Changes in Spatial Organization in French Public Libraries

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Abstract

This study analyzes mediatheques in terms of spatial organization, and examines the historical processes through which they have been systematized. It examines the physical effects of social and cultural programs on mediatheques to deduce the values underlying their spatial characteristics. By investigating and verifying these values, this study examines and interprets the spatial characteristics of mediatheques.

The scope of this study is limited to mediatheques in France, operating most effectively in the form of libraries and local community facilities. To describe the spatial evolution of public libraries as social mega facilities and to establish the reasons behind these changes, the authors examine changes in information systems, fashion, and society. By examining these changes, they describe various phenomena that characterize the transition of conventional libraries into mediatheques. They then topologically classify public libraries in France and quantitatively verify their spatial organizations by examining the structure of their spaces.

A historical examination of the topological relations of major library functions, specifically, public library-bookstack-guides and reference-reading areas, shows that 33% of all mediatheques have a topologically mixed space system in contrast to the spatial organization of conventional libraries with stack-guides and reference-reading areas.

Embodying generational changes through the visible ranges of space, and despite the use of open-frames, mediatheques have a lower level of visibility than traditional libraries. This spatial characteristic suggests that mediatheques are centered on information access, reflecting the 21st century ethos of social pluralism. It also reflects a social tendency in the age of pluralism that suggests that libraries are composed of various reading spaces meant to accommodate various readers' demands, even as the visibility within libraries is lowered overall.

Keywords: public library; spatial organization; space syntax; mediatheque

1. Introduction

1.1 Objective and Significance

The concept of space affects the social structure and the thoughts, behaviors and lifestyles of those who live in and utilize physical structures. From this perspective, examining the spatial organizations of specific structures in relation to contemporary social and cultural backdrops provides clues to how future social spaces should be interpreted and redefined from different perspectives.

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understanding today's architectural spaces in which informational spaces are utilized in all kinds of structures.

1.2 Scope and Methods

French provincial economies declined in the 1970s due to oil shortages and industrial changes, while larger cities suffered from high population density. To reanimate provincial economies, France began to construct mediatheques, or community facilities. They were led by the central government under the Act of Decentralization of Power in 1986 and 1992. Fifty-seven percent (over 20,000 in 2005) of modern French city municipal libraries are referred to as mediatheques and have effectively operated as information-oriented local community facilities. Therefore, the scope of the present study is limited to mediatheques (city libraries) in France, constructed after the 1990s because they are representative of modern libraries and reflect the social phenomena of the 21st century.

Table 1. Facilities Included in the Study (Surveyed for Three Months during 2006-07)

| Num. | City                  | Years | Reading fl. | Areas |
|------|-----------------------|-------|-------------|-------|
| A1   | Paris, Biblio. de Loi | 1850  | 2           | -     |
| A2   | Paris, St. Genevieve  | 1917  | 1           | -     |
| B1   | Brest                 | 1958  | 2           | 3,300 |
| B2   | Chartres              | 1962  | 2           | 2,300 |
| C1   | Corbeil-Essonne       | 1988  | 2           | 3,700 |
| C2   | Paris 13'             | 1989  | 4           | 3,600 |
| MA1  | Marseille             | 2002  | 4           | 21,644|
| MA2  | Montpellier           | 2000  | 4           | 15,776|
| MA3  | Toulouse              | 2002  | 5           | 12,642|
| MA4  | Limoges               | 1998  | 2           | 12,597|
| MB1  | Nice                  | 2001  | 1           | 9,208 |
| MB2  | Poitiers              | 1996  | 3           | 8,780 |
| MB3  | Reims                 | 2002  | 4           | 7,940 |
| MB4  | La Rochelle           | 1998  | 3           | 7,893 |
| MC1  | Rueil-Malmaison       | 2005  | 2           | 4,794 |
| MC2  | Venissieux            | 2001  | 1           | 4,633 |
| MC3  | Antibes               | 2006  | 4           | 4,615 |
| MC4  | Pessac                | 2000  | 2           | 4,393 |

In this study, the authors first investigate periodic informational and social changes to understand the evolution of spatial systems in public libraries as social information facilities and define the standards for these spatial systems. Second, the flow and spatial characteristics of public libraries are investigated in a historical context. On the basis of these inquiries, the characteristics of and changes to French public libraries were examined and classified. By understanding the dynamic relationships between integrated space and the visibility of interior space through space syntax for topologically classified representative facilities, the authors examine the characteristics of space composition in public libraries. In the conclusion, they suggest future directions for the development of mediatheques into new community facilities.

2. Social Change and Information Transition
2.1 Social Change: Universalization to Pluralism

Western society in the 19th century was drastically changed by the Civil Revolution and the Industrial Revolution. The material well-being resulting from the Industrial Revolution made people aware of rational and reasonable thinking. The French Revolution enabled people to recognize communal decision-making as a source of basic ethics for a social organization. During this period, people helped shape a unified power in universalizing and balancing the majority of opinions and thoughts and became gradually familiar with the uniformity of thought, which prevailed throughout the nation.

Meanwhile, Michel Foucault, who investigated the history of the punishment of criminals in Surveillance and Punishment, claims that the more a society modernizes, the more it depends on confinement, surveillance, and punishment to preserve its social order. In this vein, he narrates the correlative history between the modern spirit and power, and recognizes that the spatial organization of facilities—schools, the army, hospitals or factories—should be controlled properly in order to complete the regulative society that modernity has pursued. In short, he argues that modern society is typically a universalized society, which stresses normalization that follows a framework determined by regulations and discipline. Moreover, universalization, achieved by civil rights through revolution, is recognized as being representative; for it is representative of the majority opinion rather than the minority opinion as in regal authority.

Kisho Kurokawa's The Philosophy of Symbiosis, however, recently pointed out that the current situation has changed to one of pluralism, which contains the possibility of coming across various thoughts and understanding the significance of personality. That is, he says that the present situation has changed from one of logos-centrism, where one value represents the various values of the whole, to pluralism, which accepts various values in themselves; from universalization, by which general values are highlighted, to an age of coexistence between diversity and personality; from the age of machine to an age of life principles. These are changes from uniformity in diverse values and public opinion into an age of universalization, to the protection of these in an age of pluralism. This kind of change in historical circumstances is reflected in the rather pluralistic characteristic of recent architecture.

2.2 Changes in Forms of Information

Human beings learn linguistic systems in order to accept information and interpret accepted signs. The primary perception task is to conceive and express information to produce an "imitation" of the externals or "analogia," such as a hieroglyph (i.e. linguistic analogia) and the imitation of objects and information. It was analog, one of the information forms, which transferred a message by delivering objects according to a social agreement. Information, based on analog, was diversely stored and developed so as to establish a storage system of memory in analog form until digital
forms of information appeared.

However, since academic and technological information explosively accelerated its rate of growth around the world, modern society has faced a lack of space in which to store information for the development of digital instruments, computers, and the Internet. This lack of space, again, led to data compression through the digitalization of information. Digital information space has been developed and has overcome some of the limitations of analog storage space. A more significant aspect is that it changes information forms to discontinuity, along with continuity. Herbert Marshall McLuhan argued that electronic media would cause a revolution in space and human recognition in the 1950s. According to him, an information revolution caused by changes in the informational environment can be summed up in terms of contact, instance, non-linearity, decentralization, and inner explosion.

"Contact" implies that a world of mutual dependence and synchronous events will be created through the integration of various sensorial operations. "Instance" is something immediate and intuitive, and "non-linearity" is characterized by an associated extension of information collected by intuition. "Decentralization" implies deconstruction between the center and margin of space and the overall reorganization of space. "Inner explosion" means that an outer expansion of space is combined with electronic inner-communication so as to achieve inner expansion. It does not, however, mean an expansion of space, but aims to achieve compactness.

That is, McLuhan says, "The digitally combined world is more than beyond a village." As he mentions, modern society is the integration of discontinuous, decentralizing, and digitalized space composed of diverse information and continuous, associated, empirical, and analogic processes. According to the changes of those informational concepts, we need to reorganize a new order of spaces that can reflect these social and cultural phenomena.

3. Historical Changes of Library Forms

3.1 Libraries in the Early Modern Period

The original form of early modern public libraries was that of E-L Boullee's Bibliothèque de Loi (1784), which presented an open reading space that symbolized an integrated space. The reading space, formed as a tiered gallery, emphasized its continuity. The concept of a library space in this library, in which a plaza is referred to as a place for communication, can be described as a symbolic expression emphasizing the public concept of library space to be freely open to the public.

Louis Durand's library plan (1802), similar to E-L Boullee's, had a symbolic integrated space, which stressed integrated space by implementing a circular plane. The main difference between the two plans was the composition of an open space. That is, by placing the reading space at the center, Louis Durand arranged the bookstacks in a radial shape. In contrast with the enormous theater form of E-L Boullee's reading space, his reading space had a relative independent reading space. Consequently, the space between the reading and bookstack space increased. Though their plans were not completed, Henri Labrouste's St. Genevieve library (1850), which might be considered a miniature of their plans, had represented their ideas. Henri Labrouste's library was composed of a reading space as a symbolic space through a ceiling-vault structure in a rectangular plane. The same composition of reading space was presented in the national library (1868).

In short, not only did the early modern libraries begin with E-L Boullee's plan, but they also suggested a conceptual model for integrated space for modern times. While social changes caused such integration to undergo formative and functional changes after his plan, integration was preserved in terms of a spatial structure. Open space was divided into functional spaces and characterized as a discontinuous spatial structure. In other words, it is obvious that E-L Boullee's integrated space has continuously been preserved as an original pattern of space.

3.2 Concepts of Space in the 19th and 20th Centuries

The continuity of Louis Durand's library plan could be interpreted in Skjold Neckelmann's Strasbourg library (1894), a university library that had an integrated reading space with a domed ceiling in a square plane and arrangements of closed stacks in relation to library characteristics and space concepts, though Durand's circular plane was changed to a square plane.
The new concept of space in Tony Garnier’s Bibliotheque Cité industrielle (1917), however, became a turning point like Le Corbusier's La Bibliothèque de la Cité Mondiale (1930). Tony Garnier's library arranged the space for library administrators in front. Its reading space was located between an administration and an independent, closed bookstack. The closed stack room was arranged horizontally in order to protect materials in case of a fire. While Le Corbusier's plan, like Tony Garnier's, functionally divided its space, it expanded the space, not in a horizontal but in a vertical way, and presented an example of a multi-dimensional library in the city.

As seen from the plans, the space hierarchy, that converged on the domes or the large integrated spaces in the libraries, disappeared. This characteristic was continually expressed in the space system of the French public libraries between the 1950s and the 1960s and indicated the gradual decline of spatial integration, while reinforcing the hierarchy of the space system.

3.3 Mediatheque since the 1980s

Since the economic crisis of the 1970s, many public libraries have appeared as cultural facilities around the world. Rapid changes in information systems led to the appearance of mediatheques. From the beginning, modern libraries were composed of linear and hierarchical space systems, connected to a catalog room, a reading room, and bookstacks. This hierarchy was drastically weakened by converting the structure into mediatheques for accessing and using information, which adopted parallel composition by allowing for reading and open stacks. Centralized libraries, which centered on a catalog room and a reading room, were less frequently built and the functional spaces of libraries were diversely expressed as open planes without walls due to the dispersing arrangement of guides and reading spaces.

While the integrated spaces of the mediatheques in Marseille and Montpellier had no conventional concept of integrated space, the major space was surrounded by reading spaces, which were reinforced as the central symbol and function of modern public facilities. In other words, the major space played an integral role in the path of flow. It also opened the upper space for the inflow of natural light as a point of orientation.

The mediatheques in Limoges, Reuil-Malmasion, and Pessac served similar functions to that of a major space reduced to a courtyard or hall. A few buildings were functionally arranged so as to create a space that enabled users to choose their own way to the reading space.

On the other hand, mediatheques in Lyon and Reims presented a few cases of space systems excluding integration as a major space. Rather than stressing integration, as with an open plan and the space forms that have appeared in city areas, they presented features characteristic of the age of modern pluralism and of post-hierarchical space. Thus, if we group the modern bibliotheque-mediatheque in order to historically examine the syntactical transformation of spatial forms and systems, the prototypical concept of integrated space for the early modern period has gradually reduced since the early 20th century and again displayed pluralistic aspects of space forms because of the appearance and increase of mediatheques in the 21st century.

4. Analysis of Space Topology in Public Libraries

An analysis of the space system of information facilities showed the differences between modern space before the information revolution and network space after the revolution. Presupposing that a change of information form led to the construction of networks and contributed to decentralization, this analysis focused on the fact that the obsolete structural order and center of the early modern period had been deconstructed. It also discusses the fact that spaces had been reorganized by users, and that the center of facilities had also been changed by them. That is, using syntactic variables, the authors verified that instead of facilities that dispersed information from a dominating formative center, information was utilized as space either for users or as an open space used at the center of facilities so as to spatially shape decentralizing
paradigms in an architectural environment.

In this section, on the basis of the main reading floors, the authors quantitatively analyzed the spatial characteristics of mediatheques as the 21st century embodiment of social information facilities, especially since they are historically representative of libraries, as mentioned above, and is the reason why they conducted a case study on libraries. The reason why the main reading floor was selected for quantitative analysis of the libraries and mediatheques was that the first floor was not a proper object by which to compare the external condition of each facility and the specificity of the special programs. Thus, the authors considered the main reading floor, composed of a guide to reading and bookstacks, as the best standard for comparison.

For the topological analysis of space, syntactic variables in Space Syntax were used to describe topological relations among the space functions. This software was developed by the Research Labs for Urban Planning and Architectural Space. Therefore, case studies of the libraries were divided into convex space according to three factors—"visible," "accessible," and "fewest"—in order to draw a convex map. To analyze space systematically and objectively, data concerning control value, connectivity, and integration through computer analysis using mathematical logic were obtained. By studying these values, the authors examined changes in the space system of libraries.

4.1 Space Composition and Integration

Space in a library-mediatheque is composed of stacks (St), reading areas (Rd), and guide and reference areas (GR) which connect the stacks and reading areas. Their historical changes are shown in Table 2. in terms of topological relations.

Table 2. Analysis of Integration

| Num. | floor | Ranks of Averages by Areas |
|------|-------|---------------------------|
| A1   | 1st fl. | St(1.3850) < Rd(1.5600) < GR(2.4580) |
| A2   | 1st fl. | St(0.6680) < Rd(0.7830) < GR(1.0630) |
| B1   | 2nd fl. | Rd(1.1870) < St(1.3742) < GR(1.5890) |
| B2   | 2nd fl. | Rd(0.6762) < St(0.7122) < GR(0.7951) |
| C1   | 2nd fl. | Rd(0.5915) < St(0.784) < GR(0.9720) |
| C2   | 2nd fl. | Rd(0.6240) < St(1.0580) < GR(1.2650) |
| MA1  | 3rd fl. | Rd(1.0400) < St(1.1800) < GR(1.4100) |
| MA2  | 3rd fl. | GR(1.5040) < St(1.6680) < Rd(2.0010) |
| MA3  | 3rd fl. | Rd(0.7930) < St(0.978) < GR(1.2160) |
| MA4  | 1st fl. | Rd(0.7407) < GR(0.7737) < St(0.8856) |
| MB1  | 2nd fl. | Rd(0.7730) < St(0.8290) < GR(1.2030) |
| MB2  | 4th fl. | Rd(0.8780) < St(1.1120) < GR(1.1740) |
| MB3  | 2nd fl. | Rd(0.7970) < St(1.3800) < GR(1.1770) |
| MB4  | 1st fl. | GR(0.5308) < Rd(0.5664) < St(0.6871) |
| MC1  | 2nd fl. | Rd(0.7740) < St(0.8050) < GR(1.0150) |
| MC2  | 2nd fl. | Rd(0.7622) < St(0.8538) < GR(0.9589) |
| MC3  | 1st fl. | Rd(0.6016) < GR(0.7030) < St(0.7077) |
| MC4  | 1st fl. | Rd(1.6350) < GR(1.7110) < St(1.8950) |

(For each example, the space integration for each zone in the convex map of the main reading floors was summed up. The integration was divided by the amount of convex space to calculate mean values.)

Fig.6. Plan and Convex Space of A1

(1) A Group (Dark gray in Fig.6.: integration core)

The cases of A1 and A2, which had space systems like that of the early modern library, according to the historical changes to the library form and integration, had higher integration than that of St and Rd in terms of significant spaces in GR information facilities. The hierarchical characteristic of the space system, composed of GR-Rd-St in the library, was a universal system observed in conventional libraries. It could be defined as the spatial organization of a library used for control and integration, which had been preserved to manage and control library usage since the 19th century.

(2) B Group

With regard to the spatial organization created by the integration of the B group, as in the case of libraries post-World War II, libraries preserved the spatial characteristics of the previous generation. Specifically, the group still contained the spatial organization of a closed bookstack and was functionally classified by room, a historical characteristic that stresses the preservation and storage of resources. It, however, had a different order of integration from that of the previous years in that its order of arrangement was GR-St-Rd, and the reference area was not near the main doorway but between Rd and St. However, the B Group even further reduced the difference in integration for each space from that of the A Group. The result of such a reduction can be understood as an aspect of topological significance in Rd, and St might be passed onto the next generation.

(3) C Group

The C Group, an early model of mediatheque, has appeared since the 1980s. The group had a higher value in St than in Rd because of the introduction of an open bookstack. Though Rd, which had the smallest value of integration, was located in the most deeply
segregated area at the entrance of the hall, it was arranged at windows, by which an exterior wall was decoratively finished with a curtain wall so that it could be visibly connected to the city or outer squares. Thus, it overcame the limitation of an open space separated from the hall. This characteristic explained recent mediatheques as mediums through which to deliver information about a place to passers-by outside in the continuous space of the city.

(4) MA, MB, MC Groups

Mediatheques since the 1990s can be classified into three groups. First, as seen in Figs.10., 12. and 14., integration was reduced in the order of GR-St-Rd. This group, like the B Group, could be a universalized composition of the libraries after the modern period. The second group shows that the integration of GR was lower than that of Rd and St in the order of Rd-St-GR. The final group presents the integration of GR located between St and Rd.

In the case of MA2, while Rd had the highest integration, the entire space system was placed at the inside of the doorway. The integration of St was also higher than that of GR and was located in the middle of GR and Rd. This indicated that in contrast to the conventional spatial organization in terms of integration, its integration became smaller in the order of Rd-St-GR. However, MB4, though similar to MA2, showed that the integration of St was higher than those of Rd and GR.

In MA4, MC3, and MC4, the integration of GR had their spatial organization located around the center of St and Rd. From the three cases of spatial organization that had high integration of St, open space was widely distributed horizontally with an atypically wide distance between open bookstacks. This characteristic could be interpreted in the same way as the higher level of integration of St in MB4.

Thirty-three percent of all mediatheques had been
organized with diverse space systems through the
topological relationships of spatial organization, which
were distinct from the usual order in conventional
libraries. This reflected the pluralism of the 21st
century, which was characterized as an information
access-centered mediatheque organized by a network.
In other words, networks moved the integration core
in libraries from GR, displaying the characteristics of
modern architecture in the age of universalization to
other directions, such as St or Rd.

4.2 Visible Areas

Using visible areas of space, characteristic changes
to space over generations could be understood in the
process of the conversion to mediatheques in libraries.
Thus, as a result of analyzing visible areas (human eye-
level standard) by Isovist of Space Syntax in spaces
with high integration, the proportion of visible areas to
total area is shown in Fig.16.

The A Group presented relatively high visibility.
This could be understood as a result of reflecting the
historical characteristics that prioritized mutual control
and integration among spaces as suggested by an
Open-plan. However, as the conceptual characteristics
of symbolic halls in A1 were changed into those
of functional space systems, A2 was displayed as
a polycentric space system. This display lowered
visibility. The cases of the B group after WWII
overall had 60% high visibility. Despite the division
of functional space by walls, a bookstack that seemed
to block visibility was built on the wall and, in fact,
did not lower visibility. Thus, visibility was relatively
higher than in other space systems.

In the 1980s when mediatheques were formed,
visibility varied widely. C1, the prototype of French
mediatheques, had a lower range of visibility because
of the arrangement of open bookstacks, even though it
was based on an open-plan. This type of arrangement
had often been used to provide diverse spaces in
spaces designed by open-plans during the 1980s. On
the other hand, C2 is a mediatheque placed in an inner
city having a small area for each floor with very high
integration. Its plane was radial around the hall, and
bookstacks were arranged parallel to the line of sight
in order to create wide visibility.

Since the 1990s, the visibility of mediatheques
averaged 35%. Despite open-plans, their visibility was
lower than that of previous libraries. This result was
measured at the highest point of the topological map
such that it may differ from the level of visibility that
readers generally recognize.

Despite open-plans for open spaces in mediatheques,
the visibility in mediatheques in the 1990s was lower
than that of the A and B groups. This is because space
was visibly blocked by open bookstacks, and the
network of reading spaces for electronic information
reduced the importance of their being visible to the
readers. Moreover, in light of pluralism, in order
to meet diverse readers’ needs, mediatheques were
composed of diverse reading spaces that lowered their overall visibility.

5. Conclusion
This study in analyzing libraries as community characteristic spaces aiming to deliver information, containing social and cultural values and accepting the changes effected by new paradigms, focused on mediatheques, which have recently been called representative social information facilities.

Mediatheques presented a different spatial organization from existing libraries in order to harmoniously exchange information through diverse mediums. The spatial organization of mediatheques through the study developed as follows:

Public libraries, which appeared after the economic crisis of the 1970s, changed from having closed bookstacks for the storing and preservation of information to mediatheques aimed at maximizing the accessibility and utilization of information. Thus, the hierarchical order of library spaces yielded to a parallel composition of reading spaces and open bookstacks. As the center-oriented arrangement fell from use in mediatheques, they became functionally polycentric spaces with open planes created by a dispersive arrangement of guides and reading spaces. Mediatheques persisted, whether integration and the spatial concepts of hierarchical continuity and post-hierarchical space were implemented or not. From this perspective, examining the changes of spatial organization in libraries provides significant historical insight. In other words, integrated spaces of the early modern period, weakened by the trends of the early 20th century, reappeared in diverse forms in the 21st century as mediatheques. Integrated spaces, however, were changed into open spaces because of their connection to outer spaces. The 33% of mediatheques analyzed in this study showed topologically spatial characteristics that differed from conventional spatial organization. This spatial difference, characterized as the information access-centered network of the mediatheques in the 21st century of pluralism, indicates that an integration core has begun to appear diversely in guides and halls through a network system in the age of pluralism.

The visible range for space was 58% for group A and B, which was greater than their ranges for group C and M by 22.2% respectively.

Despite the open-plan of the mediatheques, their visibility was lower than that of the A and B groups because readers’ visibility was less important than in previous generations with regard to the space of mediatheques, as can be seen by the visible blockage by bookstacks and the network of reading spaces. Moreover, in order to meet readers’ needs in the age of pluralism, mediatheques were composed of diverse reading spaces, which lowered the overall visibility of the place.

This study examined the modern mediatheque, an important social information facility, to see how its form adopted certain values of spatial characteristics and to verify how those values became spatial. The study, however, in examining libraries and mediatheques containing strong social and cultural characteristics, was limited to facilities in France in selecting its cases studies. It also lacked a sufficient number of case studies to generalize its results. Despite its limitations, examining the spatial organization of mediatheques ultimately enables us to describe architectural space according to changes in informational aspects and styles. It is also a guide to understanding modern architectural space in which informational space is being extended into all types of spaces.

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