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Mediterranean urban and building codes: origins, content, impact, and lessons

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This study on codes is based on the context of the Byzantine and Islamic civilisations of the Near East and the territories that were under their direct or indirect rule and/or influence across all of the northern and southern parts of the Mediterranean basin. The study's sources and examples cover 14 centuries, from the 6th to the early 20th century. The article is divided into six sections: origins and diffusion, content of the codes, examples of specific codes, impact on the built environment, lessons for contemporary and future practice, and a conclusion. The section on lessons addresses in some detail the attributes of the traditional system as it relates to the phenomenon and science of *Emergence*.[1] This is of crucial importance because it is a primary consideration for achieving successful sustainability in our cities and built environment in general.
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Origins and diffusion

Byzantine and Islamic codes have direct roots in practices and customary laws in the ancient civilisations of the Near East, but they evolved separately. Their diffusion in the vast territories surrounding the Mediterranean basin demonstrates their look-alike impacts on the built environment due to overlapping similarities in the two system of rules particularly because of common goals and intentions underlying the rules and the specific codes. There is no evidence that clearly demonstrates how the Byzantine system influenced its Islamic counterpart (Lemerle, 1971).[2] On the contrary the evidence suggests that Islamic rules and codes evolved from existing practices in the region, particularly in the Arabian Peninsula, during the 7th century when Islam emerged. This is corroborated by a number of the Prophet's sayings and deeds regarding matters related to land use, its distribution, and various aspects of the construction process. He especially emphasized practices that were compatible with Islamic values (Hakim, 1986).

As for Byzantine codes, the treatise of Julian of Ascalon from Palestine, written during the period 531–533 CE, is the oldest source specifically written for construction and design rules that have so far been discovered. Its use became widespread in the Byzantine Empire when it was incorporated in the *Book of the Eparch* of Constantinople during the reign of Emperor Leon VI (886–912 CE). Subsequently, in 1345 CE, it was incorporated in the *Hexabiblos* of Armenopoulous in Thessaloniki (Hakim, 2001).[3] This widened its influence in the Balkan countries, and earlier in

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[1]'Emergence is what happens when an interconnected system of relatively simple elements self-organizes to form more intelligent, more adaptive higher-level behaviour. It is a bottom-up model; rather than being engineered by a general or a master planner, emergence begins at the ground level'. From book cover (Johnson, 2001).

[2]'The Arabs were not obsessed with taking over the cultural heritage of Antiquity at the time of their conquests' (p. 21), and 'The two worlds were strangers to each other' (p. 27).

[3]Julian's treatise was included as a part of the *Book of the Eparch* in Constantinople, 377 years after it was written, and then 435 years later in 1345 CE, it was incorporated in the *Hexabiblos*, a span of 812 years after its authorship in Palestine.

other regions that were under the control of the Byzantines, such as southern Italy.

Although Julian's treatise was composed during the same years of the compilation of the *Corpus Juris Civilis* on orders of the Emperor Justinian I (527–565 CE), its stipulations were firmly rooted in the customary practices in the broader area of Bilad al-Sham, which included Palestine. In fact, the original treatise's title rendered in English is: 'From the treatise of architect Julian of Ascalon on the laws, or conventions, in Palestine' (Hakim, 2001). One of the sources that pre-dates Julian and is firmly embedded in practices of the Near East region is the *Syro-Roman Lawbook*, dating to about 468 CE (Hakim, 2001).[4]

This brief discussion is to establish the common roots of the two systems of codes that spread to the whole Mediterranean regions via the Byzantines and Muslims. Figure 1a–d is base maps for the years 528, 830, 998, and 1360 CE respectively that have been used to locate various treatises which included rules for the built environment attributed to the Byzantine and Islamic cultures.

Map 528 CE (Figure 1a) shows the frontiers of the Eastern Roman/Byzantine Empire and the location of Ascalon 5 years before Julian's treatise was completed.

Map 830 CE (Figure 1b) shows the frontiers of the Byzantine Empire and the territories governed by Islamic dynasties. Medina, located in the Arabian Peninsula, was a major source for Islamic law through the teaching and writing of Imam Malik (712–795 CE). The earliest treatises on city, neighbourhood, and building construction were written during this period in Cairo and Cordoba, both directly influenced by Malik. They were the work of Ibn Abd al-Hakam (767–829 CE) from Cairo, and Ibn Dinar (d. 827 CE) from Cordoba. Both treatises are lost, but are cited by later authors.

Map 998 CE (Figure 1c) shows the location of Kairouan and Tutila and the work of Ibn Abu Zaid (922–996 CE) from the former and Ibn al-Imam (940–996 CE) from the latter. The treatise of Ibn al-Imam specifically addresses urban and construction topics and draws on works from Medina, Cairo, Cordoba, and Kairouan. It should be noted that all of these treatises are from the Maliki School of Law. The earliest known work on this subject from the Hanafi School of Law is by al-Murajja al-Thaqafi from the region east of Baghdad, as shown in the map.

Map 1360 CE (Figure 1d) shows the locations of Tunis and Thessaloniki. Ibn al-Rami, a master builder from Tunis (d. about 1350 CE), wrote a comprehensive treatise on building and urban codes and related customary laws of his region. He draws on previous and contemporary works and also on local opinions and practice, including his own. This treatise has been studied extensively by the present author and its rationale and main cases recorded and published (Hakim, 1986).[5] During this period in Thessaloniki, within the territory of the Byzantine Empire, a lawyer by the name of Armenopoulos compiled his large compendium on civil law in 1345 CE, known as the *Hexabiblos* (ie six books). Julian's treatise from 533 CE was included and comprises the bulk of Book 2 of this work. It is through this work by Armenopoulos that Julian's stipulations were further entrenched in the territories of the then shrinking Byzantine Empire, and especially in the Balkan countries and Greece were its influence continued well into the late 19th century and early years of the 20th century.[6]

Figure 2a is a sample page from the 1300s CE of a surviving copy of Julian's treatise. This copy was discovered in 1891 CE by a Swiss scholar as a part of the *Book of the Eparch*, attributed to the reign of Emperor Leon VI (886–912 CE). Figure 2b is a sample page from one of the four surviving copies of Ibn al-Imam's treatise from 10th century Tutila. It is generally known by the long title of: 'Rules for abutting buildings and prevention of damages'. There are now three Arabic verifications and commentaries of this treatise published in

[4]For details about this source, written in Syriac, see the work of Arthur Voobus. In his two-volume study of *The Syro-Roman Lawbook*, Stockholm, 1982, he indicates how much embedded is this compilation of codes in the ancient practices and laws of the Near East, including roots to Hammurabi's laws.

[5]Chapter 1: 'Islamic law and neighborhood building guidelines': 15–54.

[6]A case using a stipulation from Julian was found in a legal document dated October 1826 as a part of the local administration of the island of Naxos, Greece. This demonstrates the longevity of Julian's influence and how many of his stipulations became embedded as a part of local customary laws.

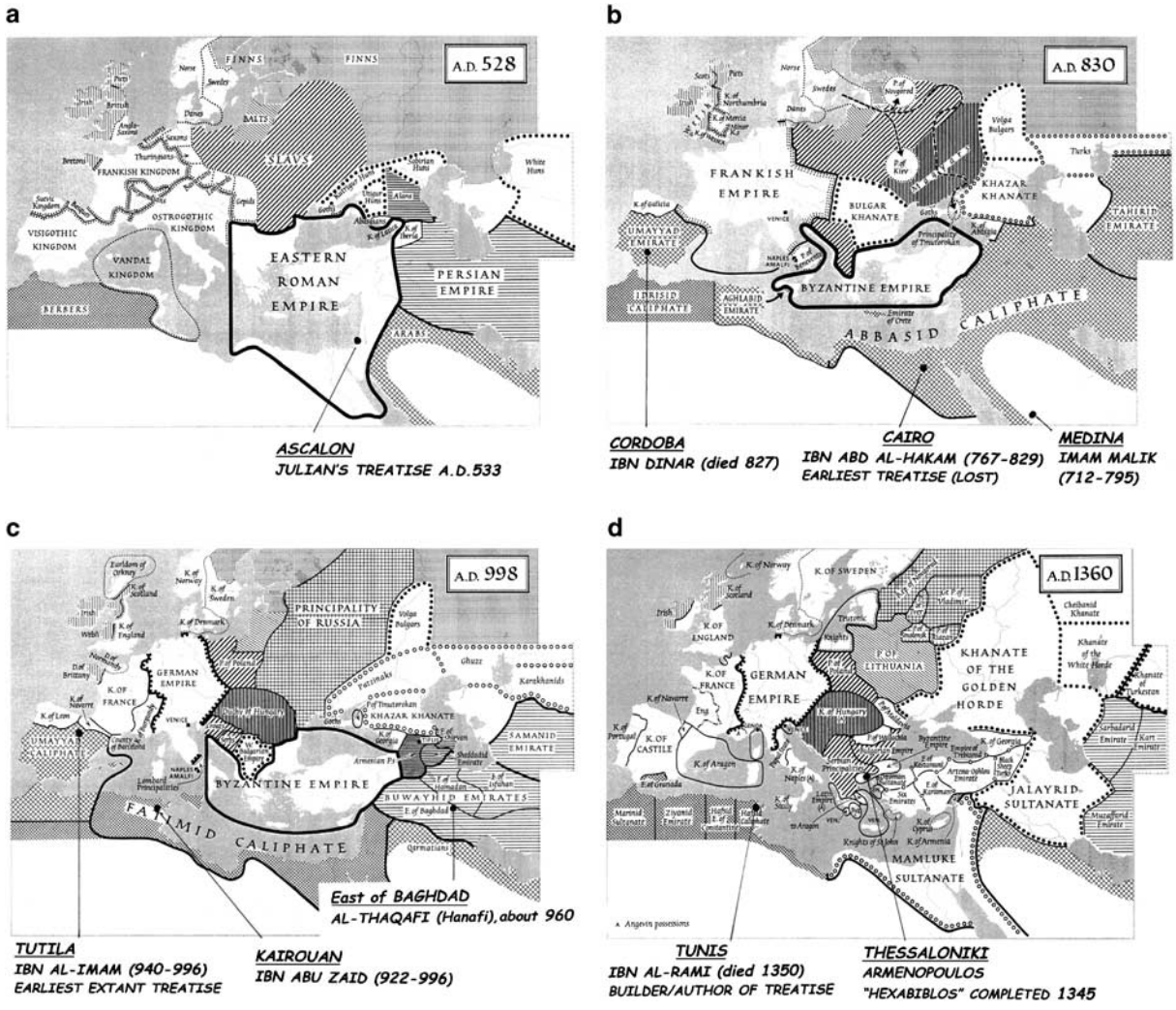

Figure 1. Maps showing dates and location of treatises and the authors that wrote about rules for the built environment. The base maps are from Colin McEvedy, *The Penguin Atlas of Medieval History*, Penguin Books, UK, 1961.

1996 in Saudi Arabia, 1999 in Morocco, and 2003 in Tunisia.[7]

Content of Byzantine and Islamic codes: their similarities and differences

For the comparison the present study uses the treatises of Julian (written during the period 531–533 CE) to represent the Byzantine system, and Isa bin Musa al-Tutaili, known as Ibn al-Imam (940–996 CE) to represent the Islamic system. Ibn al-Imam was from Tutila, modern Tudela, Spain, about 50 miles northwest of Zaragoza. His treatise was influenced by the work of scholars from Medina in Arabia, Cairo, Cordoba, and Kairouan (Van Staevel, 2000).[8] First let us look at the

[7]The nature of these codes are not to be viewed as being similar to contemporary planning regulations that are written to enforce an adopted master plan. Traditional towns, that are the subject of this study, were conceived and implemented according to known concepts and customary practices of a particular region. However, the incremental process of growth and change required that they follow accepted customary practices and rules known within the locality. These rules were formalized within the legal literature to provide local courts a framework for making sound and equitable decisions when two or more parties face conflicts resulting from changes and adjustments to their immediate surroundings. It is from this legal literature that we can identify specific rules and codes that were applied in the built environment of traditional towns.

[8]For a detailed study of the sources that Ibn al-Imam utilized in writing his work, see Jean-Pierre Van Staevel's dissertation, 2000.

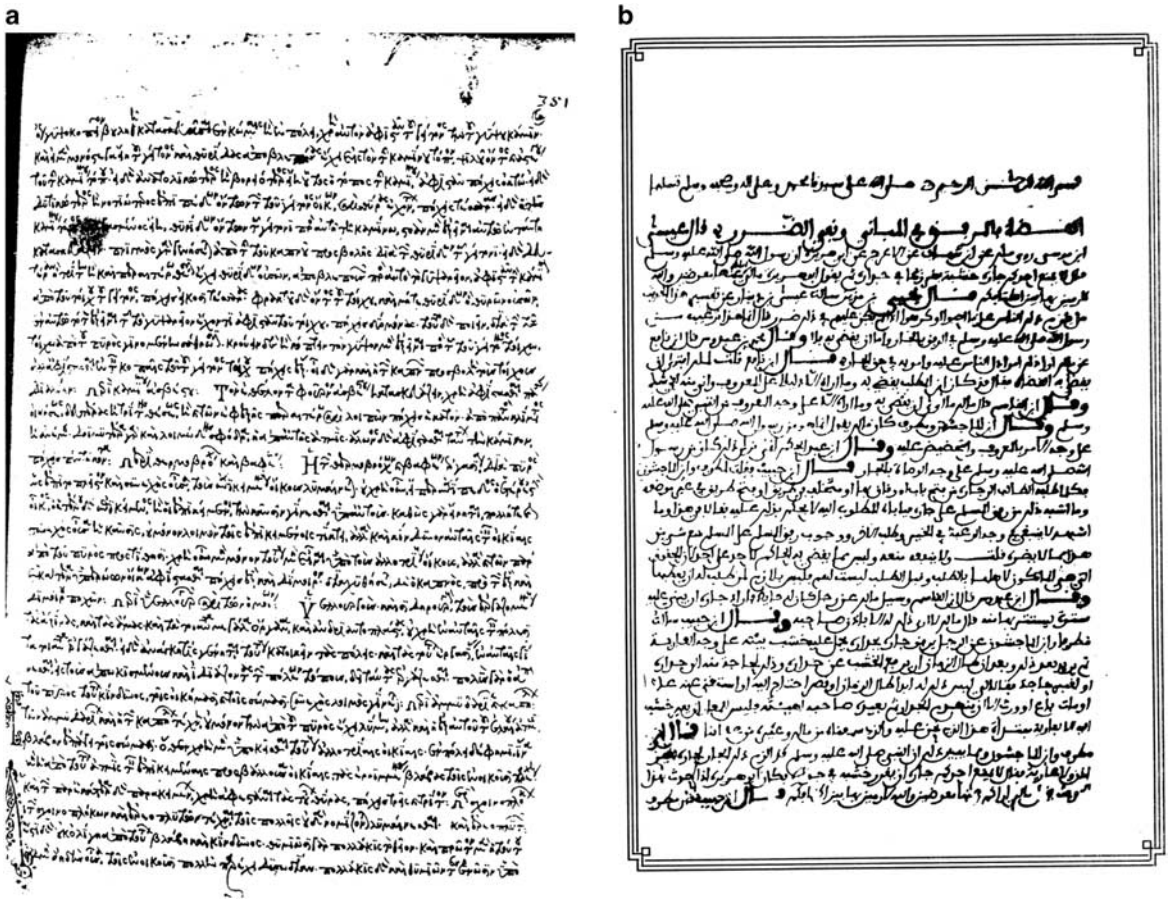

Figure 2. (a) Sample page of an extant copy from the 14th century of Julian of Ascalon 6th century treatise. *Source*: Bibliotheque Publique et Universitaire, Geneva, Switzerland. (b) Sample page from one of the four extant copies of Ibn al-Imam's 10th century treatise from Tutila in northern Spain. *Source*: Bibliotheque Nationale d'Algerie, Alger.

similarities of these two treatises in terms of their underlying *goal*:

> The goal is to deal with change in the built environment by ensuring that minimum damage occurs to preexisting structures and their owners, through stipulating fairness in the distribution of rights and responsibilities among various parties, particularly those who are proximate to each other. This ultimately will ensure the equitable equilibrium of the built environment during the process of change and growth.[9]

The underlying assumed *intentions* that are evident by a careful study of these treatises are:

1. Change in the built environment should be accepted as a natural and healthy phenomenon. In the face of ongoing change, it is necessary to maintain an equitable equilibrium in the built environment.
2. Change, particularly that occurring among proximate neighbours, creates potential for damages to existing dwellings and other uses. Therefore, certain measures are necessary to prevent changes or uses that would (i) result in debasing the social and economic integrity of adjacent or nearby properties, (ii) create conditions adversely affecting the moral integrity of the neighbours, and (iii) destabilize peace and tranquillity between neighbours.
3. In principle, property owners have the freedom to do what they please on their own property. Most uses are allowed, particularly those necessary for a livelihood. Nevertheless, the freedom to act within one's property is constrained by preexisting conditions of neighbouring properties, neighbours' rights of

[9]Equitable equilibrium is a term used here to imply that fairness and justice must always be maintained between the rights of proximate neighbours to achieve harmony and good will.

servitude, and other rights associated with ownership for certain periods of time.

4. The compact built environment of ancient towns necessitates the implementation of interdependence rights among citizens, principally among proximate neighbours. As a consequence of interdependence rights, it becomes necessary to allocate responsibilities among such neighbours, particularly with respect to legal and economic issues.
5. The public realm must not be subjected to damages that result from activities or waste originating in the private realm.

In addition to the intentions above, there is an additional generic rule in Ibn al-Imam's treatise:

> It is the right of a neighbour to abut a neighbouring existing structure, but he must respect its boundaries and its owner's property rights.

This is clearly an important additional right evident in most treatises written by Muslim scholars regardless of the School of Law to which an author belongs. This implies a host of necessary rules in dealing with common party walls (Hakim, 1986). The emphasis on abutting adjacent structures and on party wall although mentioned in Byzantine codes are not as elaborated as in their Islamic counterparts. Ibn al-Imam also addressed issues related to streets and the '*fina*'.[10] On the question of overlooking and views, Muslim societies were more concerned with preserving privacy from visual intrusions. Whereas Byzantine societies were especially concerned with the preservation of pleasant views such as of the sea, mountains, orchards, and public mural on walls. This is an example that clearly demonstrates how culture is encoded, or embodied, in the built form through codes. The following is a list of the issues and related cases that were addressed by Julian and Ibn al-Imam.

Julian addresses the following issues:

- *Land use*: including baths, artisanal workshops, and socially offensive uses.
- *Views*: for enjoyment and also those considered a nuisance.
- *Houses and condominiums*: involving acts that debase the value of adjacent properties, walls between neighbours, and condominiums in multi-storey buildings and those contiguous with porticos.
- *Drainage*: of rain and wastewater.
- *Planting*: of trees, shrubs, and other vegetation.

Ibn al-Imam addresses more issues:

- *Land use*: location of mosques, bakeries, shops, and public baths.
- *Streets*: open-ended streets, cul-de-sacs, '*fina*', projections on streets, servitude and access.
- *Walls*: abutting and sharing rights; ownership rights and responsibilities.
- *Overlooking*: visual corridors that compromise privacy generated by the location of doors, windows, openings, and heights.
- *Drainage and hygiene*: rain and wastewater drainage; responsibilities for cleaning septic tanks, and removal of garbage.
- *Planting*: of trees, and other vegetation.
- *Animals*: cattle, sheep, chicken, birds, and bees.

Figure 3 points out the underlying concepts and principles (*Qawa'id Fiqhiyah*) of Islamic law that governed the rationale for the processes of change and growth. The original Arabic version of these principles is included for reference. The English translation of the seven *Qawa'id* are:

(1) the basis for action is the freedom to act,
(2) stimulated and judged by the intentions for those actions,

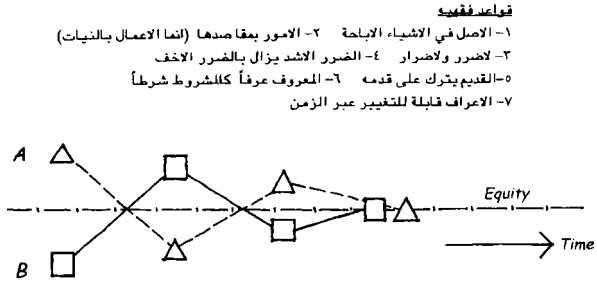

Figure 3. Principles of Islamic law (*Qawa'id Fiqhiyah*) that governed the rationale for the process of growth and change. The original Arabic version is included for reference. An important goal for these principles is to achieve equity between neighbours when expectations, demands, and needed change would create benefits to one owner to the detriment of his neighbour(s). Two owners (A and B) are illustrated. The effect of these principles over time tends to equitably harmonize the competing and sometimes conflicting demands of adjacent owners. Drawing by the author.

[10] *Fina* is an invisible space of about 1.00–1.50 m wide alongside all exterior walls of a building, primarily alongside streets and access paths. It extends vertically alongside the walls of the building and allows extensions to be built from upper levels such as balconies, awnings, and even rooms bridging a street called '*sabat*' (see Figure 8).

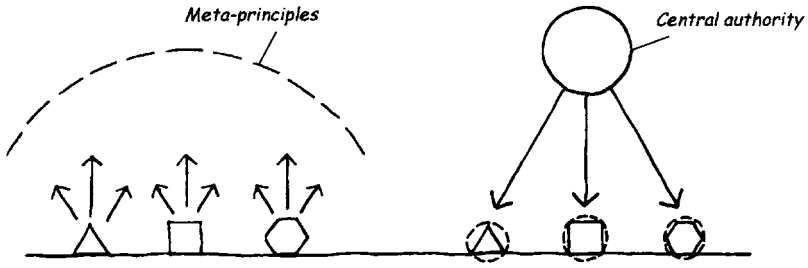

Figure 4. Conceptual representation of the impacts on the local level (three geometric shapes denoting three settlements) by *proscriptive* meta-principles, and by *prescriptive* imposed laws. The diagram on the left represents a settlement's ability to respond freely to local conditions and requirements, but restrained by an overarching set of meta-principles. This would result in settlements that are diverse in their physical form and exhibit distinct local identity. The diagram on the right represents how prescriptions from a top-down central authority, far removed from a locality, inhibits creative solutions to local problems. Over time the settlements would tend to become similar to each other. Drawing by the author.

(3) which are constrained by the prevention of damages to others,
(4) however, it is sometimes necessary to tolerate lesser damages so as to avoid greater ones,
(5) older established facts must be taken into account by adjusting to their presence and conditions,
(6) people's customs must be respected and followed,
(7) however, time might change those customs and new solutions will be needed.

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Figure 4 portrays the conceptual representations of impacts on the local level (three geometric shapes denoting three settlements) by *proscriptive* meta-principles, and by *prescriptive* imposed laws.[11] The diagram on the left represents a settlement's ability to respond freely to local conditions and requirements, but is restrained by an overarching set of meta-principles. This would result in settlements that are diverse in their physical form and exhibit distinct identity. The diagram on the right represents how prescriptions from a central authority, which are usually far removed from a locality, can inhibit creative solutions to local problems. Over time the resulting settlements would tend to become similar to each other.[12]

Figure 5 shows the various uses and implications of the *'fina'*. Columns on both sides of the *Sabat* allow flexibility for sale and purchase of the room above the right of way. Figure 6 shows a typical sequence of the emergence of the fabric of a prototypical traditional Islamic neighbourhood, following locally applied codes and customary practice. On site studies of sequences showing growth and change are essential for understanding how the codes worked and the nature of the accretion process.

It should be noted that both Byzantine and Islamic law recognized local customary practice. When determining the validity of a custom in a specific jurisdiction Byzantine courts respected the concepts of *consensus populi* and *longa consuetude* (J. de Malafosse, 1962). In Islamic law the local *Urf* (ie customary practice) was recognized as valid provided it did not clearly contradict Islamic values and law (Hakim, 1994).

[11] *Proscription* is an imposed restraint synonymous with prohibition as in 'Thou shalt not', for example, you are free to design and manipulate your property provided you do not create damage on adjacent properties. *Prescription* is laying down of authoritative directions as in 'Thou shalt', for example, you shall setback from your front boundary by (x) meters, and from your side boundaries by (y) meters regardless of site conditions. Byzantine codes in many instances included specific numeric prescriptions, unlike their Islamic counterparts that tended not to include them.

[12] For examples from the past one can see how each town has distinct features and a sense of place unique to its built form. Whereas one can see the almost identical land use patterns and built form features in the thousands of communities that were built in the United States after World War II, that is, from about the early 1950s.

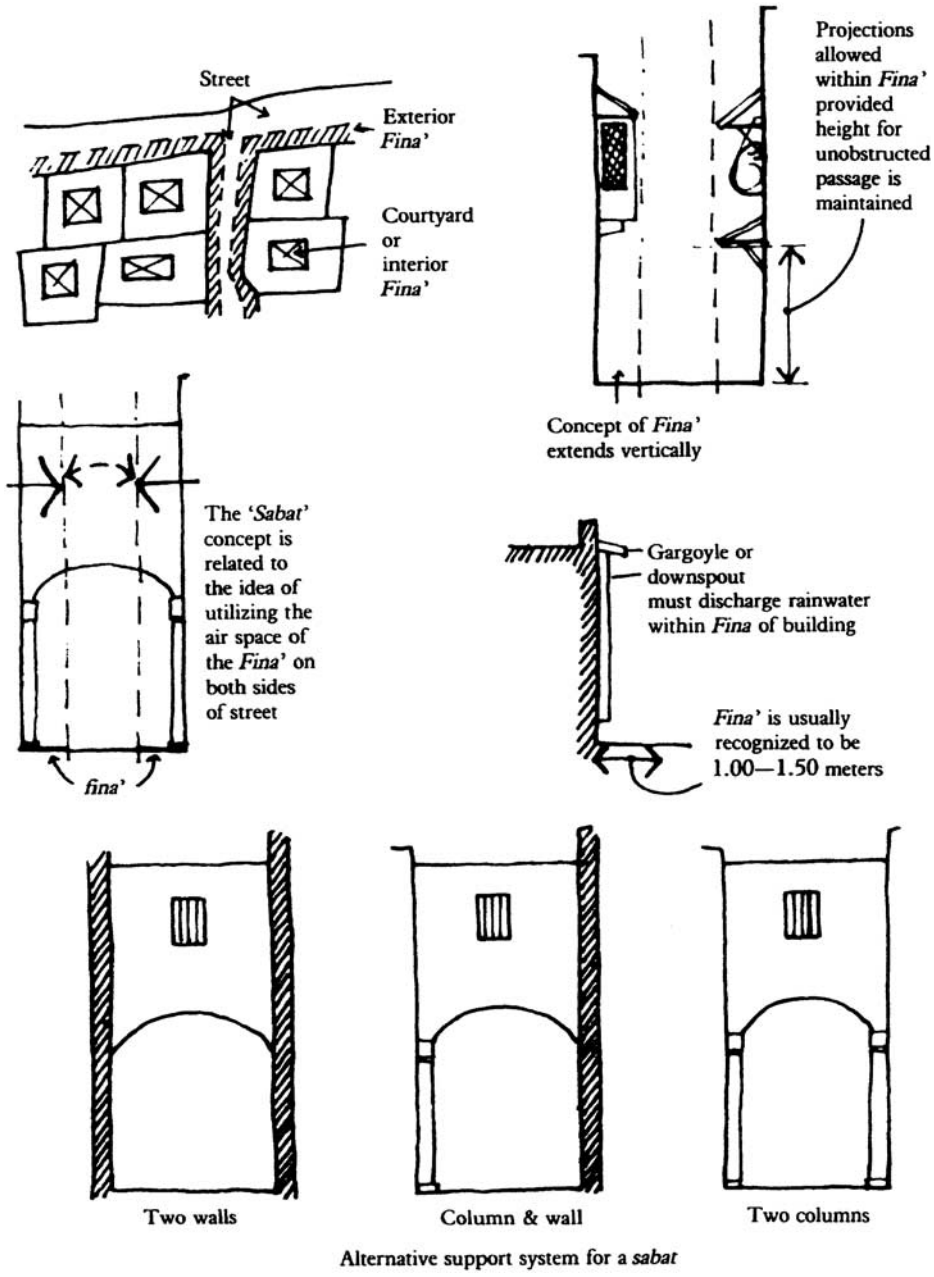

Figure 5. The *Fina* and *Sabat*. The diagram shows how the *Fina* is utilized. It is an invisible space about 1.00–1.50 m wide alongside all exterior walls of buildings – primarily alongside streets and access paths – and extends vertically alongside the wall of the building. The principle for the formation of the *Sabat* is shown as well as various methods for its support. Drawing by the author from Hakim, (1986).

Examples of specific codes and their impacts

There are a number of codes related to the issues covered by Julian and Ibn al-Imam. Four codes have been selected that tended to be universal in their impact in shaping the built form of traditional towns in the Mediterranean. Local customary practice determined the final form and character of a place.

Party walls

Buildings abutting each other on more than one side were a major feature of ancient and traditional towns dating back to 2000 BCE and earlier

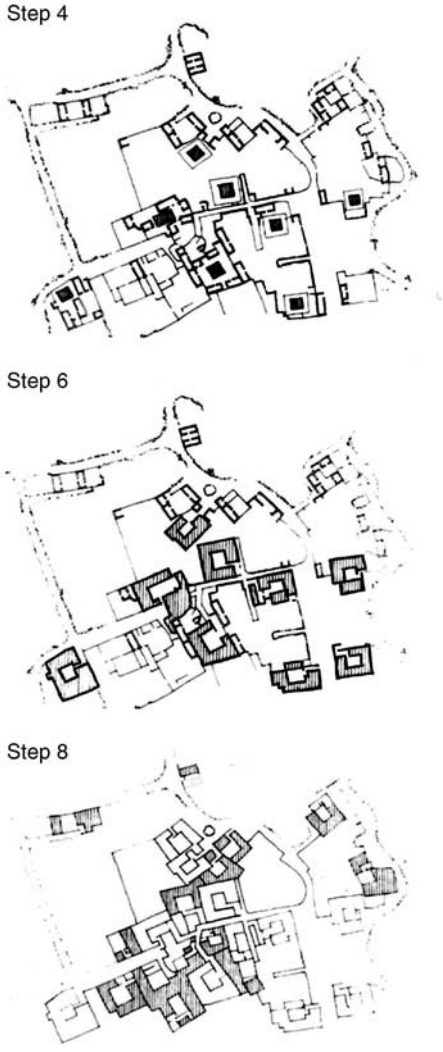

Figure 6. Simulated typical sequence of the emergence of a cluster of houses in a traditional Islamic neighbourhood setting. What is shown are only three steps from a sequence of eight. Step 4 shows the laying out of courtyards, step 6 the location and layout of rooms around the courtyard, and step 8 the final configurations. The simulation is described in the book by Howard Davis, *The Culture of Building*, New York, 1999, pp. 202–206.

in the Near East. Julian recognized this age-old custom in Palestinian towns and addressed it in his treatise. The longevity of this custom in the Byzantine and post-Byzantine periods can be traced forward, over 1200 years, to a ruling in 1777 in documents found at the island of Syros in the Aegean. In Islamic culture the issue of sharing party walls was affirmed by the Prophet himself during his reign in Medina (622–632 CE), which translates as: 'A neighbour should not forbid his neighbour to insert wooden beams in his wall'. Muslim jurists, including Ibn al-Imam and others who wrote about construction and design codes to ensure that neighbours respect this right, always quote this saying. Implementation details for this stipulation were developed by jurists and are fully documented in Islamic jurisprudence literature.[13] Two aerial photos of traditional towns from North Africa and Greece demonstrate the impact of this stipulation (Figure 7a and b).

Fina (syn: *Harim*)

This is an invisible space about 1.00–1.50 m wide alongside all exterior walls of a building which is not attached to other walls, and primarily alongside streets and access paths. It extends vertically alongside the walls of the building. The owner or tenant of the building has certain rights and responsibilities associated with his *fina*. Although Julian does not specifically mention it, its usage is clearly evident in Greek towns and villages that have survived since the post-Byzantine period, primarily from the post-1500s period. There is adequate evidence for this concept from pre-Islamic history in Arabia; the concept was thoroughly recognized by Muslim jurists and scholars in the extant literature of the Near East, North Africa, and pre-1500 Spain. It is a powerful concept and an effective tool that has done much to allow the articulation of the facades and thresholds along the public realm. Built-in benches near entrances, troughs for vegetation, high-level projections in the form of balconies and enclosed bay windows, and rooms bridging the public right-of-way (*sabat* – Arabic term – discussed below) were all possible due to implementing the various allowances of this concept. Maintenance

[13]Remarkable similarities have been found from the north of France in the 13th century. Probably due to the influence of Byzantine/Roman law, although the linkage has not yet been traced: *The Coutumes de Beauvaisis of Phillippe de Beaumanoir* completed in 1283. The County of Beauvais of the 13th century is located in the north of Paris. This book contains specific dynamic type of codes that are remarkably similar to the type of codes found in the 6th century Julian of Ascalon treatise on building and in Islamic codes from the Mid-East, North Africa and Spain. Consider this example from Chapter 24 on Customs (equivalent to the *Urf* in Arabic): *From article 706*: (But other building conventions are current in the bigger towns because the lots are narrower, for my neighbour may support his construction beams against my adjoining wall, whether I want him to or not, provided that the wall is strong enough for my house not to be in danger… continues). This clearly allows abutting of buildings together incrementally across the passage of time.

Figure 7. (a) Sid Bou Sa'id, Tunisia. A village located about 12 miles north-east of Tunis the capital, and is about 400 feet above sea level. The air photo was taken in 1970, and was published in the author's book: *Sidi Bou Sa'id, Tunisia: A Study in Structure and Form* (1978). Courtesy Office de la Topographie et de la Cartographie, Tunis. (b) Pyrgi, village on the island of Chios, Aegean sea, Greece, whose origins date back to the mid-14th century. The air photo is of the northern half of the village, taken in 1934. Courtesy Ministry of Public Works, Aerial photos Department, Greece.

of streets and private passageways, by keeping them clean and safe from obstructions, was also related to the responsibilities associated with using the *fina*. Figure 8a–d are examples from Tunisia, Greece, Italy, and Spain, respectively.

Visual corridors

Views – from primary windows, balconies, and terraces of houses – of the sea, mountains, gardens, and orchards were considered important in Byzantine and later Greek culture. Accordingly, stipulations and codes were devised to protect these assets. Evidence of such codes exists since the Roman period and from the late 5th century Constantinople. Figure 9 shows the major consideration of views of the sea in Julian's treatise.

In Islamic culture, protection from visual intrusion into the private realm of houses was the paramount consideration. Views were appreciated when available, but they took second place to the blocking of visual corridors into the private realm. Figure 10 was developed using the treatise of Ibn al-Rami in Tunis from the early 14th century. The original codes do not specify dimensions but rather intentions for performance. The dimensions indicated in Figure 10 are interpretations of this

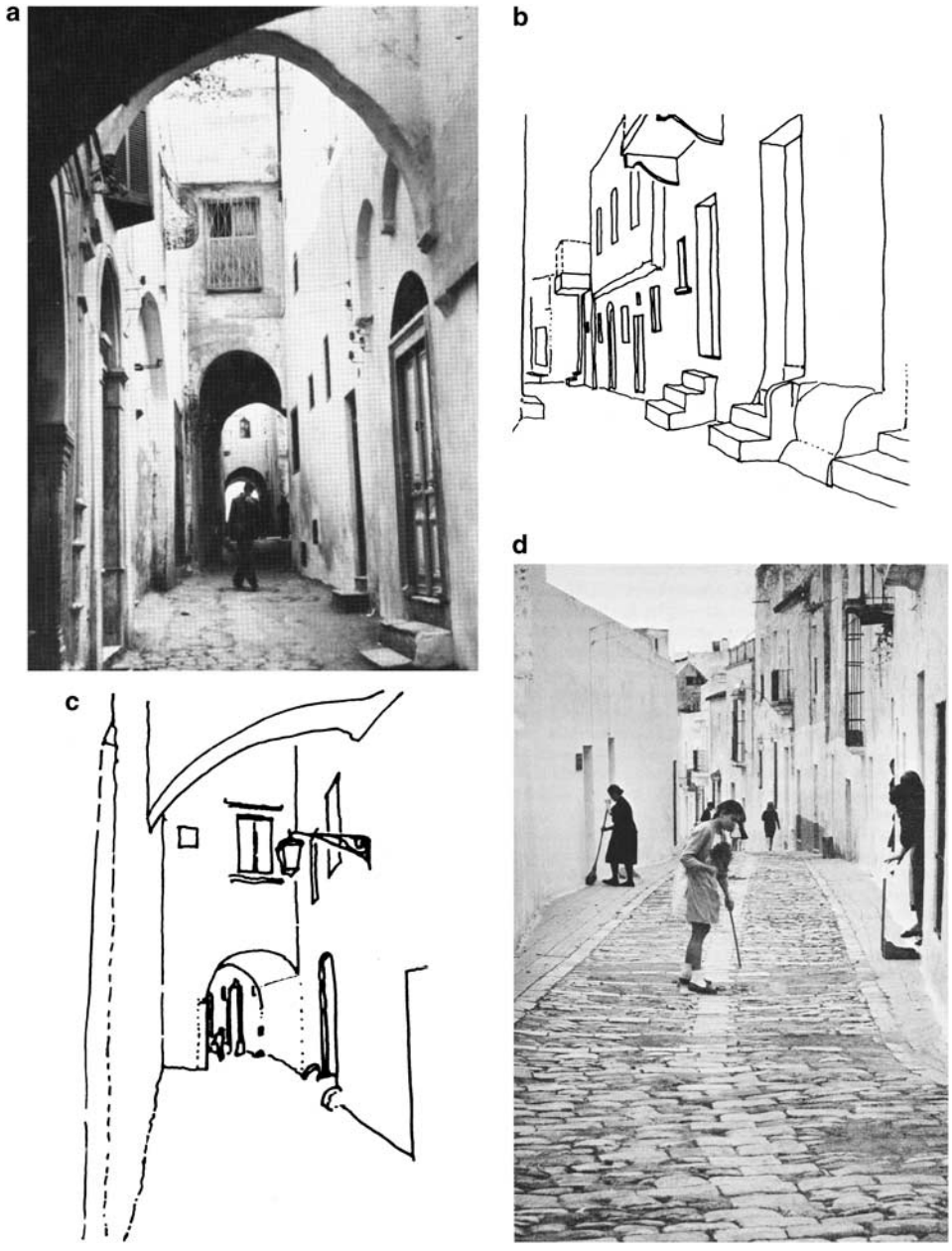

Figure 8. (a) A street in old Tunis, Tunisia. Note the steps for the house on the right are within the *fina*. Windows are above eye level, and the *sabats*. Photo taken by author in the mid-1970s. (b) A street in Amorgos town on the island of Amorgos, Greece. Note the steps to the houses on the right, the balconies on the upper level, and the upper level room projection are all within the *fina* space of the houses. Sketch by author after a photo in *Greek Island Villages* by Norman F. Carver Jr., 2001. (c) A street in Ostuni, Puglia region, Italy, near the Adriatic coast. Note the projecting lamp is high enough for traffic below it, and it is within the *fina* of the house. The *sabat* belongs to the house on the right. The arch, in the foreground, spanning the street is built to reinforce the stability of the walls implemented after agreement between owners of the houses across the street. Sketch by author after a photo in *Italian Hilltowns* by Norman F. Carver Jr., 1979. (d) A street in the village of Vejer de la Frontera, Cadiz province, Spain. The *Fina* on both sides of the street is cleaned by the residents. Photo by Bernard Rudofsky, early 1960s.

author. To discourage overlooking neighbouring terraces, roof terraces in many traditional towns in the Muslim world would be screened by parapets. Bay windows towards the public realm, usually located at upper levels, would be screened by wooden lattices which allowed views

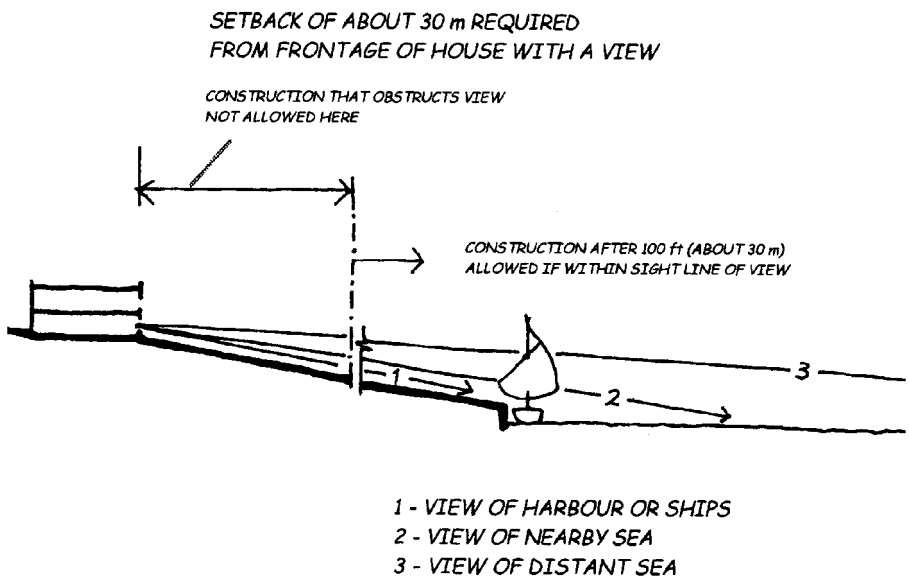

Figure 9. Preserving the view of the sea, and the categorization of the type of sea views as stipulated in Julian of Ascalon's treatise from the early 6th century. Sketch by author from his published study of Julian's treatise.

of the outside but prevented those outside from seeing in.[14]

Sabat (syn.: *Stegasto [Naxos]* and *Katastegia [Mykonos]*)

The configuration and possibility of bridging the public right-of-way emanates from the concept of the *fina*. It is a device that allows the creation of additional space attached to a building. Codes written by Muslim jurists clearly stipulate the legal rights associated with constructing *sabats*. In Figure 5 the *fina* is shown in section and an indication on how it merges from both sides of a street to form the *sabat*.

When buildings on both sides of a street are owned by the same person, then he can create a *sabat* by directly using the walls for support. When somebody else owns the building on the opposite side of the street, then the party who wants to build a *sabat* might decide to use columns for support abutting the opposite exterior wall. Or alternatively, both sides can be supported by columns that will then make the *sabat* marketable to the opposite neighbour at a future unknown time. Sometimes adjacent neighbours along the axis of the street might also decide to build *sabats*. This will result in continuous *sabats* abutting each other and forming a tunnel effect over the street. The question of height clearance for the right-of-way is addressed by Muslim jurists by stipulating that the clearance be high enough to allow the height of a rider of a beast of burden to pass unhindered. In certain regions the measure was a fully loaded camel. For example, in post-Islamic Toledo, the Spanish codes of the early 15th century prescribed that a knight with all his weapons be the measure for the clearance. One of the stipulations in Armenopoulos's *Hexabiblos* (mid-14th century) specifies that any projections, such as balconies, must allow a clearance of 15 feet above the street level.

There are other considerations to be aware of, which are not discussed in this study, related to the distribution of responsibilities among various parties whose decisions affected the built environment, the procedures that were followed in making those decisions, and the manner conflicts were addressed and resolved. There are numerous lessons for us to be learned from those considerations, particularly

[14]Also from *The Coutumes de Beauvaisis of Phillippe de Beaumanoir* completed in 1283 (see note 13 above), the issue of privacy and overlooking is addressed as it was in Islamic codes. Example *from article 708*: (When someone makes his garden or yard in a private place where the neighbours cannot see in, and one of the neighbours wants to build next to it, you cannot prevent him from building, but you can prevent him from building a door or window which would spoil the privacy of the yard or garden; for some people would do it in bad faith to take away their neighbours' privacy. Therefore a person wanting light on that side must put in an opaque window, then there will be light and the neighbour's place will not be spoiled).

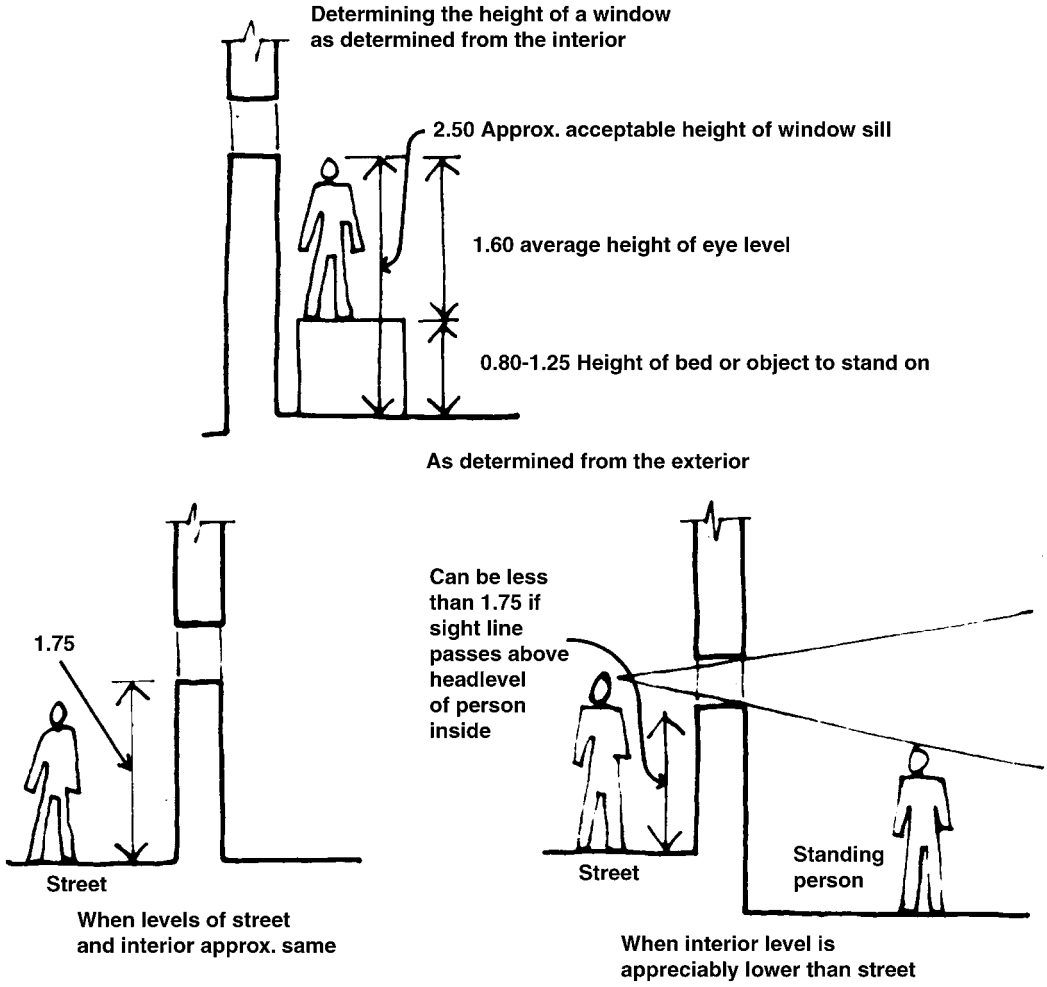

Figure 10. Determining the height of windows for the preservation of privacy in Islamic cities. The above sketch shows how to determine the height from the interior if the opening overlooks the private domain of the neighbours. The lower two sketches indicate how to determine the height of the window sills from the street so as to prevent looking into the interior. The original codes do not specify dimensions but rather intentions for performance. The dimensions shown are interpretations by the author. Sketches by the author from Hakim (1986).

in viewing them as precedence and possibly models, for simplifying our procedures and patterns of responsibility allocations that in many instances are hindrances to achieving equity and quality in the built environment.

Impact of codes on the traditional built environment

There are a very large number of examples from the southern and northern regions of the Mediterranean which demonstrate the impacts of the building and urban codes, briefly discussed above, on the built form qualities and characteristics of villages, towns, and cities. However, especially interesting is the phenomenon of towns in the Puglia and Calabria regions of southern Italy where a large number of towns exhibit astonishing similarities in their urban structure and form to those in North Africa. Yet the presence of the Muslims in those regions of Italy (excluding Sicily were Muslim rule lasted over two centuries) was of a temporary nature in the 9th and 10th centuries of the Common Era. We do find a scholar like Enrico Guidoni using the term 'Italian-Muslim town planning' to describe this phenomenon (Guidoni, 1979).

What processes and rules were followed in establishing towns in Puglia and Calabria?[15] Did

[15]My question does not apply to Sicily that was under Islamic rule for over two centuries (832–1056 CE).

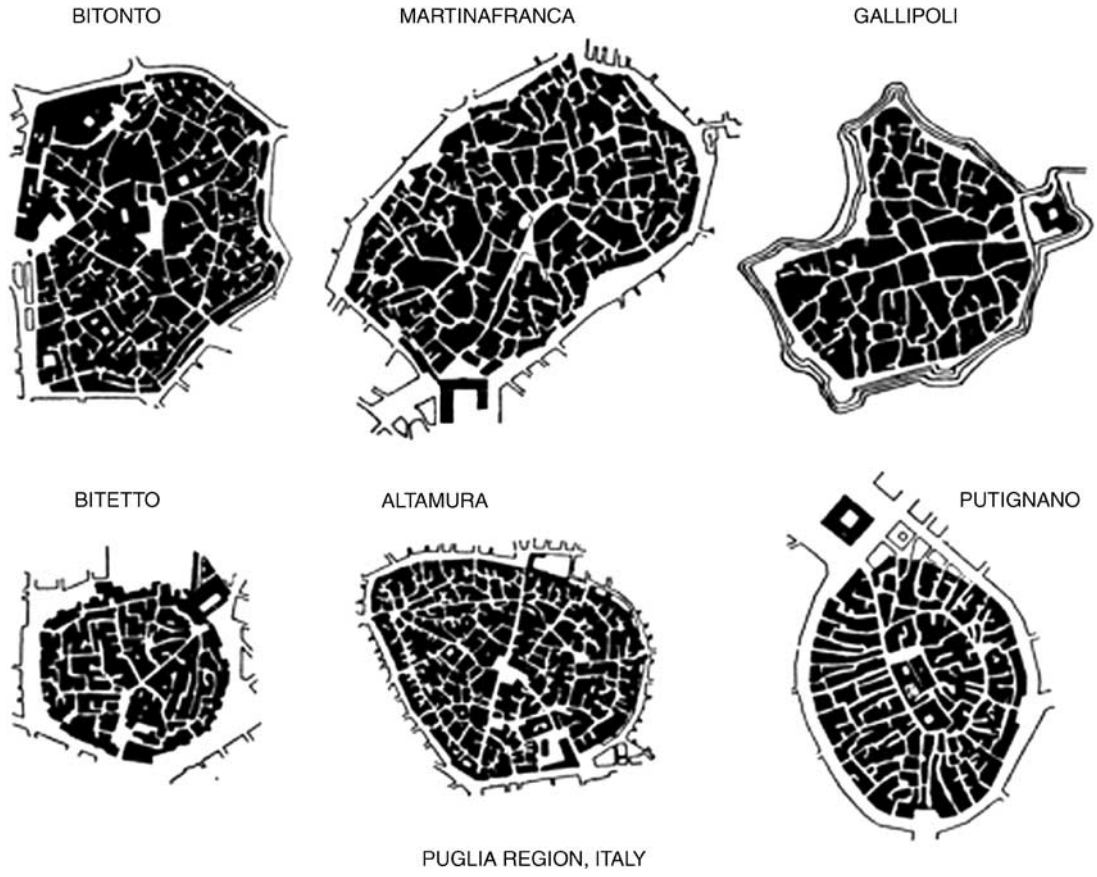

Figure 11. Six examples of traditional towns (not to the same scale) from the Puglia region located in the southeast part of the Italian peninsula. The Italian urban historian, Enrico Guidoni, made a study of the Islamic influence on towns in Sicily and southern Italy and his work was published in 1979 and 1984. This figure is from Guidoni (1979).

the Muslims have enough time to establish their system of urban development in the various towns of this region that display urban structure and form similar to Islamic urbanism? Figure 11 are plans of six towns (not to the same scale), Figure 12 is the plan of Cisternino, and Figure 13 is a view of a typical street in Cisternino. All seven towns are from the Puglia region of Italy. They all display astonishing similarities to Islamic towns, especially apparent in the street system comprising of through streets and cul-de-sacs. My own suspicion is that Byzantine codes were well established in this region and were embedded in the local customary laws that were used in the development of these towns.[16] Extensive research of this question is necessary and waits to be undertaken.

In such towns as Toledo and in numerous towns and villages in southern Spain, the effects of the rules and codes, which have their roots in the Islamic period, are on display. Casares, a town in the Andalusia province about 80 miles southeast of Seville, is one such example. However to acquire a more complete picture the phenomenon of the transition and changes to the built environment in the Iberian Peninsula from Islamic to Christian control is important to investigate and is currently being studied by the

[16]A Greek manuscript known as the 'Procheiron Legum' was found in Soverato on the eastern shores of Calabria, about 30 km south of Cantanzaro. This was possibly authored during the reign of Emperor Basil II (976–1025 CE), and subsequently revised in the reign of the Norman King Roger II (1101–1154 CE). The author is unknown but as evident from its contents he compiled this treatise from the two official manuals of the Ecloga of Leon III (717–741 CE), and the Procheiros Nomos of Basil I (867–886 CE). See *Procheiron Legum* (eds.) F. Brandileone and V. Putoni, Instituto Storica Italiano, Rome, 1895. Remarkable similarities to the 'Procheiron Legum' are evident in the contents of Julian of Ascalon's treatise and in Islamic codes.

Figure 12. The plan of the core of the town of Cisternino in the Puglia region of southeast Italy. The drawing is from the mid-1960s. *Source*: Edward Allen, *Stone Shelters*, Cambridge, MA, 1969, p. 147.

present author. However, from a cursory investigation some evidence of the continuation of Islamic law and practice and also the influence of Roman/Byzantine laws has been found. This is particularly evident in the codes of the Alarife institution, particularly from the available manuscripts written in Toledo and Cordoba that can be traced to the 15th century Common Era. The practices and impacts of Alarife institution continued in Andalusia well into the 19th century (Benito, 1986; Gonzalez, 1996).

Christian rulers also introduced concepts and specific stipulations that contradicted both Islamic and Byzantine laws. This was probably done to create a new identity for Christian rule via built form features in towns and cities, particularly considering the centuries of continuous Islamic rule. The results of such an investigation will illuminate theoretical issues related to urbanization in general, but more specifically to urban history in the Iberian Peninsula.

As for the Islamic world, we still find very large numbers of towns and cities that display the typical pattern that is based on the typology of courtyard buildings and the access system of through streets and cul-de-sacs. Granted, a number of cities in the Islamic world did not follow this pattern, choosing instead a different typology of buildings and urban morphology as evident in traditional towns of Yemen and the Southwestern region of Saudi Arabia. But therein lies the wisdom of the code system, which was responsive to different morphologies, because it was flexible, comprehensible, and easily implementable.

Customary laws and codes, with their distinct attributes, evolved in Greek towns and villages during the period of approximately 1500–1900, because of the lack of a central authority that imposed building standards at the local level. This has resulted in unique architectural and urban landscape features, still admired by visitors from all parts of the world. Unfortunately, this

began to change when the central authority in Athens began to impose its central codes and standards for the whole country from about the first third of the 20th century. Uniformity and sameness began to creep in slowly; the process continues to this day. In the mid-1980s, on the island of Paros, Greece, it was observed that the concept of the *fina* was alive and well, as was the use of *sabats*. However, if local traditional rules and codes are not revived in places such as Paros, all will be lost in the coming decades.

Lessons for contemporary and future practice

It is essential and instructive to understand the system and processes underlying the development of traditional towns and cities. Recent science can provide us with good analogies that clarify the phenomenon. John Holland's book contains useful insight (Holland, 1995). In Chapter 1 he explains what a Complex Adaptive System is and how it works by identifying Adaptive and Aggregate Agents. Individual agents behaviour is determined by a collection of rules that are a convenient way to describe agent strategies. These agents interact with each other according to rules that produce aggregation of agents at the next level and those may again be aggregated to add new hierarchal levels. Rules can change as experience is accumulated. This is precisely what occurs in traditional built environments as described earlier in the present article. What is also important to understand is that a complex adaptive system is non-linear and dynamic that creates unpredictable and diverse results within the framework of rules. Although multitudes of changes do occur, particularly at the micro level, overall coherence of the character and identity of the town or city is not compromised.[17]

In a recent study (Hakim and Ahmed, 2006) we have demonstrated how the traditional city in 19th century Northern Nigeria embodies the characteristics of a self-regulating and adaptive system. The self-regulating aspect is a result of the decisions and actions of specific individuals in starting new compounds or small farms. In doing so, they respond to existing conditions on adjacent properties by adjusting their planning and design decisions. Over time, changes and adaptations occur in compounds as their owners adjust and adapt to changes in neighbouring and contiguous compounds. The alignment of pathways and streets will be delineated and extended in response to the creation and/or changes of farm boundaries and compound walls.

Another important phenomenon that occurred in traditional towns is feedback. There are two types of feedback: negative and positive. It is the former that can handle random changes, and a way of reaching equilibrium and equitability. Positive feedback repeats the same action again and again and is associated with top-down prescriptive codes as evident in current zoning laws. The relationship between proximate neighbours depends on decisions affected by negative feedback, such as when a window from one house overlooks the private domain of another. The owner of the latter reacts by demanding that the window be sealed or removed. However, if the window was there before the new neighbour built his house, he must respond by laying out the house so that overlooking would not occur.

[17]The phenomenon of self-regulating and adaptive systems has been the focus of many disciplines for at least the last 50 years, such as in physics, biology, economics, and geography. It has been scrutinized by mathematics and has captured the imagination of social scientists whose interpretations brought the findings of these various disciplines, especially the life sciences, closer to urban planning and design. The following are brief definitions of the primary terms used to explain the phenomenon of *Emergence* – related to the term *Emergent Form* (the outcome that results from a bottom-up organization which follows its own set of rules that are often fairly simple). *Complex adaptive system* (a form of system containing many autonomous agents who self-organize in a co-evolutionary way to optimize their separate values). *Self-regulation* (When a complex adaptive system self-organizes itself it would need rules to follow during processes of change and growth. It thus forms such rules to follow, and they are generally few and simple). *Negative Feedback* (negative feedback tends to return the system to a balanced tranquil state where equity is maintained between adjacent neighbours). *Generative Program vs Descriptive Program* (a generative program is based on bottom-up rules that are understood and followed by various actors in a system. Their aggregate decisions create a unique emergent form. Whereas a descriptive program is one that is usually top-down directed and instructed where all actors follow the same rules regardless of their particular micro condition, resulting in a predictable outcome). *Non-linearity* (linear is a property of straight lines, of simple proportions, of predictability. Nonlinear on the other hand applies to systems that do unpredictable things, that cannot be exactly predicted and need to be approximated). *Agents and Aggregate Agents* (the basic elements of a Complex Adaptive System are agents. Agents are semi-autonomous units that seek to maximize their fitness by evolving over time. Agents scan their environment and develop schema. Schema are mental templates that define how reality is interpreted and what are appropriate response for a given stimuli. The term Aggregate Agents is used to refer to the aggregate result of decisions and acts by a number of agents).

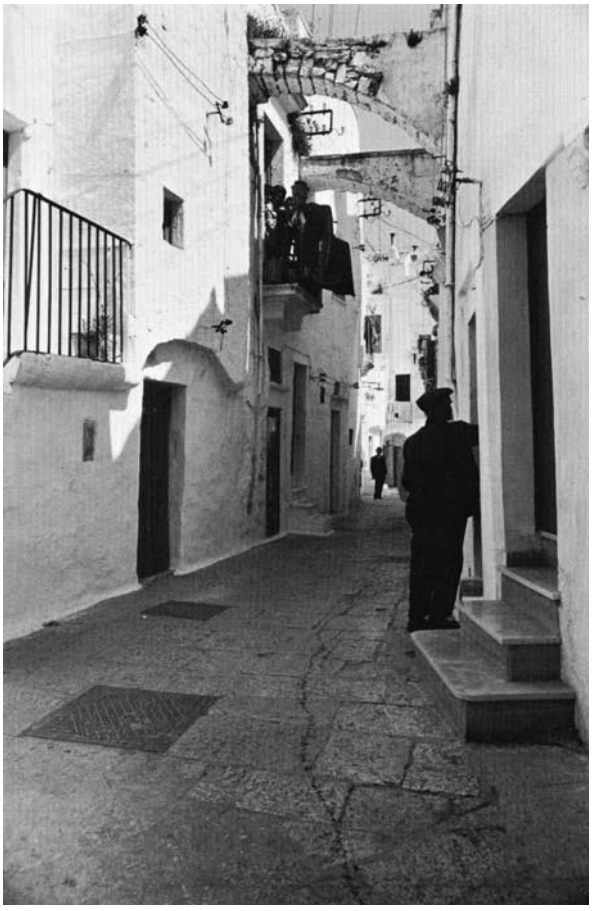

Figure 13. A typical view of a street in Cisternino showing the impact of the *Fina* and other features discussed in this study. *Source*: Edward Allen, *Stone Shelters*, Cambridge, MA, 1969, p. 157.

Emergent systems, such as we find in traditional Mediterranean urbanism, depends on living within boundaries defined by rules. The system's capacity for learning, growth, and experimentation derives from its adherence to these rules. Another important property in a living dynamic system is its network pattern. Networks of communications generate feedback loops, and such systems learn from mistakes. Thus, a community can correct its mistakes, regulate, and organize itself, as explained above in the example of negative feedback.

It is extremely instructive for further understanding the underlying generative system and its codes that shaped traditional Mediterranean towns is to use the analogy of the human or animal embryo. The following insight is from Lewis Wolpert's book (Wolpert, 1991). He uses the term 'generative program' as a framework for explaining how a generative system works:

> The embryo does not contain a description of the animal to which it will give rise, rather it contains a generative program for making it. It is like a recipe and different from a descriptive program, and a complex form can come from a simple program that is essentially contained within the genes that control cell behaviour. There is no 'mater builder' in the embryo. Each cell in the developing embryo has access to the same genetic information. A general principle of the embryonic organization is that 'small is beautiful'. There is no central government but rather, a number of small self-governing regions.

This is what occurs in a typical traditional built environment, that is, the cell referred to above is the agent or individual household, the embryo is the town under formation and once formed will continue to experience change and growth. The genetic information is the rules and codes that individuals follow without being dictated by a top-down authority. The small governing regions correspond to neighbourhoods in the town.

In a book by Virginia Postrel (Postrel, 1998), she asks in her introductory chapter: 'How we feel about the evolving future tells us who we are as individuals and as a civilization: Do we search for *stasis* – a regulated, engineered world? Or do we embrace *dynamism* – a world of constant creation, discovery, and competition?'

Mediterranean traditional urbanism and its associated generative processes, rules, and codes represent dynamic systems that allow creation and discovery and celebrate bottom-up decision-making processes. Current zoning codes, and recent attempts to replace them with form-based codes, are stasis in nature and are regulated, engineered, and mostly based on top-down decision-making structures. Yet it should be noted that form-based codes, such as the SmartCode, does provide advantages that are absent in current zoning codes.

Postrel's general principles for dynamist rules are remarkably similar to the principles of rules and associated decision-making processes found in most traditional built environments around the

Mediterranean. Postrel's five principles are:

(1) allow individuals (including groups of individuals) to act on their own knowledge;
(2) apply to simple, generic units and allow them to combine in many different ways;
(3) permit credible, understandable, enduring, and enforceable commitments;
(4) protect criticism, competition, and feedback;
(5) establish a framework within which people can create nested, competing frameworks of more specific rules.

In general therefore current types of coding, whether they are conventional zoning that dictate land use and enforce nominal prescriptive regulations for each use, or form-based codes that require adherence to very specific stipulations related to the form of the building or clusters of buildings are all top-down codes that are stasis in nature and cannot produce the dynamism discussed above.

On keeping rules simple, which was an essential attribute of Mediterranean codes, the book by Richard A. Epstein is very relevant (Epstein, 1995). He suggests seven simple rules that, in his estimate, will suffice to deal with about 95% of all possible situations facing the legal system in the US. His proposed rules are:

(1) self-ownership, or autonomy,
(2) first possession,
(3) voluntary exchange,
(4) protection against aggression,
(5) limited privilege for cases of necessity,
(6) taking property for public use on payment of just compensation, and
(7) take and pay.[18]

Regarding the question of how the law can be made to act dynamically, J.B. Ruhl's proposals are worthy of consideration (Ruhl, 1996). He proposes to make rights-based common law, a system that is adaptive, a corner stone of the legal system in the US. The three positive features of common law that he cites are: (1) Common law changes slowly and incrementally because it is limited by the dimension of rights as exercised and enforced that allows it to evolve with society's needs. (2) The common law tackles issues as they come, keeps their components together because it is adaptive and decides issues in their context, thus avoiding incomprehensible outcomes.[19] (3) The common law operates at the component interaction level *vs* current legal practice that, more often than not, tackles problems abstractly. The result is that the common law, because of its evolutionary qualities, is focused more on system structure and process thus avoiding it to fall into stasis.

All of the above qualities of the common law are very similar to the legal structure and its associated processes found in traditional Mediterranean societies. It thus enforces the qualities of complex adaptive systems and its dynamic nonlinear nature. It helps to self-regulate legal decisions and promotes the emergent qualities in the built environment discussed earlier because it is essentially a bottom-up system that responds to local micro conditions.

To further address the question: What are the lessons for contemporary and future practice? It should be remembered that modern towns and cities have employed many technologies that were absent in the past. Specifically the car and its requirements for street design and parking including multi-story parking structures, infrastructure technologies that include sewers, water, electricity, and communication lines. In addition, the contemporary city, at least since about the mid-20th century, has added various building types that did not exist in the past, such as airports, large hospitals, factories for numerous manufacturing processes, and so on. Therefore it is necessary to demarcate the city into sectors that would require control and management of infrastructure and buildings that are for public use and that require precision and technological

[18]For a detailed discussion and the rational for these rules see Part II of Epstein's book, pp. 53–148. There are many similarities in the spirit and purpose of these rules to the Mediterranean rules and codes that were discussed earlier in this study.

[19]For a detailed study of an issue that was a part of common law practice in the UK see the excellent study by Howard Davis, The Future of Ancient Lights, *Journal of Architectural and Planning Research*, **6**(2), Summer 1989, 132–153. The doctrine of ancient lights was also practiced in the early history of the US but was finally struck down by the New York Supreme Court in the case of Parker *vs* Foote, 1838 (19 Wend. 309). Another study that describes the workings of the common law in London during the 13th to 15th centuries is by Diane Shaw, The construction of the private in medieval London, *Journal of Medieval and Early Modern Studies*, **26**(3), Fall 1996, 447–466. A more general study that also discusses similar issues in medieval urban England is by Vanessa Harding, Space, property, and propriety in urban England, *Journal of Interdisciplinary History*, **32**(4), Spring 2002, 549–569.

know-how for their construction and maintenance, and the rest of most of the city that is dedicated to housing.

The lessons from the traditional Mediterranean experience, particularly its aspects of control, management, and coding, are primarily applicable to the housing sectors of contemporary and future towns and cities. The following essential principles, applicable to the habitat sectors of cities, need to be adopted and applied:

- Habitat, or housing, formation and its subsequent growth and change over time should be formed and designed to behave as a *Complex Adaptive System*.
- The system must also be *Self-Regulating*.
- The system must rely on feedback. *Negative Feedback* is what should occur during the process of self-regulation, as described earlier.
- The system must operate by a *Generative Program* and not a *Descriptive Program.*
- The generative program must be *non-linear* in nature, that is, it should rely on decisions that are informed by feedback.
- At the micro level *Agents* behave in *Adaptive* ways, and they form the next level of *Aggregate Agents* who in turn form another layer and so on. An agent could be an individual or a household.
- The *Responsibility* distribution between agents at various levels will require making changes to the current system of production and delivery, such as the role of the developer in assembling and sub-dividing land.
- The rules and codes should primarily be based on intentions for performance and therefore should be *Proscriptive* in nature. However, a minority of the codes might have to be *prescriptive*, particularly those related to technological elements such as the car and various infrastructure elements.
- The resulting system for habitat will be *Dynamic* in nature, which means that *Emergent* forms and configurations, particularly at the micro level, will be unpredictable. The resulting qualities of form will be unique to each location, thus enhancing the sense of place and identity at each micro level of the built environment. These unpredictable and sometimes surprising results will be evident from the level of the house design to the manner clusters of houses relate to each other, to the character of the public realm in streets, and to the level of a whole neighbourhood.

To summarize, the above principles are therefore anchored in the following keywords: Complex Adaptive System, Self-Regulation, Negative Feedback, Generative Program *vs* Descriptive Program, Non-Linearity, Adaptive Agents, Aggregate Agents, Responsibility Distribution, Simple Rules, Proscriptive *vs* Prescriptive, Dynamic *vs* Stasis, Emergent Form. See definitions in note 17.

Finally recent examples of attempts to work out alternatives to current practice in habitat production are highlighted. The work of Christopher Alexander comes to mind for theoretical constructs, and his built and unbuilt projects. This is amply documented in his recent four-volume book *The Nature of Order* (2002–2005). Volume 2 addresses process, and Volume 3 comprises many examples of built and unbuilt projects including a number of housing projects that attempt to recreate the underlying processes of traditional urbanism including the properties that are embodied in the list of keywords above.[20]

Leon Krier's Poundbury development, an extension of the city of Dorchester in Dorset, UK, is another example for attempting to re-create the character and sense of place of traditional towns and villages of that region. It is an example of a top-down structure of decision-making: from creating a general master plan to the manner in which the streets are laid out to the laying out the blocks for houses. The delegation for design of each building to a different architect, following a reasonably coherent code, is a process that is only partly similar to what occurred in traditional towns and has resulted in an environment with character and a sense of place. Needless to say that without Leon Krier overseeing the process at all its stages the results might not have been as successful. This is very different from development of traditional towns that did not have a master planner overseeing its development. However, Poundbury may be viewed as a first step experiment toward future attempts that will embody more of the principles that have been outlined above.

[20]For Alexander's work on neighbourhoods and related generative codes visit: http://www.livingneighborhoods.org/ht-0/bln-exp.htm. For Hakim's work on traditional Mediterranean towns and their codes visit: http://www.charrettecenter.net/Hakim. Also, see Hakim, B. Generative processes for revitalizing historic towns or heritage districts, *Urban Design International*, **12**(2/3), 2007: 87–99.

The SmartCode by Andres Duany *et al*, which is now in version 9.0, is rapidly being disseminated in the US via workshops, the Internet, and by other means. It is a model code that is designed to be adopted by local governments after changes are made to the code by using a process of calibration. The code is based on seven zones along a transect covering areas from the natural to the urban core and special districts. The implementation of the code requires a top-down structure and technical expertise due to its many provisions that are mostly prescriptive. Calibrating the code to a specific locality requires thorough technical understanding of how the code works and very sensitive reading of a locality's characteristics to make it locally friendly. As it relates to the lessons and attributes of traditional urbanism outlined above the code can be described as based on a descriptive program that relies on prescriptive stipulations. It is stasis in nature and does not foster unpredictable emergent form.

An attempt has been made recently by this author to incorporate various attributes of the processes that shaped traditional towns in a project sponsored and funded by the UNDP (United Nations Development Program) for revitalizing the historic sectors of the towns of Muharraq and Manama in Bahrain.[21] Briefly, a control, management and coding system has been developed that is based on a revival of the traditional system but adapted to the current structure of government in Bahrain. The proposed system embodies most of the principles and attributes of traditional towns that have been summarized above.

Conclusion

We have seen from the material in this study how traditional towns located around the Mediterranean and beyond display individual uniqueness in their built form qualities and overall physical attributes including a strong sense of place. We also know from observation and research that residents develop a strong sense of attachment to their town and always remember with fondness the sense of place in and around their neighbourhoods later on in life when they are living elsewhere in 'modern' contemporary built environment settings.

The study also demonstrates and explains the typical coding system and its attributes that was used. What is remarkable, however, about this coding system and its related decision-making mechanism – particularly as it relates to building in sequence and the steps that are appropriate for each family and for each neighbourhood – is that it clearly replicates natural phenomenon and related processes of inception, growth, change, rejuvenation, decay, and re-birth. The phenomenon of *Emergence* that was discovered and elaborated on within the last two decades by scientists from different disciplines confirms that these traditional towns follow models of sustainable natural processes.

In the current awareness among concerned individuals and societies about global warming, sustainability, democracy, and the strive to achieve justice, equity, and quality in the built environment that the lessons of the model of traditional towns from around the Mediterranean and in countries that have followed a similar pattern of development, that we find inspiration and clear lessons to follow and implement now and in the future.

Acknowledgements

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[21]The article in *Urban Design International*, mentioned in note 20 contains a brief description of the Bahrain project. Work on that project by Hakim was completed at the end of February 2006.

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