Is there a normative science of the built environment?

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> *The classical pragmatists, Peirce, James, Dewey and Mead, all held that value and normativity permeate all of experience. In the philosophy of science, what this point of view implied is that normative judgments are essential to the practice of science itself.*
>
> Hilary Putnam (2002)

Introduction

The notions of value and normativity are central to the topic of this volume in a number of ways. The brief to the authors, as should be clear, was to state a morphological view on the processes of city building and to provide an example of how that view is expressed in design. To give a view and illustrate its expression as a design is to make a statement of values. Design is a fundamentally normative practice. We put forward what we think ought to happen based on a set of implicit or explicit values both about the design itself and the way that it was generated. What the quote from Hilary Putnam above suggests, however, is that values and norms are just as relevant to another topic of this book: that, 'urban morphology aims at scientifically describing the physical form of cities, explaining how different agents and processes shape this form over time…'. Putnam's point, and that of the authors he cites, is not that the permeation of science with values and normativity therefore renders it hopelessly subjective but that we need to be clear that science is built on a set of shared values. We can then be clear when and where we are exercising our values and, ideally, openly express them.

To that end and to provide an initial point of reference, it is worth providing a kind of position statement for this chapter in relation to the overarching theme of the book. In particular, it relates to the questions of whether urban

morphology is a scientific, ‘objective’ endeavour and whether it can, at the same time, be a basis for design principles.

Urban morphology should not be 'for' or 'against' any particular period, principle or style of architecture or urbanism - even if some important contributors to the field are or have been motivated by the perceived failures of twentieth century Modernist architecture and urbanism. If urban morphology is to be scientific and objective, which I believe it should, it cannot take sides. It has to remain objective and describe and explain all forms created and the processes that create them - including the 'ruptures' that are common to all natural history. Once we have done that, then we can make judgements, not as urban morphologists *per se*, but as individual architects and urbanists working in a particular time and context. This situation is, in my view, one of the central reasons that the ‘bridge between morphological knowledge and action on the city has never been made robust'. If urban morphology *as a discipline* advocates for a particular principle or style *and* claims objectivity, there is a deep seated, internal contradiction. We cannot have it both ways. This is not to say we cannot use objective, scientific methods to determine how particular forms and configurations perform with regard to particular social and professional aims and preferences but we can only do that 'objectively' by being open and clear about the particular social aims and preferences - which may or may not be shared across a population. Indeed, one of the criticisms of Modernism was that its principles were claimed to be Universal.

The description-prescription problem

From here, the question might then be raised, can design principles that generate ‘good form’ be scientifically derived and if so, on what basis? A further question might be whether such principles could be universal.

The common objection to claims that design principles, universal or not, can be scientifically derived is the ‘naturalistic fallacy’. A version of the argument goes something like this.

There is nothing in the existing state of cities that determines how they either will or _should_ be built in the future. As much as we might study cities, they cannot ‘tell us’ what to do next. We always have to make a choice. This is the description-prescription problem, which is a version of the is-ought problem in philosophy as identified by David Hume (1964), sometimes referred to as the naturalistic fallacy.

Even if we consider cities as a ‘quasi-natural’ phenomenon, there is no logical certainty in moving from observations to predictions due to the problem of induction as again identified by Hume (1964). As formalised by C.S. Peirce, the move from observation to prediction is necessarily made by ‘abduction’ or hypothesis but remains uncertain. As further developed by Popper, any hypothesis can only be refuted and not *proven* by subsequent induction.

And such a shift to the ‘natural’ perspective, even quasi-natural, can contribute to the toughness of the description-prescription chestnut. The fact that cities and the societies that build and live in them have been the subject of various fields within the social sciences for many years does not resolve the description-prescription problem. Nor does the emerging notion of a ‘science of cities’ (Wilson2012, Batty 2013, Mehaffey 2014a and b). However much the development, growth and transformation of cities can be seen and modelled as complex adaptive systems and a problem of organised complexity, cities remain, inescapably, human constructions based on human choices. For that reason, cities sit firmly in the realm of the is-ought problem and so the realm of ethics. But in stating that point so bluntly, objections immediately begin to arise. So, perhaps the toughness of the chestnut is a function of the categories rather than the phenomenon itself. We seem to be unduly bound by thinking of urban morphology as either a purely ‘objective’ discipline or a matter of preference, design and ethics.

This issue is at heart of the point made by Putnam when citing the classical pragmatists. The quote is from a critique by Putnam of the the fact/value dichotomy that puts facts on one side and values on the other and never the twain shall meet. Putnam argues that the strict dichotomy is a false one, but as he goes on to state, the acknowledgement that facts are permeated by

values does not result in a distinctionless soup of subjectivity. Rather, it clarifies that there are distinct sets of values. There are, on the one hand, *epistemic* values and principles that define what we consider to be good descriptions of the world and, on the other hand, there are ethical and aesthetic values. The planning and design of cities falls within the ethical realm on the basis that planning and design is predicated on what is 'good' from a human perspective and involves human action that in some degree requires justification within a group.

That is to say, we use different sets of values for deciding 1) what is a good, objective description of urban form and 2) what are good forms to build and use in particular circumstances for particular purposes. There are different criteria we apply in determining what is an accurate description of urban form and which forms might work best for a given human activity. Which begs the question as to whether there might be a 'scientific' basis for deciding which forms to select for a given project. As it happens, one of the pragmatists cited by Putnam, C.S. Peirce, put forward the concept of Normative Science.

> *Normative science considers the phenomenon only so far as it can be controlled, compares purpose with performance, and ascertains the general principles of the relation between them.* Peirce 1983

Urban morphology and a normative science of ethics

As a basic notion, the idea of Normative Science would seem to offer a way over the apparent impasse of the description-prescription problem. The first step is to openly acknowledge the normative basis of the endeavour, the second is to focus on purpose, performance and the relation between them. The obvious question is then how such a normative science would work in more detail and in particular a normative science of the built environment. Peirce himself did not fully elaborate the idea but a further exploration of the implications of a normative science of ethics has been set out by the philosopher James Jakób Liszka (2014), also drawing on the work of John Dewey.

A key starting point in Liszka's account is the Peircean conception of purposive, goal-directed behaviour.

> *If normative claims are about what 'ought' to be done, then for Peirce, "the word 'ought' has no meaning except relatively to an end. That ought to be done which is conducive to a certain end". Given an end, one can measure whether actions have either achieved it or not.* (2014, page 463)

Liszka then concludes that,

> *the basic elements of purposive behaviour are the end desired, the means believed to attain that end, and the actions taken in that regard.* (2014, page 463)

Going further, Liszka points out that there are two types of 'normative claim': 1) claims about which is the best means to achieve a particular end, and 2) claims about which of the different ends is best to achieve?

The need for the distinction arises because there are many ends that might be pursued, some of which may overlap or conflict.

> *An ideal of conduct or an end worthy of pursuit is one that is consistent with other ends or ideals considered worthy of pursuit Negative approach to ' good results from the reduction of faults, limitations, and problems with current practices… The pursuit of any end is always within a network or system of ends which are also being pursued'* (2014, page 473)

A further consequence arises with the acknowledgement of a plurality of potentially conflicting ends, in particular when the aim is to achieve a 'reasonable' overall position. Seeking such a position forces one to generalize the ends to a point where the 'ultimate good' (*summum bonum*) cannot be fully articulated in advance. Rather, the result is to shift from a 'positive'

approach to a 'negative' one in which, 'there is no predetermined ultimate end, but good results from the reduction of faults, limitations, and problems with current practices. (Liszka 2014, p 474).

As Liszka points out, Peirce conceived of this as a process of *evolution*. Characterizing the point further, he quotes Beverley Kent,

> *"[Peirce] refused to grant that the aesthetic ideal must be a static result. By admitting process, Peirce was no longer limited to a self-satisfied ideal. He could adopt an end that would always anticipate an improvement in its results" (p. 154). The goal in this case is not to perfect an ideal, but to make things better.* (Liszka 2014, p 475)

In adopting a negative approach of 'making things better' the focus shifts to a process of identifying problems and generating hypotheses about how best to solve them. In making that shift the process also becomes one that satisfies the criteria of scientific enquiry.

> *Making things better, intuitively speaking, involves making things that are problematic less so. That involves solutions to those problems. Proposed solutions to problems are, in fact, abductions—in Peirce's language—hypotheses about changes in practices that will result in ameliorating the problem. Just as in scientific practice, problems and anomalies with existing hypotheses become the impetus for their resolution by new hypotheses that are then inductively tested, so proposed solutions to existing practices become practical hypotheses that could, in principle, be subject to testing.* (Liszka 2014, p 475)

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More particularly, citing Dewey, Liszka adds that,

> *In the context of means-end conduct, there are two types of inquiry to consider, inquiry into the lacks, conflicts, and problems of the existing situation, and second, inquiry into whether the means hypothesized will resolve those problems and satisfy the lacks. Using Peirce's language,*

> *abduction is the reasoning involved in the first sort of inquiry, while deduction and induction, the reasoning involved in the second sort. Thus, in principle, normative issues are subject to the same sort of reasoning as scientific ones.* (Liszka 2014, p 476)

Going back to Peirce's generalized characterization of normative science as involving purposes, performance and the relation between the two, it is possible to paraphrase and elaborate the above quote. The purpose, in Peirce's terms, is to resolve or ameliorate the conflict or problem and the performance is the extent to which a means hypothesized to resolve the problems is satisfactory. The relationship between the two is a two-step process.

The first step involves: the 'irritation' of a problem or problems and the identification of a purpose:, a survey and assessment of the issues involved in the problem to refine the purpose; a search for possible solutions; the selection and putting forward of a solution as a means to resolve the problem (abduction or hypothesis); mentally (or by models and simulations) working through the potential implications of the hypothesised solution and making adjustments as necessary (deduction); comparing the proposed solution against established measures and/or other successful examples to check for anticipated performance and potential issues and making further adjustments as necessary (induction). The deductive and inductive steps are checks on the performance of the proposed solution in principle .

The second step involves: selecting the final 'design' for the solution (hypothesis/abduction); putting the solution into action (e.g. constructing a building); working through any issues arising at the outset such as unresolved details, implementing corrections as necessary (deduction); putting the solution into full operation; assessing its performance on the basis of ongoing experience in comparison with the initial aims and objectives (induction).

Finally, Liszka raises a point about the operation of normative claims or rules within the context of practical reasoning. In simple terms, practical reasoning involves the desire or intention to achieve some end, the belief that undertaking a particular course of action will achieve the end and the decision to undertake the action. What Liszka points out is that the *schema* of practical reasoning provides a basis for both explanation and justification for actions.

To paraphrase (2014 p 469), practical reasoning provides an explanation for action by laying out the motivation of an action, which is the belief that the action will achieve the aim. Whether it is a true belief or not does not alter the explanation but it does affect its justification. Following a mistaken belief still explains an action even if it does not justify it. Once a given action has been established to lead successfully to a particular end, it can then be used as a justification for what *ought* to be done if that is the desired end. It can be come a normative 'rule' (though always subject to further meta-rule that success may be contingent on a wide range of variables that may not always be in place or change over time).

In summary, the key elements of a framework for normative science are that,

- It is conceived as an ongoing, evolutionary process
- The process is prompted or invoked in response to a perceived 'problem'
- There are three main elements that come into play in response to a problem: the desired end or purpose (a resolution of the problem), the means believed or claimed to achieve the end and the action
- There are two steps in the process of making a normative claim to serve a purpose and checking its performance, both of which involve abduction, deduction and induction.
- There are (at least) two types of normative claim: those about the best means to achieve a given purpose and those about the best purposes to achieve

- For a given purpose, the justification for a normative claim or ‘rule’ is the evidence that the means is likely to achieve the purpose.

Normative science and the typological process

In getting to this point, and as a kind of provocation, it was suggested that because cities remain inescapably the result of human choices, any normative science of cities must sit firmly in the realm of ethics. In many ways this should not be controversial on the simple basis that decisions about where and how to build cities can have profound qualitative effects on the many peoples’ lives. It should therefore be equally uncontroversial that a normative science of the built environment might be based on a framework for a normative science of ethics.

Another reason for adopting such a framework as a working hypothesis is the striking correspondence between the process summarised above and the typological process as put forward within urban morphology (Caniggia and Maffei 2001, Petruccioli 2007, Oliveira 2016, Kropf 2017)

The most obvious and important points of correspondence are as follows.

Both are conceived as evolutionary processes. The prompt for invoking the process in both cases is an ‘irritation’ or disturbance, perceived as ‘problems’ in the framework for a normative science of ethics (FNSE) and a ‘crisis’ in the typological process.

Both involve three main elements. In the case of the FNSE these are 1) the desired end or purpose, 2) the means believed to achieve the end and 3) the action. For the typological process the elements are 1) a need/desire and intention to build, 2) the idea of the proposed building (the *a priori* type) believed to satisfy the intention to build and 3) the act of building.

Both involve a two-step process in making a normative claim and checking its performance. In the FNSE, there is 1) an initial consideration of the options and mental testing and 2) putting the selected solution into action and reflecting on its performance against the anticipated result. In the typological process there is 1) the design stage, in which options are considered and tested ‘on paper’ and 2) constructing the design, putting it to active use and assessing the result

against the anticipated outcome and/or some criteria for success based on the initial problem. Both steps in both cases involve abduction/hypothesis, deduction and induction.

For both the typological process and FNSE, there are two types of normative claim or hypothesis. For the FNSE, there is 1) the claim about the best means to achieve a particular end and 2) the claim about the best ends to pursue. In the case of the typological process, the corresponding types are 1) the choice of the best design or type to solve a given design problem and 2) the choice of which design problems are the most important to address. The difference between these two types in both cases also corresponds to a distinction in more general models of evolutionary processes between 1) feedback or somatic change and 2) calibration or genetic change. The distinction is explored in more detail in Kropf 2014 but a key point relevant to the idea of a framework for a normative science of ethics is that, in general, feedback operates at the level of individual agents while calibration operates at the level of the population. An example that bears on both ethics and the built environment is the human response to climate change. The ‘irritation’ induced by evidence of climate change is prompting a crisis that is forcing a debate within the wider population about the most important aims to pursue in the design and construction of the built environment. The result is a progressive ‘recalibration’ of norms in terms of the range of professionally and socially supported goals. With that recalibration and the identification, for example, of carbon reduction as a socially sanctioned goal, the second type of normative claim comes into play on individual projects. The question becomes, which designs are the best at achieving the goal of carbon reduction? The purposive norms are then developed through a process feedback by testing the performance of hypothesised designs.

The potential role of urban morphology in a normative science of the built environment

If the idea of a normative science of the built environment has some coherence and potential benefit as an initial hypothesis, the next question is, what is the role of urban morphology within that framework? Given the limited scope of

this chapter, the following presents only a summary exploration of the possibilities framed in very general terms.

At the most general level, the question takes us back to the distinction discussed at the outset between the different sets of values we use for deciding 1) what is a good, objective description of urban form and 2) what are good forms to build and use in particular circumstances for particular purposes. One purpose is to provide an accurate description, the other is to provide a built form to accommodate a particular activity or, at its most general, ‘good urban form’. As set out in the ‘position statement’ at the beginning of the chapter, in my view, the primary aim of urban morphology is to provide a comprehensive and rigorous description of the built environment. It follows, in my view, that whatever the specific means adopted, the best result is most likely to come from limiting the goal to description and not including the identification of ‘good urban form’. Making judgements about whether a form is good or bad requires a different and more specific purpose in order to establish the performance criteria for success. It would also seem that having an accurate, objective description would provide the most secure basis for making judgements about the performance of forms against criteria for a given purpose and to understand how the form achieves the aim. That is, accurate descriptions, free of judgements, would seem to be a precursor to understanding how forms work and perform on a more systematic basis.

What, then, is the bridge between urban morphology and urbanism, urban planning and design? Based on the foregoing, it can only be what anyone chooses to build. There is no intrinsic, inescapable connection between the goal of an accurate description of the built environment and the goal of producing good urban form. To reflexively apply the principles brought to bear in the discussion above, it becomes a matter of clearly identifying the problem, formulating the solutions and performance criteria and putting them into action. It also becomes a matter of persuading others that the goal is sufficiently important and the means is the best to achieve it.

In doing so, it is worth taking into account some of the variability and hazards in goal-directed behaviour. One point is that

> *'Desires become more specific in the pursuit of them'. Desires are clarified by their means, and that can affect desires. For example, if people desire good lighting, it is not clear what type is meant by that: incandescent versus LED, overhead versus floor lamp, and so forth. Each could count as good lighting, but not all would turn out to be what is really desired. That becomes clearer in the process of figuring things out relative to the means available.* (Liszka 2014, p 466, quoting Peirce)

The hazard is that in contemplating the goal of providing good urban form at the most general level it might appear that urban morphology is the best means but once one gets into further detail, it becomes clear more is necessary. There is also variability in desires and goals. People seek or exercise a freedom of latitude by applying a standard to different degrees at different times depending on their inclination. People may also seek the freedom to adjust their standards in response to different situations, which Peirce called the variable of longitude (Liszka 2014, p 467).

Bearing this in mind, the question remains, what is the best means of building a bridge between urban morphology and urbanism, urban planning and design? One step in formulating an answer is to assess how urban morphology might contribute to a normative science of the built environment as sketched above. In principle the role of urban morphology would be limited to the planning and design stages of the process. The sub-stages in the process would include:

- a survey and assessment of the issues involved in the problem in order to refine the purpose;
- a search for possible solutions;

- mentally (or by models and simulations) working through the potential implications of the hypothesised solution and making adjustments as necessary (deduction);
- comparing the proposed solution against established measures and/or other successful examples to check for anticipated performance and potential issues and making further adjustments as necessary (induction).

The sensing of the ‘irritation’ of a problem or problems and the identification of a purpose and the selection and putting forward of a solution as a means to resolve the problem (abduction or hypothesis) are necessarily judgements made by the individuals or groups – the various agents - involved in the process.

A further step in assessing the potential contribution of urban morphology to a normative science of the built environment is to be clear about what urban morphology has to offer. In general, the ‘output’ of urban morphology is a rigorous and accurate description of the built environment. As put forward elsewhere (Kropf and Malfroy 2013), the actual and in-principle sub-fields in urban morphology include the study and explication of:

- The generic aspects and elements of form and their specific properties
- Generic and specific structure and relationships
- Regularities of development
- Evolution and diversification of form
- Socio-physical performance
- Meaning

For the most part, the descriptions are set in terms of types, processes/mechanisms, measures, and dynamic models, supported by explanations (including original purposes) and interpretations.

Language, teaching and intuition

The next step would be to explore the combination of stages and potential contributions but for the immediate purpose of this chapter, it is well to bear in mind that the initial goal is to persuade a wider population that the 'problem' of building the bridge is a good end to pursue. The best means to achieve that goal may not be to use the more analytical, specialised language of accurate description/explanation and work on a more analogical basis. This effort should avoid deliberately or inadvertently disguising the nomrativitiy and implying that a description is a justification for a normative choice. Rather, it should be to ensure that building the bridge is an attractive proposition. To turn back, briefly, to Liszka and Peirce,

> *Peirce provides a sketch of what formal properties an end or norm ("an ideal of conduct") would have to have in order to be recommended as something worthy of pursuit. First, people would have to have a pro-attitude toward it. It must be an attractor. As Peirce describes it, the end must be "admirable." Second, an ideal of conduct or an end worthy of pursuit is one that is consistent with other ends or ideals considered worthy of pursuit.* (Liszka 2014, p 473)

That is, the contributions of urban morphology to a normative science or, more immediately, to planning and urban design practitioners, might be more attractive as a means of meeting their needs and preferences when translated into non-specialist language that fits in with their own language and ideas. This might be criticized as 'dressing up' the contributions of urban morphology but it remains one of a number of options if the raw, untranslated language means the contributions remain unattractive. Another, or additional, option is to translate urban morphological principles by way of analogous ideas as expressed by other, non-morphologists. The result can be both to change the character of the language and more directly tie the principles to other ideas and purposes.

Some examples are as follows.

Urban form is a material that is the medium of planning and urban design (Richard Sennett, *The Craftsman*, 2005)

Urban form is an evolving technology
(Brian Arthur, *The nature of technology*, 2011)

The built environment is a library of ideas and design resource (the general idea of cultural evolution)

Urban form is a living pattern of activities and interactions on which we operate (Manfredo Tafuri *Theories and history of architecture,* 1976) quoting Walter Benjamin)

All of these openly sit within a normative realm of purposeful creation or generation of form. What I would highlight as a focal common point between them is the injunction or advice to designers: ‘know your materials’. This is a core message in Sennett’s book. If one is to become an adept and highly skilled designer, artist, craftsman or creator of any kind, it is essential to develop an intimate knowledge, understanding and practical familiarity with the medium in which you work. If you are going to make policy, set out guidance or generate designs that achieve their purposes and are successful, you need to know how cities go together and how they work – or don’t.

And like other forms of art, craft and design, deep understanding often only comes with experience and channelling intuitive responses to the materials. That experience in turn often comes from experimentation, play and making mistakes. Because these are generally frowned upon or not possible with actual projects in the the built environment (for obvious reasons), the channelling of experience in the form of active exploration and looking at places by walking around, site and context analysis, design exercises, theoretical exploration and modelling become all the more important.

Urban morphology provides a scaffold that helps tie those experiences together into a more coherent whole than would result from a random sequence. The scaffold of urban morphological concepts and analytical methods facilitates learning from experience, makes the experiences easier to recall and perhaps

most importantly, helps each subsequent experience reinforce the previous. That is to say, teaching urban morphology to planning, urban design, architecture, and landscape architecture students is the foundation of any bridge between them. It is by no means a new idea but bears frequent repetition (Oliveira 2018).

A central part of the scaffold or framework of urban morphological concepts is the typological process, which, as noted above, might also be a framework for a normative science of the built environment. As with any evolutionary process, there is an apparent paradox with the typological process when viewed from a particular angle. It is the old chicken-egg paradox. Which came first, the city or the idea of the city? In all such cases, the paradox only arises when we leave out the dimension of time. The 'answer' is, a different kind of egg in an ongoing recursive process. And while each step in any evolutionary process is necessary, there is a germ to them all, fathomable or not and however it might be induced or driven, which is the step of replication. Humans reproduce and we reproduce our cities. In that reproduction, our ideas about the future city are necessarily built out of our previous experience of existing cities and we then *choose to apply* a particular idea at a given time to build or transform a physical city.

The basis for that choice is key. I would argue that the starting point for any choice is our own qualitative judgements about places. Our sensory and cognitive equipment is set up to respond to places and make intuitive judgements. Part of the process of learning to design places is learning to make use of those intuitions by bringing them into more conscious form. That is, intuitive judgements can and should be used as a prompt to Interrogate why a place triggers a positive or negative response and identify what might contribute to the response. The step toward design is then to abstract the pattern or configuration of elements, as a diagram. We can then justify the use of that pattern in a new design (a normative claim) on the basis of its positive performance – on the assumption that it is used for the same or similar purpose as the original. The interrogation our response should extend beyond the

immediate pattern or configuration and trace its roots out in the wider context and supporting systems to ensure that if the pattern is abstracted as a ‘type’ it has the correct conditions to support it when transplanted. None of this is new as an idea but can be found in numerous sources: John Dewey’s magisterial *Art as experience* (2005), the work of Saverio Muratori and the *scuola muratoriana*, and in *A pattern language* by Christopher Alexander, Sara Ishikawa, and Murray Silverstein with Max Jacobson, Ingrid Fiksdahl-King and Shlomo Angel. - to name a few.

The principal point here is to suggest that the scaffold of urban morphological concepts can facilitate the process of interrogation and abstraction and so can play a supporting role in design decisions. Once prompted by a positive response to a place, the scaffold provides a ready language of aspects, elements and relationships to articulate the abstracted diagram and to recognize its relative position and the set of conditions and connections that support it as a positive place in use. The same framework helps in recognizing places with similar conditions and connections that might support the ‘transplantation’ of the type and provides a means of working through the implications of fitting it in to a new place. Provided the purpose, the conditions and connections and the internal configuration of the type-diagram are sufficiently similar, the positive physical-emotional response to the original provides the justification for the normative design choice. One way or the other, that choice is a hypothesis that needs testing against the performance of the type in fulfilling its purpose.

A case study: the Stratford-upon-Avon Canal Quarter

As an anecdotal example, the following is an account of an abstraction and application in my capacity as both teacher and practitioner.

The abstraction was prompted by my response to a particular spot within a redevelopment site in London. I visited the site on a field trip with urban design students and we chose the site in part because it presents both good and bad attributes. Our aim on the field trip is to get the students to directly

experience a range of examples, good and bad, and to measure and analyse them and apply what they've learned and experienced in their design proposals. The site was formerly an industrial area lying along a canal and railway line and while wandering along the canal on my first visit, I can across a space just where an urban motorway overpass crosses the canal. Despite the presence of the major overhead road infrastructure and attendant traffic noise, the spot had a positive, relaxed feel and was surprisingly active. Just at the point where the overpass crosses the canal tow path, there is a junction with a route that leads into one of the main public spaces in the redevelopment and sculpture and ping pong tables had been placed within the wide junction space. There is also a cafe the fronts on to the space. What struck me was how active and positive the space was despite being in a relatively peripheral location within the development.

I took photographs and later interrogated the space more fulling by looking at current and historic maps. What became clear early on was that the canal tow path provided an easy pedestrian and cycle route from residential areas into a central area with employment, retail and restaurants, facilitated by the redevelopment. A diagram of the space is shown in Figure?. In verbal terms, the spot is a widened junction space that creates a node on a longer distance pedestrian route from periphery to centre with a link to a larger public space, reinforced by the overpass and parallel water route of the canal. On the opposite side of the canal there are historic warehouse buildings that add visual interest along with the sculpture and ping pong tables within the space.

My conclusion from the analysis was that the success of the space arose in large part from its relative position within the network of routes and spaces, the amount of movement along the routes, fed by the activities at their ends and along them. Additional factors included the activity of the cafe fronting the space (and in turn benefiting from the movement) as well as ping pong tables, the physical enclosure of the space, including the overpass, and the visual interest of the sculpture and historic buildings. One might test the relative contribution of the various factors in the performance of the space by imagining each factor in turn being taken away.

The opportunity to apply the type-diagram arose while working as a consultant on a redevelopment project in the canal quarter of Stratford-upon-Avon. The quarter is currently an industrial area, similarly located along a canal and railway. The area runs as a kind of ‘fringe corridor’ from just outside the boundary of the historic Medieval borough and the current edge of the settlement. The canal and tow path extend further into the historic core and connect to the main public space associated with the Royal Shakespeare Theatre. The tow path is therefore current actively used by pedestrians and cyclists both for getting to work, school and shopping as well as for recreation. Because the site is confined between the canal and railway, the principal access into the redevelopment site is a road that crosses by bridge over the canal. At this point there is also a junction with the canal tow path with a connection to the main route running through the site. Just up from the junction is an open but private area currently used for parking.

The similarities between the two situations are by no means exact but the core common points are:

- A long distance pedestrian/cycle route from periphery to centre
- A parallel water route (in both cases actively used for recreation by canal boats)
- A junction with another route leading to another destination
- A space at/within the junction
- Other feature associated with and marking the position (overpass or bridge).

The similarity of basic elements and relationships prompted the idea that the location could serve the same purpose as the London example and so warranted exploring ways of elaborating the ‘unformed’ or incipient case on the Stratford site as part of the overall design framework for the redevelopment. The principal step in applying the type-diagram was to transform the car park into a public space connected to both the canal tow path and the main route

crossing the canal and running through the site. A further step was to physically enclose the space with buildings with public fronts facing on to the public space, including a cafe near the canal.

These design decisions constitute a normative claim about what ought to happen at this location as part of the redevelopment, justified by the positive performance of the abstracted type-diagram on which the design was based. The claim remains an hypothesis, as any design decision is, but tested to the extent of its similarity with the type-diagram. The hypothesis can only be fully tested by implementation and use.

Conclusion

The argument being put forward and illustrated by the case study leads to what might seem an obvious point. Once incipient types get abstracted and repeated enough times because they perform their purpose well, they become codified types. Codified types are tested design solutions.

The reason large scale house builders continue to produce standard house types is because they have proven successful. Similarly, the central core high-rise tower constructed with what Mark Jarzombek (2019) refers to as the quadrivium of concrete, steel, glass and plastic, is a global type that has shown itself to be eminently successful. The ubiquitous evidence of types, local and global, traditional and modern, across the planet suggests that the typological process is an accurate description of the process of producing and transforming the built environment. Given the similarity between the typological process and the hypothesised framework for a normative science of the built environment, it might be said that the framework is already in operation.

And as if we need reminding, crisis is part of the process. Even if the replication of types is warranted and justified by their performance, issues clearly remain. It becomes a question of who is making the decisions and for what purpose. Close replication of types is efficient, but who benefits from the efficiency? People are fond of invoking Jane Jacobs with the mantra of ‘the city is a problem of organised complexity’ but we end up forgetting why she became involved in the first place – the poor performance of the forms of

development imposed on populations, often by public authorities. But then, thirty years before and thirty years latter, in the 1930s and 1990s, the complaint was similar but against the poor performance of a different set of forms imposed mostly by private interests – the homogenization of places by standardized suburban housing. Before that, from Friedrich Engels account of living conditions in Manchester to the work of George Peabody, the spectre of slum housing remained a persistent crisis for nearly half a century (Tarn 1973).

A decade after Jane Jacobs published *the Death and Life of Great American Cities* (1961), Horst Rittel and Melvin Webber (1973) suggested the kind of problem a city is, is a wicked problem. By all accounts it remains so. There are multiple, overlapping interests and purposes giving rise to multiple, overlapping problems that are difficult to define and have no definitive solution. In the end, the city really is an ethical problem. And while we might seek a normative science of ethics, in some ways the prospect of a 'science' skews our perspective to focus on the system as a whole or minute details. Our attention is drawn away from the central, human problems. To finish by quoting Peirce, 'the only solid foundation for ethics lies in those facts of everyday life which no skeptical philosopher ever yet really called in question' (Peirce 1965, CP 8.158, 1901).

A few of the most pressing at the moment are: income inequality, race and sex discrimination, resource depletion, pollution and climate change.

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