Urban Typology, Morphology, Iconography

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Urban typology, morphology and iconography are methods of analysing, interpreting and developing the shape of the city. They consider the built, i.e. materially realised form of the city in its historical context, but differ in their focus, which results from the different origins of the methods: typology has a long tradition in architecture; morphology is mainly shaped by geography; iconography developed in art history. While *iconography* analyses the actual visible forms of the city as well as the visual representations of cities, *typology* and *morphology* mainly deal with the shapes and structures which are physically existent but not directly visible such as the footprint of the city and represent them with maps or plans like black plans (showing building footprints), floor plans (showing building ground floor plans), or lot plans (showing boundaries of urban lots). However, urban typology and morphology are not restricted to the analysis of the city plan, but can also include the analysis of urban spaces, silhouettes or building facades, thus overlapping with urban iconography.

1. Typology

Among these, typology has the longest history as a method for analysing the built environment. It was developed and used in the field of architecture not only for analysing but also for producing buildings. The most basic distinction since Renaissance architectural theories is between building types for public and private buildings. Architectural handbooks by Sebastiano Serlio in the 16th century (1966), Pierre Le Muet (1623), or Leonhard Christoph Sturm (1715) developed a highly differentiated typology for private urban houses, giving examples from the most humble house of an artisan to the most exuberant palace of a nobleman. These house-types are represented by floor plans and facade views, thus combining typological and iconographic aspects. A first step to enlarge the architectural typology into the urban scale was undertaken by Giambattista Nolli, who introduced the floor plan of public buildings like churches into his urban map of Rome in 1748.

The concept of architectural typology was refined in the age of Enlightenment in France. Jean-Nicolas-Louis Durand presented a system for designing buildings for dif-

ferent public building types, a task which had become prominent especially after the French Revolution (1801). Antoine Chrysostome Quatremère de Quincy specified the understanding of the type by elaborating the differentiation between type and model (Quatremère de Quincy 1825). While the model is repeated exactly 1:1 in each exemplar, the exemplars of the type all differ slightly. Thus, the type only is the ideal form which is in the minds of the producers, while the actual buildings following this type can differ among each other in many aspects. As an abstract ideal, the type can never be concretely built. On the other hand, this concept offers the possibility that within the built examples of a type a certain variety can emerge in contrast to the model where every example is identical.

Fig. 1: Saverio Muratori, typological plan of Venice, Quartiere di S. Zulian, phase IV: present state (1959)

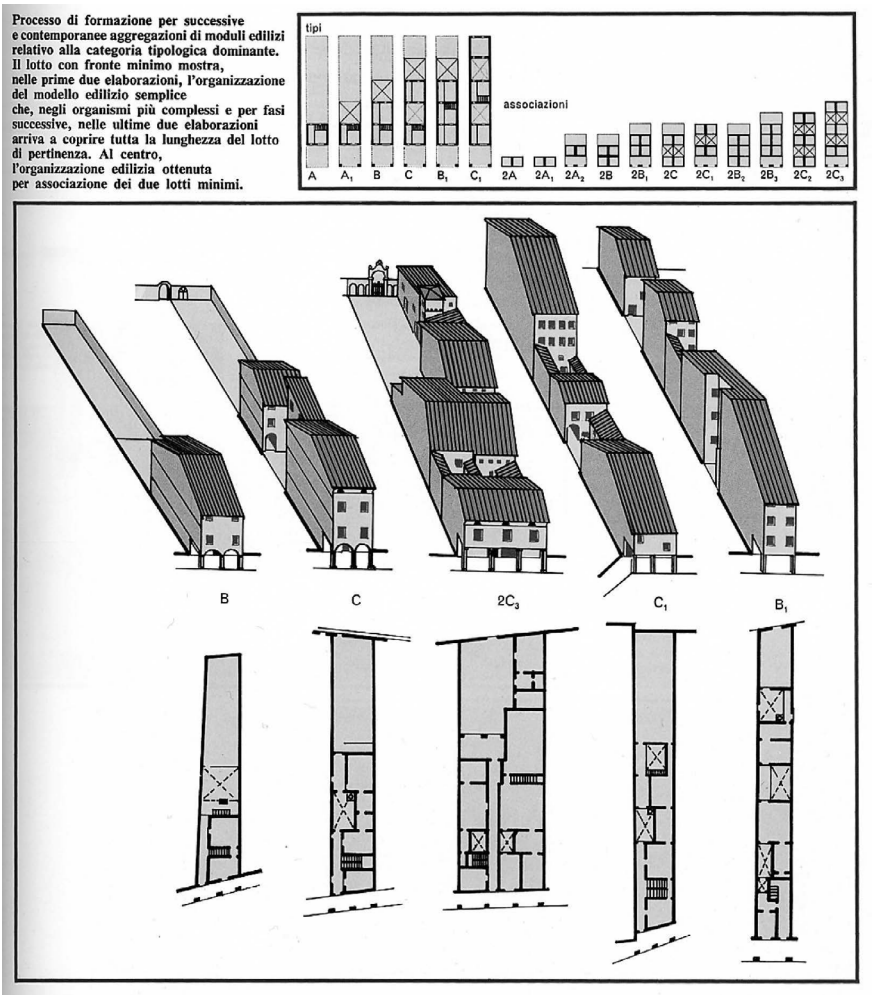
Fig. 2: Aldo Rossi, "zuammenhängende Grundrissaufnahme" (continuous floor mapping), Zurich, 1973 (gta Archive, ETH Zurich)

In the following times, the concept of typology was used both for the analysis and production of architecture. Within this concept it is useful to distinguish between the type (the existent group of similar buildings), typology (the method of arranging these similar buildings to a group and interpreting them as a type), and typological design (the method of developing a design for a building according to the rules of a presumed type). Another useful distinction is between the building type and the building task. A functionalist approach such as Nikolaus Pevsner's *History of Building Types* ignored this differentiation as it was based on the assumption that the architectural form directly followed from the function of the building (1976). Thus, he structured his book according to building tasks such as churches, town halls or hospitals, which in fact had been designed according to quite different building types.

Architectural and urban typology were merged in the studies by Saverio Muratori in Italy. His "storia operante" especially of Venice but also Rome included the floor plans of private buildings into the town plan, thus bringing the structure of the city into directly visible connection with the structures of its buildings (Muratori 1959; 1963; see fig. 1).

Again, his method had two goals: the analysis of the built environment of the city according to its historical development, including the reconstruction of lost phases by

Fig. 3: Development of house types in Bologna (Cervellati/Scannavini/De Angelis 1977)



applying the rules of types on the one hand, and the design of appropriately fitting new urban areas and buildings according to the existing types of urban structures and buildings.

The notion of type was fundamental to Aldo Rossi in his influential book *The Architecture of the City* (1966). In contradiction to the contemporary strand of functionalist urban planning with its assumption that the form of the city just followed the actual practical needs, Rossi considered the urban fabric as a long-lasting entity which offered opportunities for different functions over time. The form of the urban fabric did not follow functions, but form. Within the built urban fabric, he distinguished two different categories of buildings: the monuments which remained constant also in their materiality over time (such as antique amphitheatres, which could become urban neighbourhoods

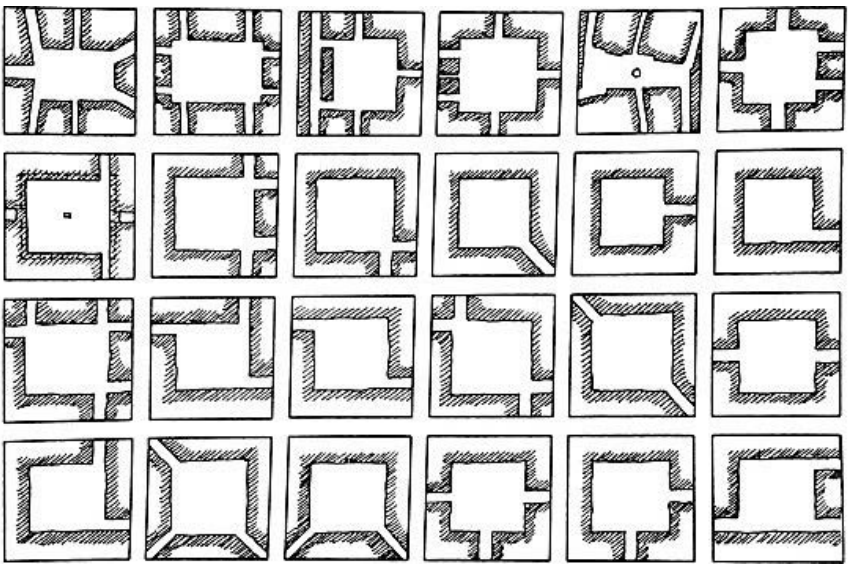
Fig. 4: Josef Paul Kleihues, Berlin-Atlas, plan showing blocks, buildings and entrance situations in Charlottenburg (Kleihues 1973b)

in medieval times) and the town houses of everyday life, where the material structure changed over time but the type remained constant.

The appropriate method of understanding the city as a built environment with its necessarily long-lasting forms therefore was an accurate mapping of the city with the floor plans of the buildings. Such a city floor plan included both the plans of the lasting monuments as well as the plans of the town houses following the long-lasting types. A

Fig. 5: Hans Koepf, facade view of a street showing a specific building type, Schärding (1972)

Fig. 6: Rob Krier, Stadtraum in Theorie und Praxis, typological plate showing examples of rectangular squares (1975)



starting point for a series of so called "zuammenhängende Grundrissaufnahmen" (continuous floor mapping) became the plan of the inner city of Zurich, which Rossi realised with students at the ETH Zurich in 1973 (see fig. 2).

This approach of typological studies by using architectural and structural mapping was continued, enlarged and refined by Gianfranco Caniggia with his studies on Como and Florence (1963; Caniggia/Malfroy 1986; Caniggia/Maffei 2001) and with the research project on Turin by Augusto Cavallari Murat (1968). This typological approach was then applied for the restauration of a historic town in the case of Bologna from 1969 onwards. Under the direction of Pier Luigi Cervellati, the city centre was protected and renovated according to different classes of buildings reaching from monuments, which should be maintained in their original materiality, to ordinary town houses, which could be

renovated or even rebuilt – but according to their historic types (see fig. 3; Cervellati/Scannavini/De Angelis 1977).

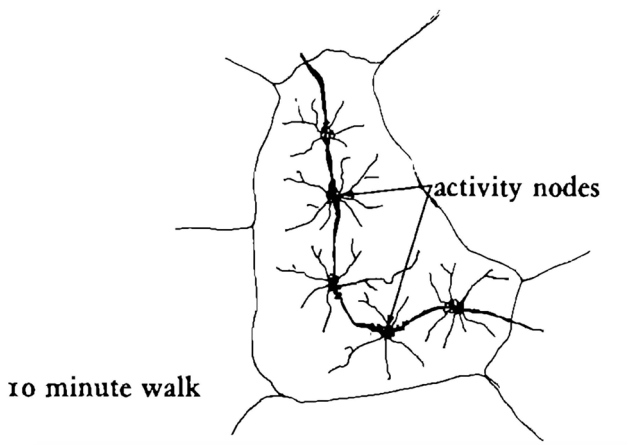
In France a similar approach of typological analysis was practised by Jean Castex and Philippe Panerai in their study on Versailles (Castex/Céleste/Panerai (1980). They also presented a broad research on the typology and development of the urban block (Panerai/Castex/Depaule 1980).

With inspirations from the Italian culture, Josef Paul Kleihues produced two model studies on urban neighbourhoods in Berlin in 1973 (1973a and b). In his *Berlin-Atlas*, he analysed the structure of the urban fabric according to different aspects such as block forms, lot divisions, house units, entrance situations, definition of public space and sorts of use. These aspects were represented in a series of maps which, put together, offered a holistic image of the urban neighbourhood (see fig. 4). This sort of typological analysis then became the basis for the development of Berlin during the International Building Exhibition (IBA 1984/87), which Kleihues organised according to his method of "critical reconstruction".

In his studies on Austrian cities, Hans Koepf complemented the continuous representation of floor plans with the continuous representation of facades. His books, starting with *Stadtbaukunst in Österreich* (Koepf 1972), included redrawn facade views of entire streets, thus offering both the understanding of the house type with its similarities and its diversities in each exemplar as well as the image of the entire street (see fig. 5). Thus, his approach can also be seen as a combination of urban typology and urban iconography.

A more abstract typology of urban spaces is offered by Rob Krier's *Stadtraum in Theorie und Praxis* (1975). He arranges urban squares according to geometric figures and presents them in typological plates (see fig. 6). His analysis is mostly intended to create a tool for future design.

Fig. 7: Christopher Alexander, A Pattern Language, pattern no. 31 Promenade (1977)



Christopher Alexander's "Pattern Language" (1977) can be interpreted as a kind of universal typology of the built environment. He defines 253 patterns of different scales from regions, cities and buildings down to building details, represented in the book by different means such as drawings, sketches, diagrams, maps or photographs (see fig. 7). Based on mathematical and linguistic theories, these patterns are co- and subordinated in web structures.

Like a type, a pattern forms an ideal principle, which in reality can emerge in an infinite number of forms. Meant to be both, an analytical tool for interpreting the built environment and a toolbox for design, Alexander's pattern language has been too complex to be applied for practical design and teaching. However, it has strongly influenced the understanding of cities as non-hierarchical but complex entities, an approach already pursued in his anti-functionalist essay "A City is not a Tree" in 1965. Alexander's theories became especially influential in the post-functionalist understanding of cities in the New Urbanism.

2. Morphology

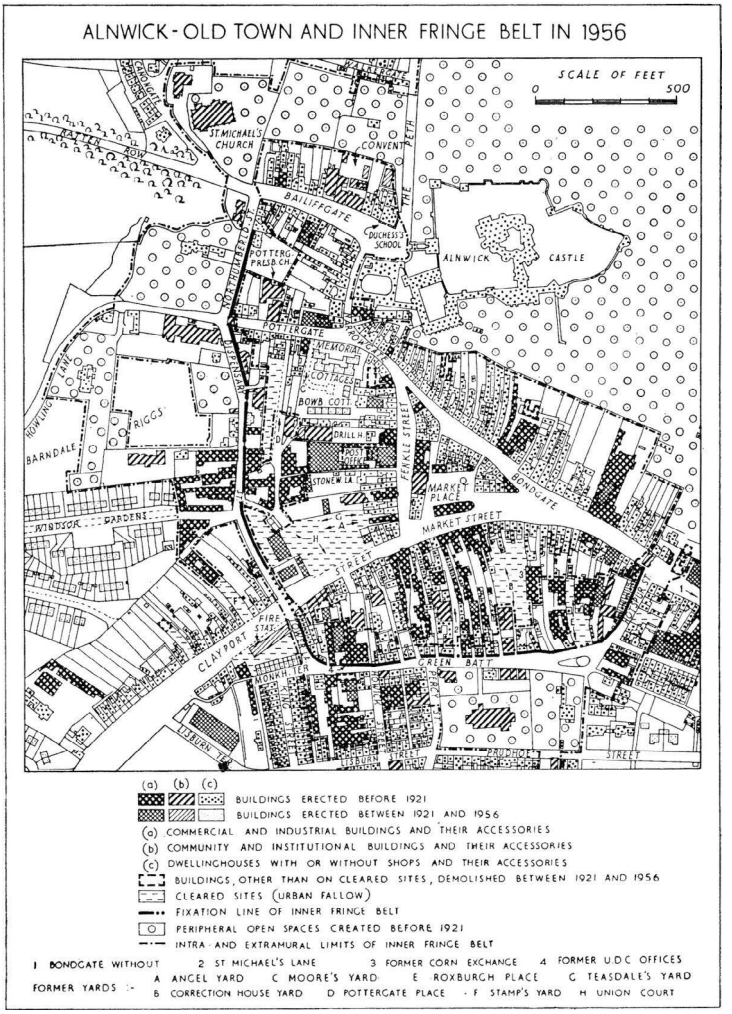
There is no strict separation between urban typology and urban morphology, and both methods have shared traditions by referring to the same authors. To express this commonality, sometimes also the term "typo-morphology" is used. Morphology developed during the Enlightenment and starts from the assumption that the explanation of a phenomenon can be found within the physical shape of this phenomenon. Johann Wolfgang Goethe used this term to describe the structure and genesis of plants, developing from an "Urpflanze" into the variety of present plants. From there on, morphology was mostly used in biology.

A seminal step towards urban morphology was the shift from biology to historiography in the late 19th century, when a distinction of two different forms of cities was introduced: the 'planned' city with an overall regular plan, and the 'grown' city with an irregular shape. While the 'planned' city was obviously a result of a deliberate cultural action, the 'grown' city seemed to follow a biological paradigm of growth, thus combining the descriptive and evolutionary aspects of the concept of morphology. This distinction of planned and grown cities for example forms the structure of Joseph Gantner's general history of urban design in *Grundformen der europäischen Stadt* (1928).

In the early 20th century, the analysis of the urban form also became a prominent field in German geography. Trained in Berlin and having emigrated to Great Britain in 1933, the German geographer M.R.G. Conzen refined and spread urban morphology in the English-speaking scientific community. His morphological analysis of the small town of Alnwick in north-east England, published in 1960, became the basic reference for the then developing tradition of urban morphology (Conzen 1960). His analysis of the urban form focused on the town plan, in which he identified three basic elements: the streets, the lots and the buildings. His plans represented these elements, but the buildings were only shown in the general footprint without the floor plans as in the urban typology tradition (see fig. 8). Characteristic for his approach was also a dynamic understanding of urban form: He introduced the concept of building and re-building

cycles within the street and lot pattern and also used the concept of the fringe belt as zone of urban development. Even though he presented his method with the example of a small town, especially these concepts of change and development were easily applicable to the analysis of a metropolis.

Fig. 8: M.R.G. Conzen, morphological plan, Alnwick, old town and inner fringe belt in 1956 (1960)

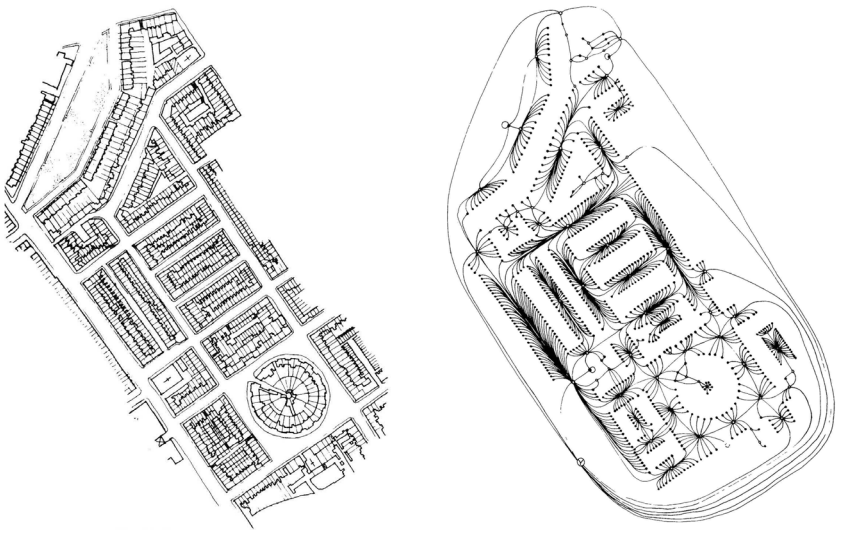


After Conzen, the tradition of urban morphology in British geography became institutionalised by Jeremy Whitehand, founding the Urban Morphology Research Group (UMRG) in Birmingham in 1974. Morphological research here ranged from the analysis of medieval small towns to modern metropoles. With strong participation of the UMRG, in 1994 the International Seminar on Urban Form (ISUF) was founded, now including researchers from different European countries, a variety of disciplines such as

architects, town planners, geographers, archaeologists, art historians as well as historians, and including typological and morphological approaches. Since 1997, the group has published the journal *Urban Morphology* as the main international platform of urban morphological and typological research (Moudon 1997).

A specific method of analysing urban space was developed by Bill Hillier as "Space Syntax" in the 1970s and then published together with Julienne Hanson as *The Social Logic of Space* in 1984. Space Syntax analyses the built spaces in correlation with their social uses, especially movements (see fig. 9). Space Syntax research includes two approaches: an inductive method of analysing existing cities and a deductive method of generating space patterns from mathematical algorithms. The first method mostly uses urban maps with indications of people's movement; the second mostly uses geometric diagrams for showing possible spatial combinations. Central categories are convex spaces (such as squares) and axial spaces (such as streets). Within the analysis of the street network, aspects of hierarchy and connectivity are crucial, as already observed by Jane Jacobs. Space Syntax became institutionalised at the Bartlett School of Architecture in London with the founding of the Space Syntax Laboratory, which since 2010 has also published the *Journal of Space Syntax* (JOSS) (van Nes/Yamu 2021).

Fig. 9a/b: Bill Hillier, Julienne Hanson, space syntax, interface map showing possible movements in a neighbourhood, Somerstown, London (1984)



A phenomenological approach to mapping urban spaces has recently been developed by Uwe Schröder at the RWTH Aachen (2015a; 2015b). The differentiation between inner and outer spaces is represented on a map in red and blue, using the association of warm and cold. In these red-blue plans ("Rotblauplan") not only spaces within buildings, but also enclosed urban spaces are represented in red (see fig. 10). Thus, this method is able to analyse the combination of open and enclosed spaces within cities, not only analysing the actual situation, but also the historic development. Compared to

the figure-ground plan or black plan ("Schwarzplan"), the red-blue plan offers a range of interpretation as the definition of inner and outer spaces is dependent on the feeling of a person perceiving this space. However, it picks up Camillo Sitte's method of analysing enclosed urban spaces and enlarges it from the analysis of urban squares to entire cities and metropoles.

Fig. 10: Uwe Schröder, "Rotblauplan" (red-blue plan) indicating enclosed and open urban spaces, Bologna (der architect 6 (2020))

Urban morphology and urban typology are not different methods, but only show different ways and scales of representation in dependence from their historic development. While urban typology has mostly evolved from an architectural discourse, it also includes the floorplans of buildings. Urban morphology developed more from a historical and geographical background; typical maps of morphological research therefore show lots or building footprints (figure-ground plans). Fundamental for both methods

is the pictorial representation of the shape of the city or metropolis, as these pictorial representations show a form which cannot be perceived in the city itself: the plan. As the plan of the built city includes all scales from public spaces to lots, building footprints and building floor plans, for a comprehensive analysis of the urban form, it is more useful to combine the approaches of typology and morphology than to separate them. Both approaches also have in common that they are developed and used for both analysis as well as planning.

3. Iconography

Iconography explores the meaning of images. It is an established method in art history and has been developed in addition to formal and stylistic analysis. It started with the analysis of religious images ('Christian iconography') and allegorical representations. Two techniques are fundamental for an iconographic analysis: the combination of similar motives and the combination of these motives with exploring texts. Especially the interpretation of images by combining them with texts which establish the meaning of the images is a central characteristic of iconography.

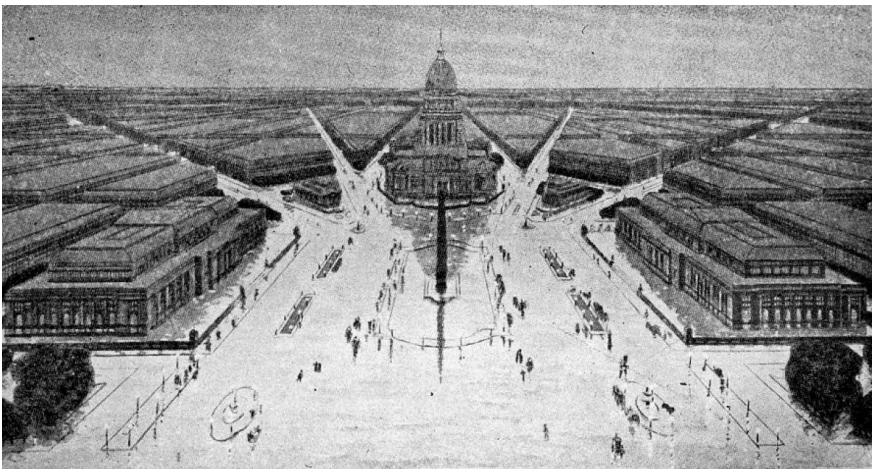
As a method in 20th-century art history, iconography has been strongly inspired by Aby Warburg and his research on the survival and revival of antique "pathos formulas", presented in his *Mnemosyne Atlas* on large plates with sequences of similar motives. The method was refined by Erwin Panofsky, who introduced the distinction between iconography and iconology in his book *Studies in Iconology* (1939). He defined iconography as the identification of the theme of an image while iconology explores the meaning of the image in a broader cultural context and historic development. Even if iconology is an old term, going back to Cesare Ripa's "Iconologia" in 1593, Panofsky's distinction never became fully established in scientific and public discourses, and the term mostly used for the interpretation of the meaning of images is iconography.

In the following times, iconography also became a method not only to research the meaning of images but also of architecture. E. Baldwin Smith's study on *The Dome* (1950) focused on the meaning of a specific architectural element. Günter Bandmann's book *Mittelalterliche Architektur als Bedeutungsträger* (medieval architecture as a bearer of meaning) (1951) explored the meaning of entire buildings. The more specific but highly controversial aspect of political meaning in architecture was the topic of Stanislaus von Moos' study *Turm und Bollwerk* (1974). Here, he was able to show that specific architectural motives in Italian Renaissance architecture had been less influenced by functional or constructional needs, but more by symbolic intentions. Thus, these buildings could be interpreted as means of communication which could be understood by iconographic research.

Martin Warnke established the theme of political iconography with several studies. His volume *Politische Architektur in Europa vom Mittelalter bis heute* (Political architecture in Europe from the Middle Ages to the present day) gave a broad overview with the presentation of several case studies of buildings and their political meaning, while his essay *Politische Landschaft* (Warnke 1992) enlarged the field to the interpretation of entire areas. Within this art-historical tradition, the field had already been widened to the

city by Wolfgang Braunfels in his book *Abendländische Stadtbaukunst* (1976). In Wolfgang Sonne's study *Representing the State* (2001; 2003), the political iconography of cities was examined with examples of capital cities from the early twentieth century. Here he distinguished several levels or scales of urban design which could be used for messages: the entire city with a potentially significant plan; urban elements such as squares, streets or ensembles; building types and elements such as temples, towers or domes; and architectural styles. As these forms had been used even in the same period for different political messages, the form itself does not convey the meaning. Crucial for the reconstruction of meaning of cities and buildings is the close examination of the historical context and the combination of urban and architectural forms with contemporary texts stating their possible meaning.

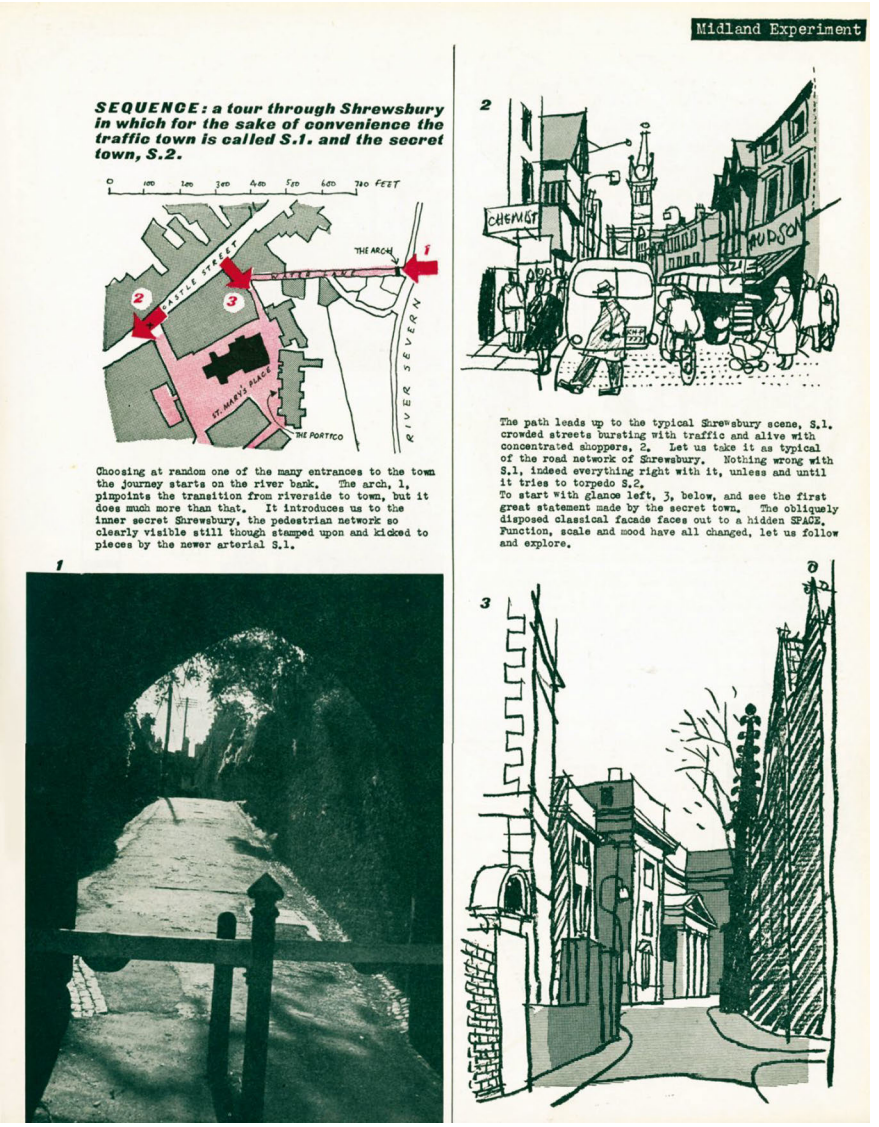
Fig. 11: Robert Breuer, political iconography of cities, Plan of Chicago from 1909 described as "monumental expression of a ruling strong capitalism and the sober pathos of a free people" (1911)



When it comes to urban iconography, a fundamental distinction has to be made: just as architectural iconography deals with the meaning of architecture, urban iconography deals with the meaning of the city, i.e. the three-dimensional material urban fabric and its spaces. However, quite often the term is also used when pictorial representations of cities are examined. But as these two media strongly differ in their qualities (the two-dimensional picture against the three-dimensional object with spaces), they should not be mixed. On the other hand, there is a strong relation between the city and its pictorial representation. The produced image of the city can strongly influence the way the city itself is perceived. Thus, in urban iconography the pictorial representation of a city can be used to analyse and interpret the city in a similar way as the map or plan of a city is used in urban typology and morphology. The difference, however, is that in urban iconography the images and the city are both actually visible (and therefore so easily become mixed), while in urban typology and morphology the maps and plans visualise a physically existent but invisible part of the city. Early examples of creating images of

entire cities for both understanding and representing come in two major genres: the bird's eye view, for instance with Jacopo de Barbari's incredibly accurate representation of Venice in 1500, and the view showing the silhouette of the city, for instance with Frans Hogenberg and Georg Braun's *Civitates Orbis Terrarum* (1572–1618) or Matthäus Merian's *Topographia Germaniae* (1642–1654).

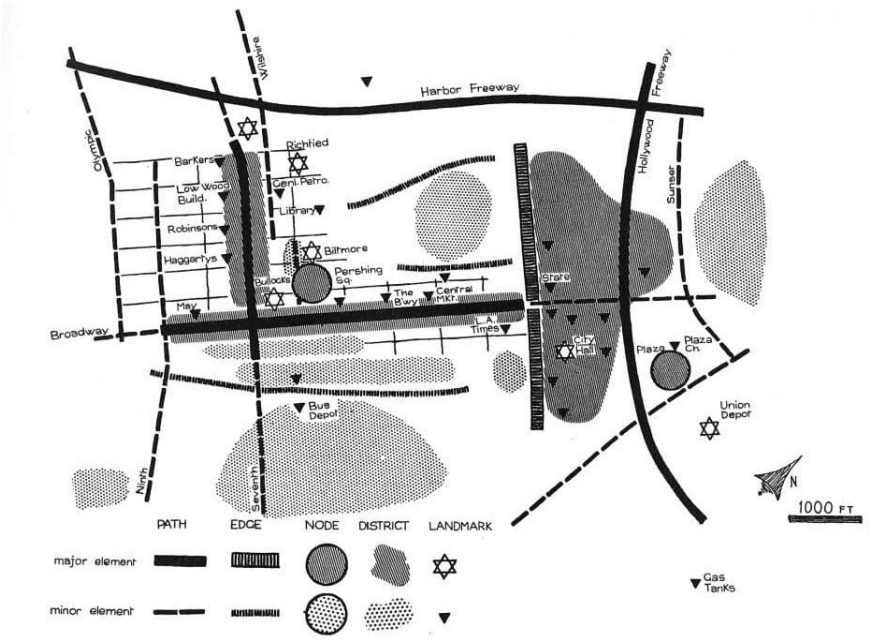
Fig. 12: Gordon Cullen, visual sequence of urban spaces, Shrewsbury (The Architectural Review 116 (1954))



Comparable to urban typology and morphology, urban iconography in the 20th century has not only been used to analyse urban phenomena, but also to design and produce cities. Within the context of architectural and urban design, Robert Breuer presented an iconography of politically motivated urban forms in an article (Breuer 1911). His text was accompanied by a series of illustrations, showing specific urban forms and assigning them to political systems in the explanatory captions (see fig. 11). The market square in Nuremberg was interpreted as "the architectonic form of the reserve that characterises the German bourgeoisie. The entrances are hardly noticeable. The square is experienced as a space that is hemmed in on all sides." Versailles, as another example, is presented as follows: "The spaciousness of the square and the representative axial disposition are the architectonic form of the Sun King's monarchy." Thus, specific urban forms and spatial arrangements were loaded with specific political meaning.

A meaningful arrangement of cities and metropoles also was intended by Bruno Taut in his book Die *Stadtkrone* (1919). Here he presented a broad collection of monumental buildings which dominated the city. The examples range from antiquity to modern times and from Asia to America and Europe. With these "City Crowns" for religious and social gatherings, the respective cities gained a higher meaning as places of spiritual communities. In his own design of an ideal city, such a "City Crown" also dominated the town and its image.

Fig. 13: Kevin Lynch, mapping of "paths", "edges", "districts", "nodes" and "landmarks", Los Angeles (1960)



In the UK, architect Gordon Cullen developed the analysis of urban spaces which had started with Camillo Sitte and his book *Der Städtebau nach seinen künstlerischen Grundsätzen* (1889). While Sitte presented his spatial analysis and spatial principles only with small plans, Cullen explored urban spaces with series of sketched perspective views, thus establishing an iconography of urban spaces (see fig. 12). Some of his presentations even show a series of views according to the way of the pedestrian through town like film stills, thus including movement into the analysis. He started his research with articles in the magazine *The Architectural Review* in 1949 and finally published it in his book *Townscape* (Cullen 1961).

In the USA, architect Kevin Lynch examined how people oriented themselves within cities. By observing and experimenting with groups of people in downtown Boston, he investigated the perception of urban space by pedestrians, publishing his results under the title *The Image of the City* (1960). His central result was that orientation in the city was focused especially on the recognition of the five elements "paths", "edges", "districts", "nodes" and "landmarks". These five elements were noted in diagrammatic "mental maps" and explained with pictograms, establishing an annotation system for the visual perception of urban spaces – an urban iconography which could be used for both analysing and planning cities and metropoles (see fig. 13).

4. Conclusion

Urban typology, morphology and iconography are established methods which offer a rich variety of ways of analysing the built environment of cities and metropoles. Having developed in different research fields and disciplines, they differ in focus and approach, but share some basic assumptions and intentions: They all focus on the built city with its forms, realised materially in three dimensions. They all see the shape of the built city in relation to its historic development. They all present their findings not only with texts but also with images: typology and morphology mostly with plans which visualise the invisible of the built city, iconography sometimes with views which represent the visible city. And they are all not only restricted to scholarly observation, but can also include planning intentions.

These methods do not reduce the built city to traces of other aspects, but see it as a valuable object of investigations. They also do not see the built city as an autonomous phenomenon, but understand it in relation to other aspects of the city such as society, politics, economy, or culture, which can have an influence, but also be influenced by the form of the built city. As every city always also forms a built entity with a specific shape, the use and further development of urban typology, morphology and iconography will be indispensable for the comprehensive understanding and planning of cities and metropoles.

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