbusier extrapolated the conceptual structure of Venice and creatively transposed it into a different medium and new construction. What they grasped was not simply the abstract logic of networks
and these properties inherent in the lagoon city, but also an algorithmic generative model, activating potential motion towards new, unforeseen configurations. Yet, we should acknowledge that the comparison of these works has limitations, as one is a work of literature and the others an instance of architecture and a city, respectively. If Venice is the outcome of collective human intelligence, *Invisible Cities* and Le Corbusier’s project are products of intentional, conscious activity by their authors.

*Invisible Cities* and the Hospital do not contain an intrinsic pre-conceived idea of the whole. This, however, does not mean that the whole is ‘mindlessly’ produced by the additive logic of local rules governing the joining of elements. Le Corbusier and Calvino conceive

Figure 5.4  Le Corbusier. Venice Hospital. Examples of different path connectors. Drawing by the author
the morphogenetic rules of the work in such a way that the work is not fixed or static but open, encompassing a great deal of generative potential. The aim is not to create formal unity but a system of unanticipated generation. The analogies between the three artefacts bring into sharper focus aspects of each that might not be directly perceived if they were examined individually. However, the differences among them are also important, showing that design translation is not a replication of the original but a creative interpretation.7

Hillier and Hanson specify the rules governing the morphogenesis of real-world settlements, named ‘beady rings’, and compare them to computer-generated systems.8 They explain that beady ring environments have a short description (‘short models’ or ‘p-models’). Short descriptions comprise a few elements and relationships capable of producing a long list of phenotypical outputs. In contrast, long descriptions (‘long models’ or ‘g-models’) embody numerous relations, specifying the position of each element in relation to every other in the system. Short models are aggregative configurations, ‘mindless’ of overall shape and form. Long models, instead, have a strong figurative nature, as their rules tend to preserve the dominance of few elements, manifested through the visual effect of shape, figure or contour. Long models apply rules hierarchically, adding extrasemantic information to a configuration corresponding to conceptual, social or ideological superstructures. If short and long models are two extremes in a spectrum of forms, the Hospital and Calvino’s fiction are situated midway between the two models. They combine the logic of self-generation with an overall framework, embedding bottom-up possibilities within the limits of a total structure. As for Venice, it is a clear case of an emergent logic found in short models, where rules satisfying local scale conditions produce over time variable local-scale configurations as well as global-scale effects.

Inspired by Venice, Calvino and Le Corbusier used the invisible structure of a city, a medium not conventionally considered as having similarities to literature or architecture. Venice for them was an abstract space providing abundant opportunity for heterogeneous categories – architecture, cities and literature – to be distilled into their essential characteristics; associated and translated into one another. Relying on these three artefacts, I discuss next how we can define the architectural imagination as a theoretical space, diversifying architectural knowledge; how to describe architecture, the city, and their relationship through multiple intersecting systems of authorships; finally, how to think of artefacts as having a real-world presence, such as Venice, and hypothetical projects, such as the Hospital, or even novels that can be appreciated only conceptually.
These questions impinge on the key issue as to where architectural ideas originate. What is the source of architectural form? Is form something that is generated in the imagination of the architect or is it embedded somewhere in the physical world? Is the generation of form a matter for the creative practitioner whose intellectual activity gives architectural products the status of authored objects, or is it the collective outcome of cultural processes and empirical contexts? Before exploring these questions, it is essential to discuss contemporary design discourse in relation to the ways it approaches the question of architectural form and its sources.

Objects and fields

In 1979 the art theorist and critic Rosalind Krauss wrote a seminal text entitled ‘Sculpture in the Expanded Field’. Published in October, the article was an attempt to interpret artistic practices, such as the work of Robert Irwin, Richard Serra, Richard Long and Donald Judd, that seemed to defy conventional categories. These artists, she claimed, expanded sculpture to being one among other structured possibilities available at the time, transcending differences between sculpture, architecture and landscape. Strongly reminiscent of Krauss’s arguments and terms, Stan Allen’s essay ‘From Object to Field’ promoted the conceptual, formal and material qualities found in aggregate configurations, which he named ‘field conditions’. In discussing phenomena ranging from flocks of birds to minimalist art, including a small number of building examples such as Le Corbusier’s Venice Hospital, Allen juxtaposed field conditions with object-oriented hierarchical compositions. Allen’s essay was largely a response to contemporary design practices, which, since the nineties, have been reconfiguring the disciplinary boundaries between landscape, urbanism and architecture.

I noted earlier that Le Corbusier’s Hospital featured in Alison Smithson’s essay on Mat-building. Prompted by sources as diverse as Krauss, Smithson and Koolhaas, Allen also used the Hospital as a key reference point in his essay entitled ‘Mat-urbanism’, re-theorising the distinction between cities and buildings. By bringing infrastructural concepts to design, such approaches have been expanding over the last two decades under the influence of complexity science and computer technology. Metaphorically referencing the natural forces of form generation, these paradigms argue for the formless configurations that Corbusier’s un-built project came to epitomise. From Smithson’s
concept of Mat-typology to Allen’s idea of field conditions, the Hospital has been categorized as a design that is unmediated by material sensory engagement and geometrical figural composition. Using the distinction between the long and short models discussed earlier, we can understand how these contemporary practices exhibit a clear preference for the generative logic of short models, often valorising their entrenched opposition to the figurative compositions resulting from long models.

These approaches to design were greatly influenced by Koolhaas’s entry for the Parc de la Villette competition (1982–1983), which sought to avoid a definitive architectural-landscape proposition, proposing instead a project that works as an instrument for unintended results. Thus the approach to architecture which emphasised the permanence of built forms and their cultural signification in the seventies has been superseded by design models that place primary importance on process rather than form, as a mode of evolutionary adaptation. This shift from the dominance of geometry to emergent patterns generated by local rules marks a turn away from the traditional idea of composition as the intellectual organisation of parts into a whole, to instrumentality, user activity, collective behaviour, interactive environments and the long-life performance of buildings and cities. It defines an instrumental turn, the foundations of which are implicit in Koolhaas’s ideas of ‘irrigating a site with potential’, a design logic described by Jacques Lucan as ‘architecture-through-process’.

If these paradigms replace static configurations with process-based operations, a different wave of reactions emerges to question the Modernist approach to buildings and urban plans as authored products. Prominent among the critics of Modernism, Jane Jacobs was the first to argue that, with their obsession with iconic buildings and mega-scale projects, architects and modern planners had failed to engage with the process of gentrification, the efforts of local communities to survive, the need for social diversity and the concept of the city as a dynamic field of interrelated forces. Since then, increased pressures to respond to environmental demands and the advent of digital technology have undermined and enervated long-held positions about architecture and its role in society. The technological innovations that have emerged since the nineties have contributed to this deconstruction. In the late twentieth century we witnessed the decline of the mechanically produced drawing as the locus of information in design and its supplanting by digital models of communication, enabling the ubiquitous transmission of heterogeneous kinds of information. These digital technologies integrate makers
and users into networks of co-production, termed ‘bottom-up architecture’.

In parallel with this conceptual sea change, a fundamental transformation in how designs are developed within a computational environment has brought the notion of emergence into the design process. Algorithmic geometries create evolutionary designs and generate forms of sophisticated complexity and variation. In evolutionary design, architectural concepts are expressed as generative rules, and the rules are described in genetic language. Computer models are used to develop prototypical forms, which are then evaluated on the basis of their performance in a simulated environment: ‘Very large numbers of evolutionary steps can be generated in a short space of time and the emergent forms are often unexpected’.

Since the design product is the result of an algorithm, if inputs into the algorithm are changed, the result is updated accordingly. As opposed to the traditional model of composition, presupposing knowledge of the design outcome based on parts–whole relationships, evolutionary design is bottom-up, ‘clear in its intentions but “blind” to the eventual outcome of the design process’. Overcoming the limitations of orthographic projection that had constrained and conditioned architecture since the Renaissance, architects have, theoretically at least, overcome the finality of the design object. With the exception of a small inventory of examples, never before has architectural imagination been freer to produce a theoretically unlimited range of forms and formal variations.

A different kind of recognition of architecture which is collectively produced was evident in Koolhaas’s Biennale in 2014 (The Elements), shifting away from the idea of authored buildings to a systemic view of market forces and technological transformations. These forces ‘mindlessly’ operate beyond preconceived architectural intention. This view has been a hallmark of Koolhaas’s approach ever since his book Delirious New York, where he interpreted Manhattan as a self-organising field maximising programmatic potential (Figure 5.5). Yet, while Delirious New York celebrated the un-authored creativity of the city, The Elements in the Biennale focused on market-based generators of buildings and their morphology, bringing about an absolute loss of context. Koolhaas’s proposition refashions architecture as an assemblage of elements. Such assemblages are evolutionary and ‘blind’ to the eventual outcome of design. In contrast, the model of design that has defined the profession since the Renaissance is strongly ‘mindful’, and in opposition to evolutionary process. Inspired by Delirious New York, Carol Willis termed the
skyscraper architecture of Manhattan ‘capitalist vernacular’. This characterisation might suggest describing Venice as ‘mercantile vernacular’, based on an early modern model of capitalism distributed across many centres and involving relatively small scales of action.

In its privileging of formal uncertainty, this approach to design, albeit facilitated by recent technological innovations, originally developed in the post-war period through proliferating experiments involving user empowerment, participation, interactivity, flexibility and adaptability as the main contributions of the architect. From Cedric Price’s notion of the architect as provocateur in *Fun Palace*, produced in collaboration with the theatre director Joan Littlewood, to Bernard Rudofsky’s romantic vision of ‘non-pedigree architecture’ (e.g. the pre-industrial vernacular), Christopher Alexander’s *Notes on the Synthesis of Form* and *The Timeless Way of Building* and Smithson’s notion of Mat-building typology, architects and theorists have been working to reconcile the idea of authorless architecture, existing for thousands of years, as a viable means to design with the idea of conscious architectural intention.

If old ideas are resurfacing in the form of fresh provocations, the things that have really changed since the sixties are the social, economic, environmental and technological factors, affecting agency in architecture. The design paradigms originally developed five decades ago and those appearing in recent years are both attempts to radically transform...
the design thinking architects have inherited from the pre-industrial and industrial mechanical past, which no longer seems meaningful in a context of social restructuring, rapidly changing technologies and economies of production. Yet, as Koolhaas’s Biennale has warned, in the absence of theories and tools, architecture becomes a practice without a theory, bereft of any capacity for critically influencing the decisions shaping social life. This is one example of how theoretical ideas seem to persist: on the one hand, there is a universe of spaces and forms without preconceived figurative order, contingent on algorithms and malleable through the participation of interactive users; on the other, there is an architecture of formal order and values. The former emerges over time, responding to an evolving set of parameters and functions. The latter is formed in the mind, shaping the environment from the inside out. One side in the debate sees design as falling within the influence of larger socio-economic or technological forces in an open-ended state of becoming. The opposition considers design to derive from its own unchanging autonomous operations. Since Vitruvius, the contrast between contingent and autonomous architecture has permeated practice and discourse alike, disguising the essential question of architectural form and its sources.

An age-old question

The discussion of the autonomous and the contingent problem falls into the category of existing binary philosophical problems. As Hillier explains,

it is no surprise that philosophers have been fascinated by architecture, since architecture is an actual-world application of philosophy. But if architecture had an overarching theory that addresses these binaries it would be as though it had solved all problems in philosophy at once.30

It is suggested that the aim in architecture is to see them not as formulas or problems to be solved, but as research questions, opening up possibilities, whether we are in a theoretical or a design mode. The question of the autonomous object and contingent context took an intensified form in the Renaissance with the flowering of architecture as a liberal art, clearly demarcated from artisanal building traditions. Are architectural knowledge and authorship found outside conscious architecture or
are they actively invented from within? This question translates to: What is the source of the architect’s design ideas? What is the origin of the architect’s knowledge? How does authorship work? I will explore these questions by looking at the logical paradoxes inherent in them. Using the three artefacts, I will discuss the logical structure of conscious architecture, as opposed to architecture untainted by conscious design intentions (characterised as ‘found’). I will also address artefacts that are factual, part of our empirical world of experience, and those that are virtual, constructs that exist only virtually through unrealised designs, works of literature, art or the collective imagination.

If we support the autonomous object, we accept that ideas originate within the architect’s mind and operations internal to design practice and discipline. If, on the other hand, we believe that architecture is solely contingent on external factors, such as socio-economic conditions, evolution, historical influences, socio-technical innovation or even chance, then it remains impervious to the discipline or designer. None of these positions alone seems sufficient to provide a convincing account of the source of architectural ideas. Mark Gelernter has asserted that ‘if a theory can explain the role of the creative author in the generation of form, then it cannot explain how individuals seem to fall under the coercive influence of a prevailing style or a predominant ideology’. Equally, if a theory accounts ‘for how architects attend the idiosyncrasies of context, it does not explain why they often generate versions of familiar forms throughout history for many different functions and contexts’. We can, of course, ‘pick and choose’, using one side or the other, or components from both arguments concerning the autonomous and the contingent object, but how can we avoid finding ourselves trapped in a narrow conception of design, particularly when the complexities of architecture demand rich rather than impoverished positions?

Gelernter argues that such problems originate in our philosophical heritage, and arise from a conceptual paradox deeply embedded in the Western system of knowledge. Known to philosophers as the ‘subject–object’ problem or the ‘body–mind’ problem, this dualism is responsible for similar confusions in many other fields, including psychology and the philosophy of science. The paradox has its origins in the innovations of the ancient Greeks, who devised a cosmological system to explain the workings of the universe that later evolved into a theory of how knowledge is possible, or, in other words, an epistemological system. This system suffered from a dualistic conception of the individual, allowing two simultaneous but mutually exclusive interpretations: on the one hand, the individual is a physical object in nature whose actions and behaviour are
completely determined, as with all other physical objects, by universal laws. On the other hand, the individual is considered as a creative subject, acting and behaving from their own personal desires and motivations, free from external influence. For Gelernter, designers identify themselves with the creative side of this equation, epistemologists with the opposite. The underlying ambiguity of the subject–object problem has allowed the two sides to meld together in the Western production of knowledge, producing theories of creation resembling theories of knowledge, and vice versa.33

Authored and authorless

Having discussed the autonomous–contingent problem and how it ties in with theories of design and theories of knowledge, I now move to the humanistic idea of modern authorship that marked the beginning of modernity in the Renaissance. This idea introduces into architecture additional oppositions: first, the superior status of architectural design to that of building-craft and city-craft and, more generally, to inherited, collective, non-authored and tacit systems of spatial production; second, the superior status of the design original to that of variations, to which the original might otherwise be subjected. With Alberti, the design of the building became the original, and the building its identical copy.34 Design might have a fluid state but for Alberti, when revisions stop, they should stop for good and forever. Yet, the Albertian model has deeper and wider repercussions than this. It confers the superior status of architectural design on buildings and cities as found, because they are mosaics of accidents, adaptations, adjustments, additions, subtractions, revisions and other errors, most significantly by lacking an identifiable author.

But we know, even if we do not know why or how, that architecture and found architectures, such as buildings, building assemblages, urban, sub-urban, peri-urban, landscape or infrastructural contexts, are not entirely separate from each other. In Hillier’s view,

we are bound up by the clear logic of various designs, but we also depend on exactly the absence of this. We delight in architecture produced by minds, but also in architectures, which are not produced by the ordering capacities of human minds, but emerge from the accumulation of unrelated acts of building spread over years.35
With the binaries of Koolhaas’s Biennale in mind, the problem of designed and emergent architectures entails the danger of another duality. Koolhaas’s exhibition drew attention to the gap between buildings that are architecturally conceived and those where authorship is diffused over multiple points of production. From planning codes and infrastructures to the absence of planning regulations in rapid urbanisation, there is a growing gap between the artistic aspirations of architects and the systemic operation of architecture as it happens on the ground. In the seventies, Tafuri claimed that capitalism had stripped architecture of its ideological purpose. Today the schism between architecture, land values and profit has turned architecture into ‘form without utopia’. But if architecture is to have social agency, we need to address social significance in both authored buildings and authorless cities and architecture. To this purpose, we need to better understand the difficulties entailed in the gap between authored and authorless as two separate types of production.

**Actual and virtual**

The autonomous–contingent question is also the source of the gap between the imaginative processes of the designer, generally considered as products of the mind, and the built products of design that only by virtue of being realised belong to the physical environment. There is a similar division between design and the analytic processes of the architectural researcher. The idea of architecture as authored autonomous object concerns the imaginative processes of inventing. In contrast, the view of buildings and cities as evolutionary processes is frequently at the core of scientific or technological approaches, which analyse existing environments in order to detect patterns related to functional performance that can be evinced as evidence to support decisions in design. I referred in the Introduction to space syntax, a theory and a method that describes the physical patterns of built environments in relation to empirical data of movement and use. Architects generate designs using concepts, often assigning attributes to places and social operations which they might not intrinsically possess. Empirical physical analysis, on the other hand, enables a building of patterns from the bottom up. Yet, clearly set apart from design conceptions, space syntax treats the built environment as though it is devoid of processes characterising conception, such as thinking, memory, imagination, representation and desire.

This binary consideration splits the architectural imagination into two camps, considering it either as a mysterious possession of the
creative individual or as an analysable property subject to the scientific process. This paradox has led to opposing world-views in design and educational theory, where architecture falls into the divide between the arts and humanities on one hand, and the sciences on the other. There is no obvious reason for conjoining the two approaches and fields into a single intellectual domain. As Philip Steadman explains, ‘the prevalent notion that to apply scientific or rational thinking in design must in some sense involve making the design process itself “scientific” is nonsensical and ultimately highly dangerous.’ However, as he also suggests, rational thought in research applied to design can significantly contribute by subjecting the products of design to scientific study. It is equally important to acknowledge that not all aspects of creativity are appropriate for scientific modes of inquiry. Yet, while design and scientific inquiry can remain intellectually and institutionally discrete, theoretically speaking, neither the autonomous imagination alone nor scientific knowledge is capable of explaining the architectural imagination as a particular kind of knowledge.

If the intention in analysis is to explain the world ‘as it is’, the purpose in architectural design is to explore a plurality of worlds, a complex system of different kinds of actuality, virtuality and presence. Whether situated in the actual world – the centre of our system of reality – or in hypothetical perspectives, design is a theoretical exercise that structures existing and alternative worlds as syntactic and semantic domains, each with their own modalities, combining many types of knowledge. First, there is direct empirical knowledge (Figure 5.6). If I happen to live in or have visited Venice, my knowledge of the city derives from direct experience of the empirical kind. Second, there is
encyclopaedic knowledge. I might have not been to Venice, but I know from the encyclopaedia that such a city exists, with such and such properties and qualities.\(^4\) We trust the encyclopaedia for our factual knowledge to the extent of producing faithful reconstructions in our mind from what we have heard or read. The trust we place in it extends to including places, events and states of the past existing only as memory fragments or those yet to exist, but which will exist in the future – a weather forecast, a new town or building, a project at the design stage or under construction.

The third type of knowledge is theoretical knowledge of the analytical kind, such as knowledge generated through the processes used in the analysis of the three artefacts. Theoretical knowledge in design concerns three things: first, the configurational logic in such artefacts; second, the evolution of this logic through history: how ideas travel through generations and how innovations are affected by historical circumstances; third, how systems and artefacts are thought of, taking into account the modes in which architecture is conceptualised. Seen together, these levels describe how complexity is organised in space and in thought, as well as how it evolves over time.\(^4\)

The fourth type of knowledge refers to the combinatorial world. This is knowledge of possibility, of variants consciously or unconsciously combined, expected or unexpected, realistic or imaginary combinations of elements, images and composite relationships, at multiple ranges, types and scales of magnitude.\(^4\) It contains typologies, morphologies and projects, including places visited in thought but not yet discovered or realised, such as More’s *Utopia*, Campanella’s *City of the Sun*, Cedric Price’s *Fun Palace*, Le Corbusier’s Venice Hospital and Calvino’s *Invisible Cities*.\(^5\)

These branches of knowledge intersect with each other, informing the multiform, potential and conjectural nature of design. The designer navigates memories, direct experiences and facts, repertories and territories of possible and impossible worlds that may be actualised, discarded, concatenated or remain in a virtual state. Alternative possible worlds have the capacity to influence the world of our experience and factual knowledge. In contrast to the analytic understanding of how instrumentality and functional reasoning proceed, analytic theories know precious little in any formal or spatial sense of alternative possible worlds, or how to design buildings that are functional, imaginative and aesthetically intriguing.\(^6\) Through the discussion of the three artefacts I will suggest that the diversification of knowledge is the most basic condition for understanding buildings and cities as products of analytical knowledge and imaginative design.
In exploring the morphological affinities among the three works, I have disentangled two main ideas: one is the idea of relatedness, referring to architecture as being about elements simultaneously entering into relationships with other elements, which our minds read and creatively interpret; the second idea is that generic relatedness refers to generic properties operating across different kinds of artefacts and systems of knowledge. In the first chapter, for example, I argued that the typological composite structure of squares is interlaced with intersections between canals and alleys in Venice. Squares thus become intensified and amplified in our perception as relational systems. In the second chapter I argued that the structure of the Piazza San Marco and the semantic relations embedded in the architectural and iconographic programme of this space are mapped onto the topological structure of the urban network. In the case of de’ Barbari’s map, I suggested that the network centrality of the Rialto and the Piazza is translated into geometric and semantic centrality expressed by the mythological figures. In Calvino’s *Invisible Cities*, the numerical structure and order of appearance of the thematic categories are mapped onto the linear series of city descriptions. When considering the Venice Hospital, we find that the network of squares and pathways is mapped onto Venice’s spatial networks, which consist of island squares and the street and canal systems.

Relatedness enables generic properties to perform two kinds of operation: first, construct multiple memberships of elements into different classes of relationships, or frames of reference, bringing about densification and perceptual intensification; second, undergo transformations and traverse boundaries between categories (architecture and the city), discursive and non-discursive formations (architecture and literature), one type of structure and another (topology and geometry), actual sites and representational signs, signifiers and the signified. When a pattern is perceived in two self-consistent but different frames of reference, it registers simultaneously in two different classes of elements regulating different kinds of relationships. If the squares of Venice are parts of a conceptual class of elements, we can call the network properties relating the squares to a network the *syntax-of-a-class*. We can name the composite structure of elements constituting the squares (open space-churches-bridges-canals-steps etc.) as the *form-of-a-class* (*Figure 1.14*). Registering simultaneously and repeatedly in these two types of relations, the squares become amplified in our perception as typological, morphological and syntactic structures. In *The Act of Creation*, Arthur Koestler describes this
phenomenon as ‘bisociation’. We can then suggest that relatedness is generic enough to enable bisociations in which the same elements are simultaneously drafted into different class memberships, or categories, by virtue of being governed by different relations. Relatedness also enables bisociations through patterns that link two different associative contexts, such as the context of network properties of Venice (the syntax-of-a-class) and that of the abstract structure of language in Calvino’s network of city descriptions. In the case of Venice and the Hospital, this structure is decoded in our perception onto a network where the perceiver can work backwards, fitting in the links between the associated classes of forms and spaces. In the case of Calvino’s fiction, relatedness refers to the ways in which strings of words, text, paragraphs or chapters are translated into a web of thoughts, recovering the links between associated concepts in the form of a network.

We may think we know what architecture and literature are about, but using relatedness within a particular medium, system or properties domain, and associative logic across media, writers and architects like Calvino and Le Corbusier expand the boundaries of their disciplines outside normative definitions of literature and architecture, respectively. The media, ontologies or categories I refer to are mapped in Figure 5.7, registering a set of binaries into a quartered field expressing the opposition between them while simultaneously opening it along the intersecting axes of authored and authorless, factual and virtual domains. Architecture, the city and literature thus become logically expanded structures, capturing alternative intersecting types of authorship and reality. The horizontal axis in the diagram plots the variance of artefacts based on whether they are built (factual) or un-built (virtual or imaginary). The vertical axis locates variations of artefacts along the designed and non-designed (or found). The three squares in the diagram capture differentiation of scale to include buildings, building complexes, cities and landscape.

Taking Venice as an example in this illustration, works by architects such as Palladio, Sansovino, Codussi and Scamozzi are found in the top right corner of the diagram, representing the production of built authored designs. Venice is at the bottom right corner of the smallest rectangle corresponding to cities, as the outcome of evolutionary collective authorship. The Venice Hospital is found at the top left of the figure by virtue of being a designed building complex that was not materialised. The places Polo describes in Calvino’s Invisible Cities – complete by its own measures – and ideal cities such as Sforzinda by Filarete fall into the same quadrant as the Venice Hospital. They are
characterised by ‘design’ intent but are only mentally accessible as creations. In contrast, cities like the ideal city of Palmanova occupy the opposite quadrant, having been built as a planned city for military purposes in the late Renaissance for the Venetian Republic. Products of collective mythology, such as Venice’s collective myths, which were later formalised as The Myth of Venice, also have a place in this structure. This is found in the bottom left quadrant as legends, stories or beliefs held among people, which correspond to the collective and unconscious production of ideas in society. Finally, there are hybrid
cases such as speculative architecture, which fall onto the right side of the x-axis, being consciously designed by architects but lacking intentionality of the architectural kind. Similarly, designs conceived as algorithmic models through collaborative authorship in a digital environment (and remaining virtual informational models) belong to the left side of this axis.

This diagram can feature as recombinant taxonomy, capable of generating hybrid versions. The various transformations of the Piazza San Marco are an instance of this possibility. What was combined in the Piazza was the authorless ubiquitous typology of the Venetian square evolving over an extended period with the authored interpretation of this square as the ancient typology of the Roman forum. Kublai Khan’s palace and gardens in *Invisible Cities*, where Polo and Kublai have their italicised conversations, are historical and fictional places both in Calvino’s novel and in Coleridge’s poem (*Xanadu*). These spaces form another instance of recombinant transformation where ideas and forms are borrowed from history by virtue of the writer’s imagination being informed by the collective imagination and vice versa. Even though this diagram constitutes a simplification, there is no reason for not imagining a term that would encompass both landscape and architecture. This term has in fact been imagined by Krauss in her concept of sculpture in the expanded field. Even when Krauss suggests that our culture has not been able to conceive of the expanded field, it can be argued that various architects and artists have thought of it in the past. Alberti, Palladio and Le Corbusier, for example, performed an imaginative analogical translation explaining that a building is a small city. Abstract, generic relatedness allows analogies and translations to be formed in the combinatorial expanded field. Like Lull’s thinking machine, algorithmically combining principles in the pursuit of new knowledge, relatedness and combinatorial expansion of the field are demonstrations of the imaginative elasticity of media of expression.

Once we have the concepts of multiple alternative authorships and relatedness, we can begin to see how society and culture insert themselves into the form of the designed and the found, built and unbuilt architectures or objects. The example of the Hospital can help us understand how found architectures such as Venice infuse conscious architecture, and what the latter adds to them: abstract comparative knowledge of the designed and the found. Comparative knowledge is raised to the level of conscious reflective thought, and made the object of creative attention and innovation in a field of possibility expanded by this mode of thought. The example of *Invisible Cities* shows the generative effect of preconceiving the general structure of the work (in the
form of the diamond shape), but releasing a vast potential that trains the imagination of readers. The combinatorial aesthetics in the Hospital and Calvino’s *Invisible Cities* is neither total nor local, but an amalgamation of intentional design with rules that are generative and systemic. The three examples demonstrate that ideas travel from the external world of artefacts to the mind and back to the world again through creative transformation. In response to the question of the source of architectural form, the Hospital and *Invisible Cities* originate neither inside nor outside the creative faculties of the author, but in the interaction with the world, whose logic the mind retrieves and translates into new patterns.

**Possible worlds**

‘I have also thought of a model city from which I deduce all the others,’ Marco answered. ‘It is a city made only of exceptions, exclusions, incongruities, contradictions. If such a city is the most improbable, by reducing the number of abnormal elements, we increase the probability that the city really exists. So I have only to subtract exceptions from my model, and in whatever direction I proceed, I will arrive at one of the cities which, always as an exception, exists. But I cannot force my operation beyond a certain limit: I would achieve cities too probable to be real.’

Italo Calvino, *Invisible Cities*

I have discussed the imagination as an abstract space of relations capable of associating matrixes of relations and translating them from one ontological category and medium to another. I will now return to the role of Venice in the creative imagination and the question posed at the beginning of the book. How does Venice stimulate imaginative reflection? A city like Venice appeals to the imagination for multiple reasons, and this book does not claim to exhaust them. However, the creative affinities between the three artefacts can explain the potency of the city of Venice itself and the two works to stimulate imaginative engagement. I argued that Venice, *Invisible Cities* and the Venice Hospital share the characteristics of a modular system based on discrete elements and recombinant network-like generative rules. These characteristics facilitate recognition of combinatorial universes and their embeddedness into networks of relationships.
In her study of narrative theory and possible worlds, Marie-Laure Ryan explains that ‘the complexity of a plot depends on an underlying system of purely virtual embedded narratives [...] contained in dreams, fictions, fantasies and belief systems conceived or told by characters and any kind of representation concerning past and future states and events’. Among these embedded narratives, some reflect events from the factual domain, while others delineate un-actualised possibilities. The aesthetic appeal of a plot is a function of the richness and variety of the network of virtual sequences, the narratives produced by speculative activity and promising plot lines. A plot is, therefore, not simply the textual world depicted in the narrative, but a larger and more complex universe capable of being actualised or remaining virtual in readers’ minds.

Like every multi-permeable urban system, Venice’s spatial network affords many ways to connect points in space and time, as it can be expressed by a graph of interconnected nodes, encapsulating movement choices. What make Venice unique, though, are first, the networks of pedestrian and aquatic routes, which intersect and separate from each other; second, the combinatorial syntax of element-types; and third, the heterogeneous nature of its space, which consists of variable overlapping registers. As the canal network intersects with, and disrupts, the street pathways, any path from A to B contains interruptions, suspensions, sudden turns, and ups and downs, resulting in sequence networks produced by embodied activity and virtual networks produced by speculative activity in the mind. Arriving at a dead-end at the water’s edge, one is forced to think of alternative routes to the one followed, linking the starting point with possible ways to move, actively intersecting actuality with possibility in the mind. The shortest and most frequently crossed paths intersect in the urban squares, revealing their nature as crossroads, as combinatorial universes of urban elements, actual and hypothetical routes over land or water.

Due to the tortuous network of short streets, squares in Venice materialise unannounced, enmeshed in the convolutions of canals and alleys dissecting the islands. Pedestrians anticipate another square emerging along their path, yet cannot determine whether or not it will be one previously experienced. This fleeting appearance and disappearance of campi assumes the character of a recollection, fluctuating and unstable, like a phantom. With time spent in Venice, the fleeting, newly discovered places and those remembered begin to mingle in perception. From Venice’s squares, imagination and memory set forth, creating multiple Venices of pathways taken in actuality and in the mind, combining
the explanatory function of intelligibility with the exploratory function of excursion, and the larger imaginative functions of prediction, projection, hypothesis, interpretation, correct and erroneous inferences, un-actualised plans, previous experiences, recollections, encyclopaedic knowledge and desires. All of these universes inform our knowledge, calling into question the distinction between the actual and the possible and casting them all as forking paths on the actual map, thereby multiplying the size and diversity of territories travelled in the imagination.

In search of the irretrievable past, the hidden space in memory where time stops, Proust intuitively recognised the fictional nature of memory and imagination, which were inextricably related to some of Venice’s most basic properties. Having ‘plunged’ into the network of little *calli*, he came across a ‘vast and splendid *campo*’. Not able to find it again, he wondered whether he had visited it only in a dream.

And as there is no great difference between the memory of a dream and the memory of a reality, I finally wondered whether it was during my sleep that there had occurred, in a dark patch of Venetian crystallisation, that strange mirage which offered a vast piazza […] to the meditative eye of the moon.

Proust seemed to have grasped in the complexity and plasticity of Venice’s networks its capacity to affect the plasticity of memory and imagination. As studies in modern neuroscience have revealed, memories are malleable, continuously in the process of being modified: ‘The novel and the life, the journalist and the fabulist, are really hopelessly blurred together’. Proust likes it this way because that is how memory actually is. The potential of a city, building, landscape or novel to stimulate the imagination depends to a great extent on what is there, that is, its properties, perceptual qualities and associative logic. It is argued here that it also depends on the alternative pathways through which a place is accessed in our imagination. The memory of a particular place we have recently experienced is revised on the basis of the alternative routes we have approached it from, adapting it to what we know, and what is possible to know, each time.

This diversification of knowledge and possible combinatorial universes constitutes the most basic condition of dynamic generation of meaning. It also explains the intersection of analytic with generative knowledge. If generative knowledge concerns the production of variants and possible worlds, analytic knowledge restricts or limits the range of possible worlds conceivable in design. If we ascertain the impossibility of certain universes in relation to our past experience, or that they do not
correspond to what encyclopaedic and analytical knowledge hold to be the laws of reason, we are, at this point, involving external criteria not only to discriminate against the results of the *ars combinatoria*, but also to introduce constraints within the art itself in order to control and limit the possibilities of the system.  

Analytic theories are based on the recognition that the generation of possibility is restricted by the laws of some generic functions, such as intelligibility, movement and occupation. In this respect, Hillier and Hanson’s theory, used to inform this analysis, is not specifically architectural, that is, relating to generative potential, but is an analytic theory of social performance and realisation. However, the intersection of analytic and generative knowledge in design is the engine for produ-
cing un-actualised possibilities and evaluations according to the laws of reason. Even when the outcome of a work explicitly highlights one type of knowing rather than the other, as when the designer engages with generation, or the analyst with explanation, reflective activity always annexes both kinds of knowledge. Designers enable the possible to become the actual by surmounting limitations imposed by laws of necessity or reason. Theorists and scholars enumerate possibility and explain how we arrive at the actual by rational processes. The *reflective designer* and the *creative theorist*, on the other hand, identify both possibility and the laws needing to be contravened for design to engender new knowledge, thus locating the crucial creative space between necessity and freedom. Analytic and generative knowledge are central in design and theory, as each allows access to worlds whose centres of reality are not discrete, permanent and static but interacting and shifting dynamically with the processes of creative activity and time. In a nutshell: in addition to theories of explanation and generation, we need a combined theory of freedom and necessity in architecture and design.

**Voyage to Venetia**

I have, in this book, described Venice as a story of urban form encapsulating the imagination in its spatial properties of growth and combinatorial worlds, containing a memory and an algorithm of existing and unforeseen generation. At the beginning of this work I explained that, present problems aside, Venice is like the ancient artefact of epic or myth, a tapestry of forms and fantasy folk tales where the theme of multiplicity develops its variations. In closing the book, I would like to return to this not so improbable analogy between Venice and epic narratives, which,
like Venice, have survived through the ages and which we treasure, partly because we seem to have lost the ability to produce their contemporary successors.

It is no accident that, among the legends entertained by the Venetians about their origins, one lineage of stories traced their heritage from Trojan warriors, who had supposedly found refuge in ‘Venetia’ after the sack of their city by the Greeks.\(^{59}\) The founding of Venice for the Venetians was attributed to a multitude of disparate fabled origins, partly touched upon in the second chapter and all, of course, unsubstantiated, but this is not the point. What is of significance here is the idea that the distant memory of the voyage of Ulysses or Aeneas marked the mythical founding of a city that developed through processes of artisanal craftsmanship similar to the way an improvised oral poem, recited from memory, incorporates fragments of narrative already sung by others. As Calvino explains, Ulysses’ voyage to Ithaca or Aeneas’ to Rome – or, I may add, to Venetia, as Venice was called in the era of its founding – is in essence a voyage to utopia, a past we have irrevocably lost but need to recite from memory as an aid to moving forward to a better future.\(^{60}\)

This mythical voyage to utopia has other crucial characteristics: it is densely loaded with recognisable forms that multiply their own space at every turn; it is diverse, sung not by a single but by many ‘bards’, a fusion of different origins by many hands and minds; it is a merry-go-round of inventions of fun and freedom by ‘gods’, ‘heroes’ and ordinary people, their harsh experiences of pain, horror and anguish notwithstanding. For the bards of antiquity, who sang poems without a song sheet, the risk of forgetting must have made theirs the most precarious form of existence. The future we must strive to achieve is made possible by creating afresh at every occasion the memory of what has gone before, extemporising with whatever variations inspire on each occasion. This is what also inspires the imagination in Venice – from tourists, consuming what the city offers for them to see, to ordinary Venetians caught between modernity and ancient tradition; and from the visitors to international exhibitions to the pilgrims still paying annual visits to Santa Maria della Salute and the Redentore to give thanks for the ending of the plague.
Notes

Introduction: Between authored architecture and the non-authored city

17 Many cities include examples of traditional, classical and modern structures but, due to restrictions imposed for historical conservation purposes and its fixed outer boundary limits, Venice comprises the most intense and striking expression of these three periods.
21 Calvino, *Six Memos for the Next Millennium*, 91.