



7.9 • Tree patterns and constitutions. (a) A tree has in-built arteriability and access constraint. (b) Removal of access constraint – but retention of arteriability. (c) Hence the conjoint structure of traditional street patterns.

Access constraint is a condition typical of ‘modern’, ‘planned’ or ‘hierarchical’ layouts, whereby each road type is controlled in terms of which other types it may connect to. This equates with the fourth structural condition, namely ‘allowable connections’. While access constraint is typically built into modern road layouts, it has often been retrofitted to traditional street grids, where main streets have side streets closed off, to improve traffic circulation and safety on the main routes.

The term access constraint is used specifically in connection with road network structure. Additionally, the term *stratification* can be used as a more general version of access constraint, just as ‘strategic contiguity’ is used as a more general version of arteriability. Stratification can be applied in other contexts, such as geological strata, or institutional hierarchies, where the term ‘access constraint’ is not so appropriate.⁶

Together, arteriability and access constraint form a pair of properties that can distinguish different types of constitutional structure.

Types of constitutional structure

From the combination of the two fundamental properties of arteriability and access constraint, we can generate four permutations of *constitutional type* (Table 7.4).

The most ‘hierarchical’ constitutional structure would combine both arteriability and access constraint. This case can be termed *dendritic*, which is ‘tree-like’ in that it embodies all of the first four structural conditions of the tree analogy (Figure 7.3). In other words, just as a ‘tree configuration’ is as tree-like as a configuration can get (i.e. as far as the sixth condition), the dendritic constitution is about as tree-like as a constitution can get (i.e. as far as the fourth condition). The dendritic constitution could therefore be described as the ‘tree-like’ hierarchy associated with conventional road hierarchy and modern distributory urban layouts (e.g. Thamesmead, Figure 4.8(d)).

Now if we imagine the image of a set of tree branches and allow them to interfere and intersect in a single plane, this creates a pattern that loses the access constraint, but retains arteriability, to form a conjoint structure (Figure 7.9).

The *conjoint* case implies ‘all joined up’, and makes use of the first three structural conditions of the tree analogy (Figure 7.3). It is typical of inter-urban networks (Figure 3.15), and is also typical of traditional settlements where major streets have joined up to form through routes, forming a ‘natural hierarchy’. This is seen in the case of the Bayswater network (Figure 5.13) with its strategic continuous roads and short, deep minor