

Paper No: 151 The Architecture of Climate: Studies in environmental history, Smythson and the Smithsons

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Abstract

One of the primary functions of architecture is its role as a modifier of climate. The work presented in this paper offers an historical perspective of the relationship between architecture and climate. The focus of the study is the British climate and the architecture that has been fashioned in relation to this in the period from the end of the 16th century to the present day. To establish something of the historical scope and the methodology of the research, this paper presents studies of two buildings that mark the beginning and the near end of this period. These are Hardwick Hall (1590-1597) attributed to Robert Smythson and Upper Lawn Pavilion (1959-1962) by Alison and Peter Smithson.

Keywords: architecture, climate, history, culture

1. Introduction: Describing Climate

The recording of objective climate data has a long history and the oldest continuous instrumental record of climate is the Central England Temperature (CET) series that collates monthly temperature data from 1659 to the present (1) (Fig. 1). The methods of modern meteorology were firmly established by the end of the 18th century and Luke Howard's *The Climate of London* (2), first published in 1822, presents detailed daily data for a period of over twenty years.

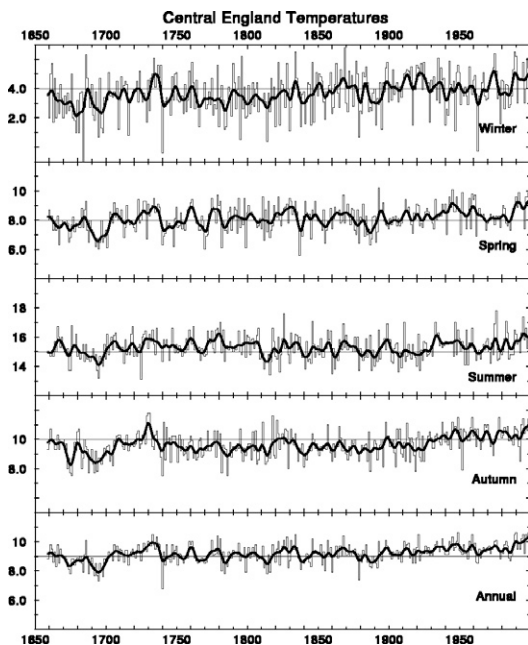


Fig. 1 Central England Temperature Graphs, After G. Manley

In one of the standard works on the climate of the British Isles, the meteorologist, H.H. Lamb wrote,

“The climate of these islands ... is moderate as climates go, though its continual changes of mood are interesting and may help to keep us sprightly.” (3)

A more detailed description (4) expands this,

“The western and northern parts of the United Kingdom tend to lie close to the normal path of the Atlantic depressions. are mostly cool and windy. The lowlands of England have a climate similar to that on the continent (drier with a wider range of temperatures than in the north and west). However, the winters are not as severe as those on the continent. Overall, the south of the United Kingdom is usually warmer than the north, and the west is wetter than the east. The more extreme weather tends to occur in mountainous regions where it is often cloudy,

These sources represent an invaluable resource for historical research in architecture, but it is essential also to seek other, non-scientific, references to climate in pursuit of the needs of the present research.

The cultural historian, Jan Golinski, writing of 18th century Britain, (5) observed that,

“The British weather came to be seen as an example of God’s providential goodness to the island’s people, his benevolence in bestowing upon them conditions that fostered the growth of agriculture and commerce. The national climate was represented as bound up with the character of the people and a condition of the progress of their civilization.”

Golinski makes extensive reference to the daily records for the year 1703 as reported by an anonymous diarist living in the village of Edglock in Worcestershire (6). This is meticulous in its detail, and adopts verbal descriptions, metaphor and philosophical reflection rather than numerical data. Equally potent sources may be found in the writings of English poets and novelists. For example, the scholar of English literature, Jonathan Bate, points out Jane Austen's characterisation of climate in *Emma* (7)

“The weather – ‘a sun bright, without being oppressive’ – is made one with the social structure. Here Austen is inheritor of a long tradition of European thought which associated a temperate climate with a liberal society and excessive heat with oriental despotism.”

From these and numerous other sources we can begin to construct an understanding of the climate history of Britain expressed both as numerical data and, equally important, as human experience. The aim of the present research is to examine how architecture may be interpreted as both an instrumental and a cultural response to climate. The intention is to construct an account spanning four centuries of architectural history. The method is to identify specific instances in which these connections may be drawn with particular effect. In the present paper the broad outline is sketched by studies of just two buildings. We begin at the end of the 16th century with a study of Hardwick Hall, designed by the architect Robert Smythson for a remarkable patron, Elizabeth, Countess of Shrewsbury – usually referred to as Bess. Then, to represent the 20th century, we retain the name Smithson in a study of Alison and Peter Smithson's tiny weekend house, Upper Lawn.

2. Climate history and architecture

Hardwick Hall (Fig. 2) stands on a hilltop in Derbyshire in the English midlands (Lat. 53°10'N, Long. 1°18'W, Elev. 179m.). Construction of the house began in 1590 and it was first occupied in 1597 (8). Its striking appearance soon attracted the appellation, 'Hardwick Hall, more glass than wall'. The exterior of the building observes a strict symmetry, but its internal organisation, in both plan and section, is complex and free in its arrangements of apartments of diverse dimensions and purposes (Fig. 3)



Fig. 2 Hardwick Hall, west front

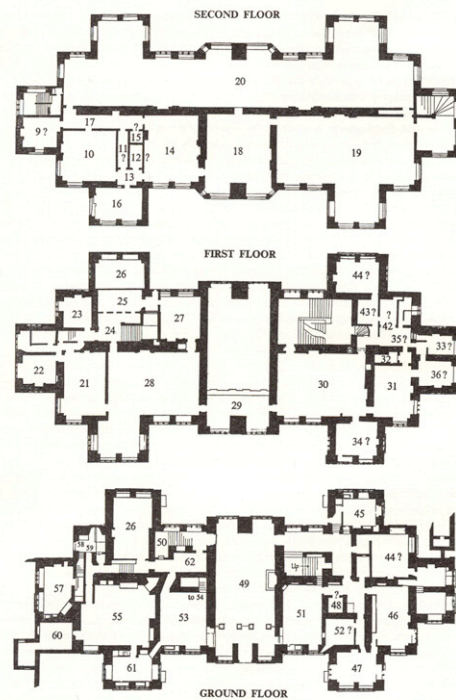


Fig. 3 Hardwick Hall, floor plans

The long axis of the house runs north-south. This is defined by a load-bearing wall that, at the second floor, runs the entire length of the house. At ground and first floors this is interrupted by two lateral walls that define the double-height entrance hall. These walls contain at least 27 fireplaces and, thus, deliver heat to all the principal rooms. It was these, fuelled by coal from a mine on the estate, that offered the prospect of warmth in compensation for the heat lost through the large areas of glass. The tall chimneys that are part of the house's remarkable silhouette, eloquently express the warmth to be found within the house. But the disposition of the apartments within the body of the house also reveals an environmental sensibility. In apparent contradiction to the external symmetry, the rooms are arranged in response to both the elaborate ceremony of aristocratic life in Elizabethan England and to the dictates of orientation. The ground floor houses the practical spaces, kitchen, nursery; the main hall was primarily the domain of servants. and so forth, the kitchen at the cool north end, children to the warm south (9).

Bess had her own apartments, for both day and night, along with those of the closest members of the household, at the southern end of the first floor. Others of lower rank were located to the north. It is inconceivable that this differentiation was made in ignorance of the benefits of the warming effect of the sun in this climate. The second floor is of immense height, 8 metres floor-to-ceiling, and houses the grandest apartments of state. The whole composition is inter-connected

by the remarkable staircase that heads southwards, from ground to second floor (Fig. 4).



Fig. 4 Hardwick Hall, staircase looking south

The high great chamber sits at the south-west corner. (Fig.4) It was here that important guests were received and feasted. Such occasions also included dramatic and musical entertainments. Again the orientation would have been advantageous and the flood of ever-changing, natural light would have enhanced events. Dinner was usually served at 11.00 am and supper at 5.00 pm. After dark, light was provided by candles, distributed and carried around the house. An inventory of household effects, dated 1601, shows that the great double height hall was lit by, "too great Copper Candlesticks with severall places to set lightes in hanging in too ropes paineted, four plate Candlestickes of brass to hang on the wales" Twenty-six portable candlesticks were kept at the Porter's Lodge for use throughout the house. We would, therefore, expect the house to take on a very different aspect after dark. Moving from the brightest daylight to tiny, flickering points of candlelight and glowing embers in the fireplaces.



Fig. 5 Hardwick Hall, high great chamber

The entire eastern side of the second floor is occupied by the Long Gallery, which is 51 metres long and between 6.7 and 12 metres wide (Fig. 5). Here the relationship between the glazed envelope and the fireplaces in the spine wall is most clearly revealed. The walls as those of all the principal rooms are covered with tapestries over which paintings, principally family portraits, are hung. The gallery was sparsely furnished and was used as a further reception space and, significantly in the present discussion, as a place for exercise during inclement weather.



Fig. 6 Hardwick Hall, long gallery in the 19th century

In good weather exercise was also taken on the "leads" of the flat roof. The six turrets, rising high above the roof, were mainly used for storage, but that at the south end was described as a banqueting room. In those days the banquet was a dessert course served following a meal. The elevation of this turret, with views over the surrounding countryside, and warmed by the sun through its great east, south and west facing windows would have been a perfect environment for this.

It is possible to construct a provisional sketch of the environment within the house from surviving records (10). From these fragments it may be deduced that the house was cold in winter. In a commentary to the 1601 Inventory, Peter Thornton describes the "elaborate steps" taken by the Countess of Shrewsbury to defend her bed chamber and her withdrawing room against "the rigours of the Derbyshire climate". These included thick curtains and "Coverlettes" at the windows and the door. Her bed had thick enclosing curtains, upon it were numerous quilts and blankets and it was surrounded by eight warm mats, to protect her feet against the cold of the floor. The Countess was around 70 years of age when she moved into Hardwick on 4th October 1697. It is not surprising that, at this age, she felt the cold of winter and her discomfort was almost certainly increased by the then nature of the English climate, for this was one of the coldest periods of the "Little Ice Age" that affected the global climate from the 14th to the 19th century. In England the 1590s were the coldest decade of the century (11). On its hilltop the house would have been particularly exposed to this extreme weather. On the other hand we should take into account the expectations of "comfort" of the first Elizabethans. These would be formed by their experience of earlier and contemporary houses, which, even though they did not push the relation of window to wall to the extremes of Hardwick, would also have offered, in comparison with our modern expectations, only primitive comfort in winter.

Analysing Hardwick in the terms of modern environmental design principles we can say that

the relation of external envelope to internal sources of auxiliary heat was conceived with clear logic. Furthermore the disposition of individual, apartments within the powerful symmetry of the exterior form demonstrates a deep understanding of the effect of orientation upon interior conditions in the English climate. The position of Lady Shrewsbury's personal rooms at the southern end of the plan and in the middle of the vertical organisation could almost be described as optimum, if such a term would have occurred to an Elizabethan. Most importantly, these practical arrangements work in absolute concord with the ceremonial purpose of the house, the splendour of the great rooms on the second floor being powerfully reinforced by the floods of ever changing light that enter through the transparency of the external envelope.

My second building brings us forward three and a half centuries to the middle of the 20th. We remain, however, with the name Smythson/Smithson. Alison and Peter Smithson were two of the most important practitioners and teachers of architecture in Britain in the post-war years (12). The Smithsons knew and greatly admired Hardwick. In 2001, in a conversation with students, Peter described the environmental essence of the long gallery.

“The organization of the house was based on the available coal. In this part of England coal was produced at the time. Fuel found formal expression in the organization of houses, so that in winter you have screens around the gallery against the fireplaces, and in summer you moved into the bay windows.” (13)

It is clear to me that this analysis arises from, but also informs, a key aspect of the Smithsons' own practice. Over some 40 years their work demonstrated a consistent engagement with the relation of architecture and climate, although this has to date received relatively little attention in the critical debate regarding their work.

A significant early example of this environmental interest was the project for an 'English Climate House', 1957. Here, in just two sheets of sketches, they showed how the form and organisation of a house might be arranged as a direct response to the conditions of climate. Matters of orientation and the relationship of solid to void and the configuration of individual rooms are carefully considered.

These sketches were made at the time when they were designing and constructing Upper Lawn (1959-1962), a small weekend house for themselves and their, then, young family.

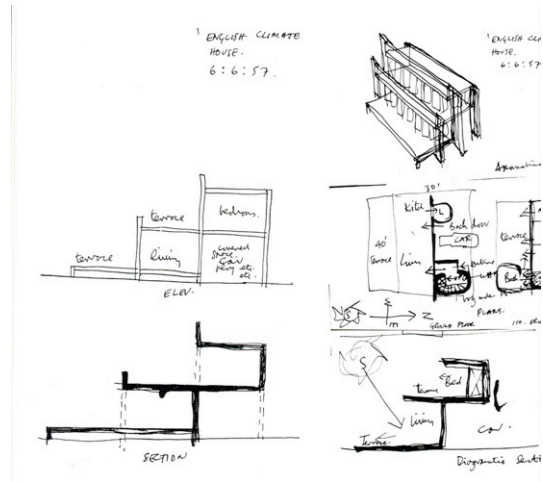


Fig. 7 Alison and Peter Smithson, The English Climate House, 1957

In its original form Upper Lawn, which is in Wiltshire on the threshold of the so-called West Country, was as rudimentary as Hardwick (14). At a very different scale and with totally different social intentions it demonstrates, I propose, a deliberate rejection of 'modern comforts' in realising a historical continuity of response to the characteristics of the climate in which it is set and, simultaneously, brings this to the service of convivial inhabitation.

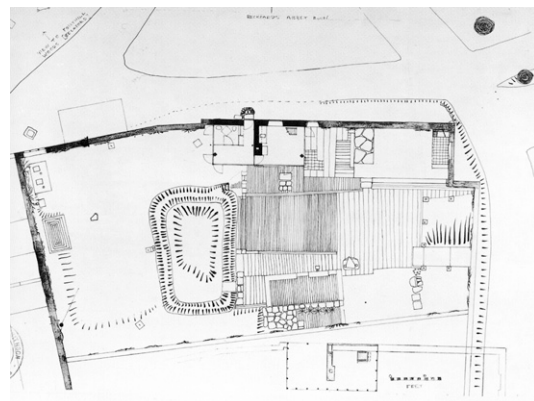


Fig. 8 Upper Lawn, plan

The site is at the edge of an ancient farmyard. As found, its principal feature was an existing stone wall running east-west (Fig. 7). The house is a simple two-storey, structure, with a concrete first floor slab supported on columns wrapped in a timber-framed enclosure located to the south of the wall. The elevations are fully glazed to east, south and west and the north façade is clad in aluminium sheathing except for a large fixed window that allows a view to the north west. A new masonry core was constructed perpendicular to the existing wall containing a chimney, the simple kitchen and sub-dividing the enclosure at both levels. The entrance is from the north and the bathroom, kitchen and dining are at ground level. A ladder-like stair gives access to the first floor and the two spaces served as living/sleeping

quarters. The area to the east of the house is an extension of the living space, enjoying the southern aspect against the protection of the ancient wall. This incorporates a large, ingle-nook like fireplace.



Fig. 9 Upper Lawn, view from south-east

The design adapts the generic principles of the “English Climate House” to the specific conditions of this site. It also posits an alternative, one might say primitive, interpretation of the norms of comfort that informed most domestic architecture of the time. The glazed enclosure was intended to capture useful solar heat gains and the cleverly detailed sliding screens at ground floor allowed easy extension of the space.



Fig. 10 Upper Lawn, interior

When first built the house had minimal services. The image of the interior (Fig. 9) shows the kitchen, with bottled gas for cooking, a small solid fuel stove and candlesticks on the folding table. A piped water supply was provided to the kitchen sink and, of course, to the bathroom.

As a weekend refuge the house was freed from the need to provide conventional levels of comfort. Peter Smithson described life there as ‘camping out’ (15). But the house provided the Smithsons with a much-loved refuge for many years. In addition to accommodating the family as the children grew, it was also a place for work and, for many years, was where they wrote many of their influential essays.

Even with the deficiencies of single glazing, the house would capture useful solar gains in winter, to supplement the heat from the stove. At all seasons the direct connections between in and out would be savoured and from spring to autumn

life would extend out of doors in sympathetic response to the English climate.

The Smithsons used the terms ‘sun acceptance’ and ‘energy containment’ to describe the environmental basis of their architecture. They wrote that,

“The stress is on the needs for immediacy of response and reaction to the changeable weather of England; the almost constant need for full or partial weather protection from one quarter or another, a need that can change several times throughout an afternoon ... Northern Europe involves us inevitably in sun acceptance, amelioration of climate and, above all of exclusion of rain.” (16)

The elements of this analysis were eloquently summarised in an image made in 1977 (Fig. 10).



Fig. 11 Alison and Peter Smithson, a ‘replenishment’ image, 1977.

4. Conclusion: The Architecture of Climate

This paper is the first, tentative presentation of the work of a research project that aims, eventually, to cover a period of four centuries of British architecture’s evolving relationship with climate. In that period the essentials of that climate, have changed little in broad terms, but there have been significant deviations from this generalisation. These include the ‘Little Ice Age’ and, later, the effects of urbanisation in transforming the naturally occurring climate, particularly that of the city, through pollution. The effect of the Little Ice Age would certainly have had an influence on both the conception and first inhabitation of Hardwick Hall at the end of the 15th century. Upper Lawn was designed in response to a less demanding climate than that, as mean temperatures in Britain have slowly risen since the middle of the 19th century. Nonetheless its architects were, unusually at that date, acutely sensitive to “the changeable weather of England” and the house, in its extreme simplicity, is a carefully considered response to that. Both buildings may be read as analogs of the climate in which they are set.

Their form, material and organisation are encoded climate.

All the accounts of the life of Elizabeth, Countess of Shrewsbury, and studies of the works of Robert Smythson suggest that the house was intended to symbolise the ultimate in political and social ambition, realised through the most extravagant architectural expression – ‘more glass than wall’. Nonetheless the intention would be to achieve this without sacrificing comfort within the expectations of the time. The extent to which this was achieved is hard to determine. Was it better or worse than other houses at that date? But we can say that, on *prima facie* evidence, the organisation of the house in relation to orientation and the understanding of patterns of seasonal occupation reveal sophisticated environmental understanding.

A similar claim may be made for Upper Lawn. In comparison with subsequent examples of so-called ‘low-energy’ houses built in Britain it has obvious technical shortcomings. But its clarity of form and construction, its modernity and its engagement with its context, of both climate and place, speaks more eloquently of the conditions and boundaries that climate impresses on architecture in Britain than many more technologically developed designs.

The point I wish to make in conclusion is that the issues of environmental design in architecture are deeper and more diverse than the purely mechanical observance of technical principle. Historical analysis has a role to play in adding depth to the continuing development of the architecture of climate. The further stages of this research will aim to reinforce this proposition through the study of examples of British architecture in the centuries that lie between Hardwick Hall and Upper Lawn.

5. Acknowledgement

The idea of representing Hardwick Hall, as ‘environmental’ architecture was first suggested to the author by Peter Smithson in a conversation in 1986. Now, over 20 years later, it is this intuition that informs the present research.

6. References

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