Place, Space, and the Parametric

'Place' is often cited as a key concept in architectural design, and architecture is itself frequently characterised as a form of 'place-making'. What the emphasis on place means is not always clear, and sometimes it seems to reflect little more than the necessity for architects to pay some attention to the sites at which their designs are to be realised. Nevertheless, the focus on place does appear as an important part of much contemporary architectural practice or, at least, of the rhetoric that it deploys. Critical regionalism provides one important example of this (although it offers little insight into the concept of place on which it draws) and so too are the phenomenologically-oriented approaches to design found in the work of architects and architectural theorists such as Peter Zumthor and Juhani Pallasmaa. Closer to home, and in a more institutional context, the 2017 draft architecture and design policy for NSW (NSW Government, 2017) not only invokes the idea of place in its very title, 'Better Placed', but also talks of the creation of 'good places' as a primary aim of architecture and design. But if the focus on 'place' is one prominent feature of contemporary architecture and design practice, it is by no means the only or most salient feature of such practice. Indeed, many would argue that parametric design, or 'parametricism', is much more prominent in current architecture and design, and certainly has a much higher profile, being associated with some of the best-known of recent and contemporary architectural practitioners such as Frank Gehry and the late Zaha Hadid. To a large extent, the placed and the parametric seem to stand apart from one another – place-based design tends not to engage with the parametric, while parametric approaches tend not to draw on ideas of place in any integral way that goes beyond the merely symbolic. Yet if place is an important notion in architecture and design, then it seems reasonable to ask to what extent place can be taken up within the frame of the parametric; and if the parametric is so important and transformative of contemporary architectural and design practice, then to what extent can the parametric be accommodated within any place-based approach.

How we answer these latter questions depends, however, on what we take the terms at issue to mean – on what we take to be at issue in talk of both 'place' and the 'parametricism' – and that is not something that we can simply assume.

Parametricism is itself a controversial term. To some, notably Patrik Schumacher, it designates a style or movement (Schumacher, 2012). To others, it names any approach to design that gives priority to the use of parametric techniques. Although terms can certainly be appropriated to different uses, the emphasis on parametricism as characterised by technique rather than style seems the more reasonable if only because it ties parametric back to that which is certainly invoked in the term itself – to the idea of the parametric, and so also the parameter, as such. Indeed, the fact that approaches to design that draw upon parametric techniques can in principle give rise a wide range of different design forms (and have done so in the past even if, in contemporary architecture they often give rise to much that is similar), and can also be applied to many different design tasks (and not only in architecture), would seem to reinforce the characterisation of parametricism in terms of technique.

Understood in this way, parametricism, or parametric design, can be said to be a mode of design practice according to which design outcomes are arrived at through the manipulation (frequently, but not always, using computer design tools) of sets of quantities that can be varied within a certain range and whose variation is often interlinked. The degree of variability over which those quantities range indicates, and is set by, the parameters (or what might also be thought of as the boundary conditions or defining limits) of the design, and the final outcome will be the result of the fixing of

those quantities in a way that satisfies those parameters overall according to the preferences of the designer.

Parametric design is frequently treated as a relatively new phenomenon – as essentially an outcome of contemporary digital approaches to design. But there is an important sense in which what lies at the heart of parametric design is something basic to all design and, indeed, to any and every form of thoughtful engagement with things. Parametric design can be understood as a form of optimisation process that begins with a set of general optimisation conditions that can be fulfilled in more than one way. This situation is one that can obtain specifically in design, but it also obtains in every problem-solving situation involving multiple variables that must be solved together, and so where the constraints on solution are holistic rather than atomistic. Consider, for example, a translation problem focussed on a specific text. There will be no one solution to the problem of translation that is uniquely determined by the text. There will be a set of parameters within which the translation must operate, but essentially those parameters are set by the text itself – the translation must be adequate to fix the values (where such 'fixing' is relative to the translation) of all the terms that the text contains and so the assignment of translational values to each term must be consistent with all of the other terms. In the practice of translation, one typically varies the values assigned to parts of the text until one arrives at an overall assignment that is deemed satisfactory.

The major difference between the translation case and that of contemporary parametric design is that the variation in assigned values is not a variation that ranges over quantities – the variation is over semantic values which we might say are qualitative rather than quantitative. However, that has not stopped attempts to develop approaches to translation that draw, like contemporary parametric design, on computational and algorithmic approaches (although how adequate these approaches are or can be remains controversial). Of course, in design itself, one can also employ parametric techniques without explicit appeal to computation or algorithms. A designer who sketches variations on a basic design form using paper and pencil may effectively be operating parametrically even if not in any formalised fashion. The basic idea of the parametric is just that of a set of parameters that allow for variation among a range of outcomes. Significantly, neither the decision regarding the setting of the initial parameters nor the decision that governs which outcome is to be preferred can be determined parametrically – at least not from within the parameters of the original parametric process (although any specific parametric process can be embedded within other such processes – so one might have a parametric process that operates to deliver both settings and decision outcomes for other such processes).

It is important to recognise the way contemporary parametricism in design is connected both to the character of problem-solving in general (as an instance of problem-solving) as well as to earlier and especially non-digital design practices. It is important because it allows us to understand better what is at work in parametric design – to understand its basic structure as well as its limits. In other words, it allows us better to understand the parameters within which such design operates, and which also constitute it.

Despite the ambiguities around the notion, we have thus come to a sense of how parametricism is best understood. The original question with which we began, however, concerned the relation between parametricism and place, so what of this latter term? Unlike parametricism, 'place' is a much broader and more complex term. Although place is often invoked by architects and designers, what is meant by place in architecture or design is seldom explicitly explained or interrogated. Often invoked as if its meaning were already self-evident, the way place is used suggest that it is frequently taken to be identical merely with a particular spatial location or some spatially-demarcated area. In this respect, there is a strong tendency for 'place' to be treated as more or less interchangeable with

'space', and even thought the *terms* can overlap (and in some languages the same term can be used to refer to both place and space), the *concepts* are distinct even if also interconnected.

The distinction between place and space is most clearly apparent when one considers the fact that there is nothing in the idea of space that requires any idea of limitation. One can thus begin with the idea of a delimited space as might apply to the space of a particular object or site (often a notion of volume or area), but if one then removes the limits of that object or site, extending the space outwards indefinitely, one has not thereby undermined the idea of space that is at issue – an *unlimited* space still makes sense *as space* no less than does a *delimited* space. This is not so in respect of place. If one removes the limits of a place associated with an object or site, then one is not left with an *unlimited* place, but with *no place* at all – one loses the here/there that is the heart of place – and what is left, if anything, is just the idea of an unlimited *space*.

The lack of any intrinsic limit in the concept of space is tied to the character of space as amenable to quantification – something indicated by the etymological connection of the Latin term *spatium*, from which modern forms of the term in many European languages derive, to *stadium* a unit of linear measurement as well as a place measured out to a certain length, as well as to the Greek *spadion*, which has similar meanings. The term 'place', however, has no such quantitative connotations instead having its origin in the Greek *plateia*, which means 'broad way'. Although space is tied etymologically to notions of span or stretch, essentially to the idea of measurable extension, and place also carries a sense of breadth or openness, what marks off the notion of place is precisely the idea of an openness that is also bounded. Place is essentially a *bounded* openness.

This understanding of place not only differentiates place from space (even while it also acknowledges a connection between them), but it also distinguishes place from mere position or simple location. This is significant since it means that place cannot be construed in geometrical terms – neither as tied to any sort of positional array nor as a point in a system of coordinates nor as a geometrical projection. In addition, place cannot be construed as some sort of construction – whether geometrical or social. In this latter respect, place cannot be a product of subjectivity, since subjectivity only arises in a place, and is itself always placed – and the same is true for the social and for the political. The commonplace understanding of place, ubiquitous in modern social theory, as essentially space plus subjectivity is not only false, but also naive, since it treats subjectivity as prior to place and as therefore somehow unplaced. The tendency in many areas of architecture and design to treat place, in similar fashion, as *essentially* a function of subjectivity is problematic for the same reasons. Place undoubtedly stands in an important relation to subjectivity (and to the human), but it is not determined by subjectivity. Indeed, properly speaking, it is subjectivity that is 'determined, in the sense of being made possible, by place (see Malpas, 2018).

None of this is to impugn the fact that the terms place and space (and time too for that matter) can be used is a wide variety of ways – what is at issue here is not how the terms may sometimes be deployed, but what concepts at might be at issue in talk of, for instance, place-based design. If such talk is to be genuinely contentful, and not arbitrary, then it must involve the idea of a mode of design that does not mistake place for space nor reduce place to some subjective construct or geometrical projection, that does not treat place as a mere quantity, and that is also attentive to the bounded openness that is place, and so is attentive to both the boundedness in which the act of design is focussed as well as the boundedness in which the act of design itself operates.

If we treat the parametric in its broadest sense, the sense that does not tie it exclusively to the computational, the algorithmic, or the quantitative – the broad sense of the parametric that I indicated earlier – then the parametric displays an important point of convergence with the placed:

the idea of the parametric is the idea of the bounded, since the parameter is a bound, and place is also constituted by its boundedness. But the parametric also carries with it the idea of a bounding *measure* (*metron* in the Greek). How we understand the latter notion – to what extent which take measure as *quantitative* – will determine how we understand the parametric, and so how we understand its relation to place. If understand he parametric as a notion primarily associated with measure as *quantitative*, then that will also mean the prioritisation of space, as quantifiable, over place, as irreducibly qualitative.

If the question of the extent to which the parametric is tied to the quantitative is here put as a genuine question, then it is partly in order not to forget or overlook the point that was made earlier regarding the way the parametric connects with general forms of problem-solving as well as with practices that are restricted to architecture or design alone. This would still be consistent with also recognising the way the parametric connects with measure, and given the tendency to construe measure in terms of quantity, with recognising the way the parametric itself tends towards the quantificational, the computational, and so, also, the spatial. But it would allow us to see that connection as it stands against a more complex conceptual background, and so provide some insight into the complexities of the parametric itself.

Yet the idea that the emphasis on the parametric as quantificational already tends the parametric towards space and away from place may be thought to have begged the original question – to have already assumed, in the way place has been characterised, the incompatibility of place and the parametric. Is it really the case that place is so resistant to quantification? What exactly is it about place that could set it apart from quantity in this way?

A large part of the answer here lies in the nature of limit itself – or in the different forms of limit at work in the spatial and in the topological. Spatial limits are always limits that demarcate a space in such a way that the space on either side of the limit is essentially the same. Thus we can divide up a space, without changing the nature of the space that is so divided – the divisions are like the divisions of a measuring tape or ruler or, even, of a map. We might say that the limit at issue in spatial terms is purely quantitative or numerical because this is also the nature of quantity and number – the quantitative is just that which allows itself to be divided up or added to without any intrinsic alteration. Topological limits or bounds – the limits or bounds that constitute places – are quite different in this respect, as are the places themselves. The bounds of a place mark out quite different regions on each side of the bound, which is to say that the bound is always asymmetrical in structure – what lies on each side of the boundary is not the same, and this is captured in the difference between inside and outside. That difference is not a difference merely of quantity or number and cannot be expressed merely quantitatively or numerically.

At this point, a brief diversion may be in order, since one of the features of Schumacher's treatment of parametricism is his assimilation of the parametric to the autopoietic, and the autopoietic also brings with a notion of bound or limit. The notion of autopoiesis, which has become a notion fashionable in many contemporary domains, originates in discussions of biological systems. Literally translated from the Greek it means 'self-making'. It refers to processes of self-realisation and self-maintenance. Biological systems are the paradigmatic examples of autopoietic systems or entities because their development is governed by principles and structures internal to the system or entity which also maintain the integrity of the system or entity. Autopoietic systems are bounded systems since both the maintenance and development of the entity of system is tied to the bounds or limits that are constitutive of it. The role of bound or limit in autopoietic systems is not always explicitly thematized, and it is not thematized in Schumacher's account. Instead, his focus seems to be on the parametric as autopoietic in the sense of being self-realising and self-maintaining. The parametric is

not, however, autopoietic in this sense – or at least not in any especially meaningful way. The parameters within a parametric design framework operate in such a way that changes in assigned quantities always bring adjustments in the overall structure, but this simply reflects the character of parametric systems as indeed systematic and holistic. Autopoietic systems are also systematic and holistic, but autopoiesis is not identical with systematicity or holism. Significantly, autopoietic systems need not be conceptualised as systems that operate over quantities – Aristotelian biology understands living things autopoietically (in fact, one might argue that although Aristotle does not us the term, the idea of autopoiesis is essentially a reformulation of an essentially Aristotelian notion, though, in Aristotle, expressed in terms of entelechy and function), but it does not, therefore, understand living beings as determined quantitatively. Perhaps most significantly, as self-realising and self-maintaining, autopoiesis is a temporal notion – it involves the idea of an entity or system developing and maintaining itself over time. Parametric systems need exhibit no such capacity for temporally extended self-maintenance or self-realisation.

To return, however, to the main theme: It is the distinctive character of the limit or bound associated with place that presents an insuperable limit to attempts to treat place or the bounds and limits of place, in quantitative or numerical terms. Indeed, it is this that underlies the difficulty involved in any attempt to treat experience, meaning, mind or any such 'contentual' notions quantitively and numerically. The claim I am advancing here is that it is the character of place that underlies this non-reducibility, but the fact of such irreducibility is evident in many different domains often without any reference being made to the notion of place at all. The idea that we could treat place parametrically by looking to quantitative 'measures' of place is already ruled out by the character of place – and so of experience, meaning and mind – as intrinsically qualitative.

This should not, in fact, be a terribly surprising conclusion. We know that the variations in own mental lives - our experiences, thoughts, emotions, and so on – cannot be mapped in any direct linear fashion onto the physical variations in our environments (even in our immediate environments). This is not just because of individual or 'subjective' difference, but because of the way in which individuals are embedded in environments 'holistically' (which means that the assigning of values to elements within any individual-environmental structure, even were it possible overall, would be subject to the same variability – what in other contexts might be called indeterminacy – as is evident within parametric systems), and because of the complex way in which mental states supervene on physical states (so there is no significant type-type identity between those states that reliably carries across from one instance to another). There is another level of difficulty here, however, that relates to a fundamental difference that is specific to the situation of architectural design.

In one of several allusions to the limitations of parametric design in his *Attunement: Architectural Meaning after the Crisis of Modern Science*, Alberto Pérez-Gómez writes that:

> The obsession with algorithmically generated form thrives on a distrust of the capacity of words to recount the experiential qualities of a site and to propose meaningful, attuned environments for human cultures, a distrust justified by the inherent opacity that always operates in the gap between the words we speak and the things we make (Pérez-Gómez, 2017: 130-131).

Language permeates human experience – even when we do not speak or cannot find the right words, still language stands always in the background, surrounding and supporting us. Places are themselves structured by and opened up by language. The most obvious way this is evident is in the way places are suffused with stories and narratives. Many of those stories and narratives are of the simplest kind – stories and narratives of how to get from here to there, of how to do this or that, but

also stories and narratives of a more complex and emotionally charged character, stories and narratives that concern who we are, who we have been , and who we might be in the future, stories and narratives connected to memory, to hope, to desire and belief. Without stories, and so without language, there are no places. How then does a quantitative approach to design that aims to engage with place also manage to engage with language and with story?

The problem is even more complex than it might first appear since architectural design, including the techniques of parametric design, is so much oriented towards the production of three-dimensional designs in visual form. But how are language and story to be encompassed by means of three-dimensional visual presentations? Contrary to the old saw, pictures do not tell stories – neither one story nor many stories. Stories live in language and not in pictures, and it is only through being embedded in language that we can suppose that there are stories to be found in pictures in the first place. The stories that we find in pictures are stories that emerge as the picture is given linguistic articulation. If there is a limit to parametric design in its capacity to engage with place it is not only in the limit of the quantitative and the spatial, but also the limit of the story, of the narrative, and of language (a limit, it might be added that is itself directly connected to the way language and place are themselves intimately tied together).

Although he does not focus so directly on story, narrative, or language, Richard Coyne also draws attention to certain features of parametric design that are evident visually:

> It's no wonder that parametric design flourishes in the production of elegant sweeping building facades and continuous organic roof structures, rather than floor plans, circulation routes, and subtle spatial interventions. With skins, surfaces and sculptural abstractions the constraints and their interdependencies are more amenable to algorithmic control, unencumbered by issues of use, history, culture, politics, and the complexities of human inhabitation (Coyne, online)

Part of Coyne's point here is that the very quantitative nature of contemporary parametric design practices tends to give priority to certain more abstracted and even aesthetic aspects of building design and the forms associated with them (although the aestheticism is more an aestheticism of the conceptual than the sensory), and such abstraction can be seen, once again, as tied to a prioritisation of the visual. Moreover, in an alluding to "issues of use, history, culture, politics, and the complexities of human inhabitation", Coyne can also be seen to be drawing attention to the complex narratives that are embedded in places, and in which places are embedded, as well as to the way these narratives are an inevitable and inextricable part of any design both in plan and in built form. To assume that all of those can be encompassed within the frame of a single parametric design system is already to have left out much of what is essential – and that is true even without explicit recourse to the complexities introduced by ideas of place.

Significantly, many of the elements that Coyne suggests are overlooked by parametric approaches are also elements that are more directly related to the way in which built forms interact with human life and activity. On the other hand, those features in the production of which parametric design often "flourishes", as Coyne puts it, are, in their very abstraction and formality, already removed from such life and activity. In this way, the tendency of parametric design, in its commonly realised contemporary forms, not only stands apart from the complexities of language and narrative, and of "use, history, culture, politics, and … human inhabitation", but also from the complexities of the human as such (and this is surely what underlies a large part of Pérez-Gómez's critique).

Place and the human are inextricably bound together (see Malpas, 2018). Human existence is always an existence *in place,* and not merely in the sense that it is spatially located. Human existence is first of all relational, which means that is constituted through the multiple ways in which it is connected,

causally, affectively, and rationally, with respect to the internality of the self, the commonality of others, and the externality of things. Such relationality does not ramify in some unbounded and homogenous space, but arises only within the bounded but open heterogeneity of place. The world, as it is itself open to human engagement in all its multiplicity and alterity, begins in that place, and in the placedness that belongs essentially to the human. Just as place resists any reduction to the quantitative, the numerical or the merely spatial, so too does the human also resist such reduction.

Consequently, the more the parametric is seen as tied to the quantitative, the numerical and the spatial, the more it is untethered from any genuine connection either to place or to the human. It should be no surprise, then, to find parametrically oriented designers focussed on forms of design that seem to operate independently, not only of the complexities of "human habitation", but even of human capacity (see eg. Menges 2016 in which computational robotic design, including parametric techniques, is seen as part of a purely computation and material design culture). One may ask to what extent this also constitutes an untethering of this form of design practice from any previous tradition, and so whether it actually constitutes a completely different form of design practice – perhaps even a new and different disciplinary configuration.

Whatever else it might be or become, it seems clear that parametric design cannot directly take up place as something to be defined parametrically in the sense in which the later term is most often used today. And this is because place will indeed be resistant to any reduction to quantity or number. This will be true not only of place in general, but also of many elements of place – the movements that are an integral part of it, the stories entwined in it, the organisational configurations that it enables, the atmospheres and experiences to which it gives rise. Parametric design will always remain with that which can be given quantitatively. That quantitative , and so also formally even though that may also be in forms that are aesthetically elegant – indeed, their elegance is itself a function of their mathematical manipulability, and is also indicative of the parametric tendency towards the prioritisation of form

One conclusion that might be drawn here is that parametric design can operate only as an adjunct to place-based design, along with other design techniques, rather being that in which such design is based or founded. The danger, however, is that the way in which so much contemporary parametric design privileges the quantitative, and the abstracted and purely conceptual-aesthetic elements in design may mean that even when employed in an explicitly place-based design approach, parametric design will have to be used with caution, just because the tendencies with which it is associated run counter to what is at issue in place. It will be all too easy for the quantitatively parametric to take over, with the likely result being what we so often see in parametric design around the world, namely the production of buildings whose forms reflect the design tools by which they have been formed (and so often repeat certain general forms and tendencies) rather than the places in which they are actually situated – hence the globalised character of much contemporary design (globalism itself being a feature that Schumacher takes to be characteristic of parametricism as a style).

Of course, parametric design, as I noted earlier, does not itself generate the parameters with which it operates. Those parameters must have their origins in some existing artefact, site, or design idea. The parameters that parametricism employs thus always lie outside of the parametric. This would seem to reinforce the point, already made above, that parametric approaches can only be an adjunct or a tool in design, rather than being constitutive of design, and this must be so even given the design tendencies that parametric design may itself bring with it. If there is a style associated with contemporary parametricism, then, it will be a style grounded in the more basic choices made by parametric designers and that themselves set the parameters of that mode of design that is then

termed ‘parametricism’. Recognising this general point is itself a part of grasping the proper place of parametric design, which is to say, it is part of grasping the limits of parametric design.

Despite the tendency for the parametric to be identified with quantitative and numerical approaches, and so for paramatricism to be taken to be more or less convergent with computational (or digital-computational) approaches in design, it remains important not to treat parametricism as simply identical with computationalism. Although it has become dominant in many areas of contemporary architectural design, computation is not always parametric in character. Thus, not only does the parametric extend beyond the computational (so that there were, as already noted, parametric modes of design and design-making even before the advent of digital computation), but the computational itself extends beyond the parametric alone. If computational and parametric are brought together at all, it is only in virtue of the tendency for parametricism, in its narrower contemporary form, to privilege quantity and number, a tendency that is, of course, central to the computational. But inasmuch as parametricism and the computation can also be distinguished, then there is also the possibility of thinking of parametricism more broadly, and so in ways that do not rule out the possibility of a real connection between place and the parametric – one that goes beyond the mere technical usefulness of parametric techniques.

To take place as the key notion in architectural design is to take place as having the central conditioning role in the making of design – on this approach, architectural design should, from the very first, be constituted as a response to place. Another way of putting this is to say that it should be place that is the proper *measure* of design (where ‘measure’ is here understood not as a quantity, but as that which is ‘proper to’, is ‘moderated’, is ‘within limits’). In this sense, the parametric can be understood as already invoked in the idea of place, since place must here function as that which sets the parameters within which architectural design, in general and in particular, must operate (place will thus be what provides the measure in the sense of moderating, ‘appropriating’, limiting). We thus come to the point, finally, where there appear to be two answers to the question of the relation between place and parametricism: on the one hand parametricism always concerns place, since in one important sense, the parameters of any architectural design can only be the parameters set by the place itself; on the other hand, if we understand the parameters at work in parametric design always to be set qualitatively and numerically, then parametricism will be, at best, simply a tool or technique available to place-based design (as to any design), or, at worst, may operate to obscure the placed, which is to say, the properly bounded, character of design.

There is an obvious irony in the way in which, when understood narrowly as focused on the qualitative, numerical, and so also the spatial, parametricism does indeed have a tendency to neglect or overlook the idea of limit or bound. It does so, however, just because of the way in which the bounds that arise within the purely qualitative, the numerical, or the spatial can only be arbitrary in character (for this reason, it is also subjective, which is to say that it operates always as something *posited* or *projected* by a subject). The notion of limit or bound at work in the idea of place, however, is not arbitrary, but relates directly to the very nature of place and is constitutive of it (it is therefore also not a subjective posit or projection). The irony here, then, is that parametricism, in this sense, actually stands opposed to a certain form of the parametric – to the parametric as referring to the bounds that belong to place itself.

Recognising this does, however, reinforce the possibility (already briefly indicated above) of rethinking the parametric, quite aside from its role as a design technique, in a way that takes the idea of the parameter, of the ‘proper measure’, as indeed a fundamental notion. In that way, parametricism would not only be compatible with place-based design but would have to be recognised as identical with it. Such a reading of paramatricism would, however, require a quite

radical shift in the dominant understanding of parametricism in contemporary architecture and design.

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