

# Plots, property and behaviour

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**Abstract.** *There is a lack of clarity in urban morphology in the use of the terms 'plot' and 'lot'. The complications arise in large part because these terms are used to refer to several things. Further ambiguities arise because the concept of property is not univocal, and the boundaries corresponding to the different meanings of plot do not necessarily coincide. An attendant problem is that distinct aspects of urban form are conflated into a single, ill-defined entity. Given the significance of the plot in building typology and urban morphology, the ambiguities in its definition raise questions about the role of the plot in the generation and transformation of urban form and in particular in the central phenomenon of persistence and the differential rates of change between street pattern, plot pattern and building pattern. The aim of this paper is therefore to clarify the terms plot and lot by examining the pertinent characteristics that are used to define them and the underlying relationships and logic they entail. The resolution offered in conclusion is that the fundamental basis for defining a plot – as property and an element of control – is rooted in human behaviour and our interactions with both our environment and each other. This may then provide a fruitful basis for investigating the phenomenon of persistence in more detail.*

*Keywords: urban form, property, control, law, custom, behaviour*

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The contents of this paper are the result of theoretical research that has examined in detail the pertinent features and phenomena used in the definition of built form. The research has been undertaken using critical analysis and descriptive, logical-relational methods working through iterations of hypothesis, deductive analysis and inductive testing. The principal criteria for judging the results in terms of working definitions are that they should have the following attributes: consistency, specificity, generality, comprehension and coherence (see Kropf (2009) for an elaboration of the criteria). A central tenet of the research is the core morphological principle of relative position: individual elements are defined in terms of their position relative to others within a

larger whole. This paper seeks to clarify the definition of the plot or lot as a component of urban form within that general framework. Important precursors on these points are set out in Kropf (1997, 2001, 2009, 2011 and 2014). The root sources for the research include Conzen (1969), Caniggia and Maffei (1979, 1984, 2001), Moudon (1986), Castex *et al.* (1980), Panerai (1999) and Petruccioli (2007).

The plot is one of the fundamental elements of urban form within the field of urban morphology. For M. R. G. Conzen it was the neglected element of settlement geography that he sought to raise to its rightful place in works such as his monograph on Alnwick (1969). Conzen's conviction about

the importance of the plot was taken up by numerous researchers, including Whitehand (1972, 1987), Sheppard (1974), Slater (1988), Lafrenz (1988), and Baker (2009). Similarly, the seminal work of Saverio Muratori (1959), which drew attention to the role of the lot as the module of urban tissue, has been extended and refined by a range of scholars and practitioners including Caniggia and Maffei (1979, 1984, 2001), Moudon (1986) and Petruccioli (2007). For Castex *et al.* (1980, 2005), Panerai (1999), Rossi (1982), Pinon (1994) and Allain (2004), whose work brings together the legacy of Muratori and urban geographers and urbanists such as Lavedan and Poëte, the ‘*parcelle*’ is a fundamental component of their analytical methods.

More recently Scheer (2016) has emphasized the importance of what she terms the urban matrix in our efforts to understand the formation and transformation of urban form. Building on her previous work (2001, 2010), Scheer highlights in particular the persistence of configurations such as street and plot patterns. She rightly points out that the role of the matrix – the underlying pattern of property boundaries – is not given sufficient attention and weight in morphological analysis and investigations. For all of these authors and many others, focusing attention on the plot or lot has allowed a much better understanding of the dynamics of urban form.

There is no clear consensus, however, on the definition of the plot or lot. In common usage a plot is a small piece or area of land. According to Conzen it is ‘a parcel of land representing a land-use unit defined by boundaries on the ground’. Conzen also makes reference to the plot as a unit of property holding (1969). Additionally, Conzen identifies a *plot head*, ‘the smaller but usually more important front part of a strip plot including the frontage and any land under and close to a *plot dominant*’, which is in turn ‘the main building associated with the land use of the plot’; a *plot tail*, ‘the larger but usually less important rear part of a strip plot’ and, a *plot accessory*, ‘a subsidiary building associated with the land use of the plot’. Caniggia and Maffei (1979) refer to the ‘built lot’, which is identified as the ‘module

of urban tissue and is constituted by the built area and what they refer to as the pertinent area (*area di pertinenza*) which is the open area for the use of the inhabitants associated with the building. In her study of an area of San Francisco, Moudon (1986) focuses on the plot as a unit of property, describing the initial and subsequent subdivision of land into parcels for sale and occupation. These different sources would appear to indicate that the plot is at once an area of land, an area of land with some buildings on it, a land-use unit, and a unit of property.

From this it might be wondered how the plot could have been so effective a concept if it is fundamentally ambiguous? The tentative reply that informs this paper is that the plot as a concept and element of urban form has been extremely fruitful mainly in ‘normal’ cases in which it has been assumed that property boundaries correspond with physical boundaries. This assumption tends not to cause problems in most ‘normal’ circumstances because there is a sufficiently close correspondence between the three aspects of physical form, property and use that most differences do not matter. The same ‘thing’ works for all three aspects. But normal cases are not necessarily as revealing as abnormal cases, or, more strictly, as revealing as *comparing* normal and abnormal cases.

In seeking to clarify the conception of the plot, this paper has three main parts. The first concerns the nature of property in terms of the features and relations that define it, the second deals with a range of cases that explore the relationship between the boundaries of built form and property, and in the third a specific basis for drawing a distinction between built form and property as separate aspects of urban form is put forward.

### The basic nature of property

One of the principal ways of dealing with the complexity of the built environment is to identify distinct categories or aspects and clarify the relations between those aspects. Kropf (2009) suggests that a productive basis

for distinguishing the aspects is to define them in terms of relations. This leads to three broad categories of aspect based on different kinds of relation:

- Spatial relations between physical forms
- Relations between humans and physical forms
- Temporal relations

In the definitions of the term plot cited above, there are two kinds of relation between humans and physical forms. One is *use* or activity and the other is *control*. In basic terms, use is the relation of doing something in or with built form. It is the relation between human activities and the forms created to accommodate those activities. We make *use* of a plot, as a physical form with buildings and open space when we live in it. Control is the relationship embodied by the ability or power to determine who can gain access to and make use of an area of land or built form (see Moudon (1986) and Habraken (1998) for more detailed explorations of the concept of control). The concept of *property* is a form of control that is established by custom or law. In common terms, ownership of a plot of land as property gives the owner the right to occupy and use the land and buildings as well as to sell and profit from it. The term 'property' therefore necessarily makes reference to three things. One is the land, another is the person or group and the third is the connection of ownership between them, sometimes called a 'holding'. In order to get a clearer picture of the plot as an element of urban form it is necessary to look more carefully at the nature of all three of these.

### Owners and the plot as a physical entity

Looking first and very briefly at the nature of the owner of a plot or lot, in simple terms, the owner or, more generally, the agent of control, is a person. In more complex systems, the agent can be:

- an individual
- a family
- a corporate entity in both the generic and legal senses.

The key distinction that has a bearing on the behaviour of the agent and the processes of urban development, including phenomena such as the persistence of plot patterns, is the difference between individual and group and the size of the group. Larger and more complex groups tend to act more slowly. This in itself is a significant area for research, but beyond the scope of this paper.

Turning equally briefly to the plot as a physical built form, as noted at the outset, both Conzen and Caniggia and Maffei refer to plots as physical entities. In very broad terms the components of a plot include the land surface, boundary features and buildings. Examining most settlements either directly or as represented by maps and aerial photographs, these components are formed into distinct repeating patterns of physical structures that singly or in aggregates as plot series or street-blocks combine with street spaces to make up urban tissue.

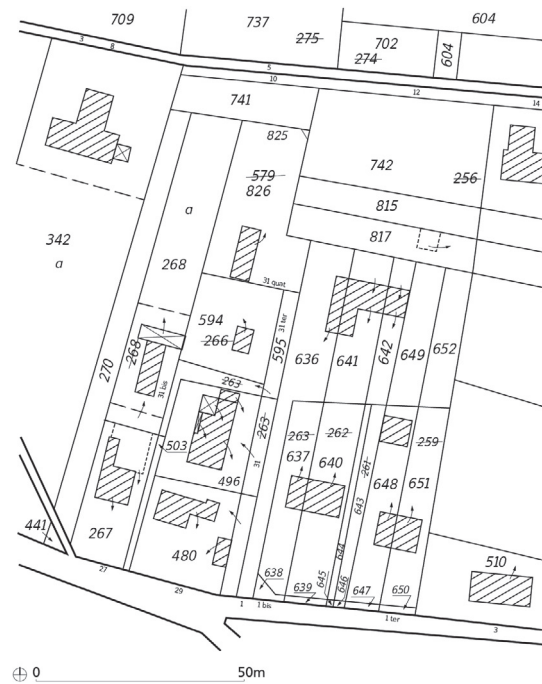
One of the contributing factors in the ambiguity of the term plot is the fact that there are very few commonly used terms for a plot as a solely physical entity. This is not to say there are none. In French there is the term *implantation* which is used to refer to the arrangement of buildings within a *parcelle*. Also, in English, there is the relatively disused term *messuage*, referring to a dwelling, its garden and outbuildings.

### The nature of control and property as a relation

'Property' is not an attribute of either the owner or the object owned but is a link or tie between the two. In strict terms, property is a *relation* and as such is *intangible*. This is highlighted by the fact that property can be transferred from one person to another. A person can own different properties and a property can be owned by different people. A central consequence of the intangible nature of property as a relation is that the boundaries that establish the limits of that relation are necessarily and fundamentally *abstract*. The abstract nature of property boundaries is perhaps most vividly

illustrated by the question of which part of a physical boundary constitutes the limit of ownership. If the physical boundary is a stone wall that has a thickness of say 600 mm, where does the boundary lie? Where does one ownership end and the other begin? Is it one face or the other, in which case the wall itself would be owned by one owner or the other, or does the property boundary run down the centre line (or any other line) through the wall, so the wall is in effect shared? What if there is no physical boundary at all? If the surface of the land is uniform and continuous and covered with grass, the only physical manifestation of the boundary may be a difference in the height of the grass depending on when each owner cuts it. This points to the behavioural nature of the relation of control – and so the behavioural nature of property. In the following section a number of further examples are set out that highlight the abstract nature of property boundaries and the consequence that the relation between property boundaries and physical boundaries is fundamentally *variable*.

The following section explores the different ways in which property and physical boundaries can vary. As a preface to examining these different cases it is worth summarizing some of the basics of land ownership within the context of Western legal systems. First and foremost these systems allow for the transfer of ownership from one owner to another. This exchange usually necessitates a description of the property to be transferred or *conveyed* so that it is clear what exactly is to be transferred. Such descriptions usually refer either to a plan drawing or to a verbal description of specific, identifiable physical features. Neither of these methods is particularly precise. On the one hand, drawings are notoriously inaccurate and so in some legal systems plans are considered as illustrative only. Depending on the scale of the drawing, the width of the line that defines the boundary can represent a significant area of land and obscure any precise indication of the location of the boundary on the ground. On the other hand, the physical features on which a verbal description is based are prone to disappear or move (markers used to set out the plot in the first place or streams and other



**Figure 1. Extract from a cadastral plan of part of Aumont-en-Hallate, France.**

bodies of water being good examples). A typical solution is to resort to fixed bench marks and abstract mapping co-ordinates.

An institutional mechanism adopted by many countries to deal with such uncertainties and to ensure the security of title to land is the establishment of a central register of land ownership that includes a comprehensive plan representation of property holdings and a tabular register of text/numerical data associated with each property. Such systems are referred to as cadastres and in Western Europe have roots in Roman law and its revival in Napoleonic Codes. An extract from a French cadastral plan is shown in Figure 1. A central point for the purposes of this paper is that cadastral systems often have two primary purposes. One, as mentioned, is to record and ensure security of title. The other is for the administration of land taxes.

### **Variability of boundaries: subdivisions of property without corresponding forms**

Figure 2 illustrates the case in which there is a division of property with no corresponding



**Figure 2. Part of Aumont-en-Hallate, France. (a) Physical features of plot boundaries and buildings as determined from aerial photography. (b) Overlay in red of property boundaries from the cadastral plan.**

physical boundary. Within the French system (and others), a given parcel might be subdivided either for the purpose of assigning title to different people or for levying taxes at different rates. In such cases the subdivisions of the property do not necessarily correspond to specific physical features. Some of the divisions are arbitrary with respect to physical form and there are more subdivisions of property than there are of form.

#### **Variability of boundaries: subdivision of form without corresponding divisions of property**

Private property is, of course, not a universal phenomenon across cultural groups. Rather, there is a range of relationships: customary group attachment to a territory, central state ownership, and private individual and corporate ownership, amongst others. Within these different systems it is possible to find cases where there are distinct physical forms – buildings and plots – without corresponding boundaries of ownership.

One case is the situation that arises with Communist governments where land is declared inalienable and the right of private land ownership for the purposes of buying and selling is removed. Any existing pattern of ownership is erased – though without necessarily clearing all the physical features. Plots and buildings remain and new buildings and plots are constructed without a corresponding boundary of ownership. An example is the People's Republic of China, though not without qualifications and complications. There, under current laws, while land cannot be bought or sold, it is possible to purchase the right to occupy land and to buy and sell buildings (Zhang, 2015). There are thus in principle, and in law, units of control corresponding to some of the physical entities (such as buildings or apartments) but at an additional level removed from outright ownership of land.

A similar situation arises in principle with the distinction of leasehold and freehold in the UK. The freeholder owns the right to buy and sell the land as well as the right to profit



**Figure 3. Overlay of land ownership (in red) on built form, in part of Bath, England. (a) Multiple plots/buildings largely within one ownership (upper half), and different parts of a single building in separate ownerships (lower half). (b) Buildings, plots and street spaces in multiple private ownership. (c) Mixed public and private ownership reflecting ‘right-to-buy’ legislation. Base mapping © Crown Copyright and Database Right (2017). Ordnance Survey (Digimap Licence). Land Registry Index Polygon data licensed under the Open Government Licence v3.0.**

from the lease while the leaseholder only has the right of use. Both freeholds and long-term leaseholds are recorded in the English equivalent of a cadastre, called the Land Registry. Looking only at the pattern of freehold as shown in the Land Registry Index Polygons (Figure 3), the pattern is much coarser than the pattern of physical boundaries. Some of the boundaries of the freehold properties have no obvious physical manifestation and may cut across physical boundaries. In contrast, the pattern of leaseholds generally corresponds to plots, buildings and apartments. In some instances the property boundaries are not recorded in the Land Registry but only in historical paper deeds.

Another example of mixed patterns has arisen in the UK with legislation giving individual rental tenants of Local Authority (local government) housing the right to purchase the freehold of the property they have been renting. The result on the ground is a ‘shotgun’ pattern of individual plots embedded within larger ownerships (Figure 3c). While the outer boundary of the larger ownership may correspond to some physical features, the area includes individual physical plots and buildings with no corresponding boundary of freehold ownership.

#### **Variability of boundaries: overlapping areas of control**

Most cadastral plans reveal the common distinction between, on the one hand, land for occupation by individuals or corporate entities and, on the other, land for movement. The basic pattern that has emerged is of interconnecting linear surfaces for movement giving access to intervening surfaces for occupation. Crucially, in this pattern the surfaces for movement give access to multiple parcels and are therefore common to and shared by a group. In order for that shared resource to remain useful to the group it tends to be controlled by, or at least on behalf of, the group. That control will be exercised to maintain the value of the route to the group. In broad terms then, the control is both *restrictive*, in the sense that it limits the use of the space to movement, and *permissive* because it allows for wider common use by the group.

This dual form of control is expressly articulated in the ancient Roman legal category of a *servitus*, which was applied by the Romans to public and private roads. For major public thoroughfares, the Roman state would mandate the route and declare it a public right of way but would not necessarily expropriate



**Figure 4. An overlay of land ownership on built form in part of Bath, England, showing a right of way or *servitude*. Base mapping © Crown Copyright and Database Right (2017). Ordnance Survey (Digimap Licence). Land Registry Index Polygon data licensed under the Open Government Licence v3.0.**

the land. Known colloquially as an easement, right of way or wayleave, a *servitus* (or in current Civil Law a *servitude*) gives an individual or group a right of access over land without any other property rights. The concept explicitly separates ownership (with the right to buy and sell the land) from the use of the land in the form of a right of access. Figure 4 shows the freehold title boundaries of the land in red. They are crossed over by the streets or ‘public highway’ (carriageway and footway), represented by grey lines. The public highway and footway are public rights of way (*servitudes*) and are controlled by the local authority. Technically, the local authority control extends only down to the depth of the physical structure of the carriageway and footway.

The separation of rights highlights an important feature of ownership and legal title as it has developed in many legal systems. There are different *kinds* of property rights (which go back at least to Babylonian times). The three principal rights are:

- Sale – the right to dispose of, ‘destroy’ or alienate the property
- Profit – the rights to the proceeds derived from the property but without destroying or consuming it
- Use or Occupation – the right to occupy and use the property without (or with limitations on) altering it.

A key point is that the three rights for a given property can be held by three different parties or agents. It is also the case that the extent of the three rights might not all correspond. It is possible, for example, to rent or lease a room in a house or part of a larger building.

#### Variability of boundaries: encroachment

A further phenomenon that highlights the intangible nature of property boundaries and the social and negotiated nature of control is encroachment – the occupation and use of land without the permission of the owner. A basic question with regard to property is what stops someone from occupying and using someone else’s land? The principal means is by physical boundaries. If there are no physical boundaries corresponding to the property boundary, encroachment can only be stopped by legal or social sanctions. If there are physical boundaries, they might be moved, which in turn could only be stopped by legal or social sanction. It may also be the case that physical boundaries get put in the ‘wrong place’ by deliberate action, by accident or by ‘drift’ – progressive small-scale changes without reference to an agreed line as recorded in a deed or cadastre. A relatively common occurrence is for property boundaries to follow a physical boundary *in part*. The assumption is then made that the *whole* physical boundary corresponds to the property boundary and encroachment occurs up to the physical boundary ‘by accident’. An example is shown in Figure 5. In this case, when the land to the south was developed, the physical boundary (shown in black) was a temporary security fence that did not follow – but was assumed to be – the title boundary. The construction of the houses and gardens was extended up to the physical boundary, resulting in encroachment on to some land (mainly



**Figure 5. An ownership boundary (in red) and a physical boundary (in black). Base mapping © Crown Copyright and Database Right (2017). Ordnance Survey (Digimap Licence). Land Registry Index Polygon data licensed under the Open Government Licence v3.0.**

to the north-east) and the ceding of other land (mainly to the north). Ultimately, as suggested above with reference to legal and social sanctions, adherence to a boundary comes down to defensive behaviour of one kind or another. The behavioural foundation of property and its boundaries is attested to in a recent UK government study that highlights the frequency of legal boundary disputes (UK Ministry of Justice, 2015). The intangibility of property boundaries makes space for legal wrangling.

### Territory and plots: forms of behaviour

The examples above highlight that property boundaries are not fixed in any strict, physical way to physical boundaries. Two questions that arise from this are why do they tend to be associated with physical boundaries and how do they persist? An idea that has the potential to at least clarify these questions is that property is best seen as a form of behaviour.

Perhaps the most basic precursors of property are the notions of *territory* and *home range* as exhibited by many species on the planet. Occupation of territory is an implicit exercise of control. At the most fundamental level, the control is exercised by

physical presence on (above or below) a patch of ground and making use of the territory for a range of purposes – feeding, mating, sleeping. The control is more explicit if the territory is contested and triggers a response of defensive behaviour.

Occupation is then the most primitive form of control. The idea of *property* moves beyond mere occupation to the notion of *the right to occupy as recognized by a social group*. That is, the idea of property establishes the relation of control by social convention irrespective of the physical presence of the owner. The owner can leave and come back and still control the land in question. With the development of more elaborate social structures and written language, the right to occupy has been codified into law. A key point is that the relationship or connection between land and people persists beyond the lifetime of an individual. The connection is passed on through the generations.

Within systems of codified, written law the relationship is recorded in written title deeds or cadastral records. And, while a person may have a piece of paper that states he or she has title to a patch of land, the deed can only have tangible consequences if the rest of the community subscribes to the overall system and the specific terms of the title. In the end, the only tangible expression of property is our mutual behaviour: my defence of my right to control who enters my patch and what they do on it; others respecting those rights and my respect for theirs. Property is a socially agreed set of limits on behaviour. Property *boundaries* are a socially agreed set of *spatial limits* on behaviour. One must, of course, add that property is not just socially agreed but also negotiated and contested, which points to the two questions just posed. Property boundaries tend to be associated with physical boundaries and tend to persist because owners want to protect the value of their property.

### Methodological consequences

In terms of urban morphological analysis, the most immediate consequence of making a clear distinction between property boundaries and

physical boundaries is methodological. To adequately understand the role of property boundaries as part of a plan analysis, the boundaries need to be represented graphically as a separate drawing or layer. This starts from the basis that conventional mapping such as Ordnance Survey or USGS maps represent physical features and cadastral maps show property lines. A useful technique is then to create an overlay of property boundaries represented by red lines over the plan of physical boundaries shown in black. This technique makes it immediately apparent where the boundaries coincide, where they do not and where there may be easements or servitudes. Where physical and property boundaries do correspond, one of the principal aims of the analysis is to determine whether there are cases in which physical form has been inflected or adapted to work around a property boundary. That is, where one owner seeks to defend boundaries and protect value, others must adapt to them. The pattern of property boundaries constitutes part of the morphological frame and can therefore help to explain the transformations of physical form. Ideally, separate layers would be produced for as many historical maps as possible so the plan sequence illustrates the changes to both the property and physical boundaries in parallel. The analysis could then explore the implications of particular patterns of property division for the transformation of the physical structure over time as well as particular instances in time. A further step to take would be to move towards using different terms for the plot as a physical form and as a unit of property. This potentially involves an invidious choice between anachronistic terms and neologisms, both of which can prove unpopular. A potential solution might be to use the more general term 'parcel' for units of property and/or add a qualifier such as 'built plot' or 'built lot' for the physical form.

### Plots, property and questions of persistence

This paper started with the problem posed by the ambiguous nature of the term *plot* (and *lot*). In different definitions it refers variously to a physical form, a unit of land use and a unit of

property. It was argued that these three meanings refer to three distinct aspects of urban form based on the distinction of different relations: spatial relations between physical forms, relations between physical forms and human activities (use) and relations between physical forms and human control. As a specific instance of the more general concept of control, property is by definition a relation that necessarily involves three things – owner, object and the relation of ownership between them. Because the relation is itself not tangible, the boundaries of control and property are necessarily abstract. Examination of a number of different cases shows that the correlation between abstract property boundaries and physical boundaries is variable, reinforcing the intangible, social nature of property. The combined result of the analysis is a characterization of property as a socially agreed (potentially contested and negotiated) set of limits on behaviour. In that view, property boundaries are a socially agreed set of *spatial limits* on behaviour.

To some extent this paper is a necessary precursor to more in-depth research. A first step would be to establish the extent to which physical and property boundaries are variable within different customary and legal systems in different places. A second would be to determine whether there are different kinds of variability and compile illustrative evidence. A third would be to investigate the interrelations and interactions between physical boundaries and the boundaries of control in the dynamics of urban form. In particular, how do we explain the *differential rates of change and persistence* between street patterns, plot patterns and building patterns? More fundamentally, how and by what mechanism do plots and plot patterns persist? Is it the inertia of physical boundaries? Is it the human exercise of control and protection of value? Is it something else? Is it all of these together?

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