

# Permeability in Art Museums/Galleries

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***Abstract*** – Museum is a structure which affects human perception and movement depending on its *spatial configuration* and provides the visitors with their choice of movement inside the space. Space plays a major role in museum designs right from the availability of areas and surfaces to display exhibits, to the creation of a particular ambience. Those days the museum spaces were mostly placed in a chronological manner in which a storyline dictates the ordering of spaces. But in the present-day context, the chronology of spaces is not sequenced in a periodically, as the taste and preferences changed. Time factor plays a major role in today's museum space in which a visitor can choose his preference of gallery he wishes to see and move out of the museum rather going all around the museum in a particular order to exit, as in the case of traditional museums. ***Permeability*** in the museum is a study of circulation patterns and movement of visitors in the space. Explorations in demonstrating the space-use patterns can be predicted by the spatial properties of gallery layouts, including both permeability and visibility relationships. The effects of this spatial arrangement help the humans in *wayfinding* and enhance the movement. Space syntax is a tool used to evaluate the spatial arrangements and their effects. This paper aims in evaluating the level of permeability achieved through its spatial arrangements using space syntax as a tool which is applied in two museums. The two case examples are taken in such a way that one being a Traditional art museum and another being of Contemporary nature.

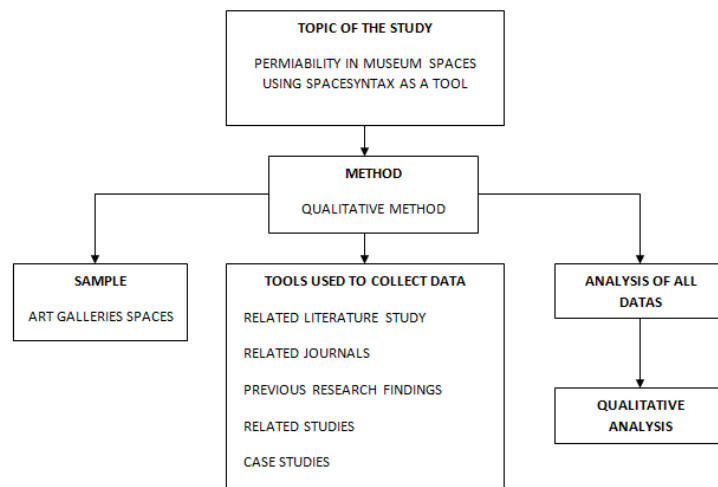
***Keywords:*** permeability, spatial configuration, wayfinding, space syntax.

## I. INTRODUCTION

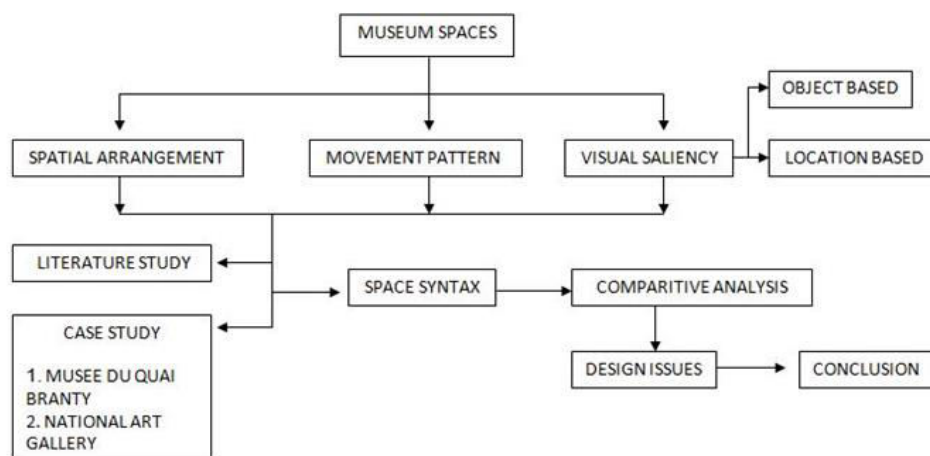
Permeability is nothing but the network of spaces in which one moves through space and it gives the relation between the spaces [1]. *Spatial organization of spaces* and the placement of the artworks are based on two aspects; one is location-based and another one is object-based. The latter plays a major role in art galleries. The design considering such spatial arrangement has a better design of art galleries instead of sequentially arranging spaces which creates a monotonous space. Spatial organization is evaluated through space syntax. Space syntax is a theory of space and a set of analytical, quantitative, and descriptive tools for analyzing the layout of space in buildings and cities[2]. Space syntax is based on two ideas. The first idea explains that space is not just the background to human activity and experience, but an intrinsic aspect of it. For example, human movement is essentially linear, in that movement traces are line patterns; Interaction between two or more people is essentially convex, in which all points are visible from all others; and we experience ambient space in buildings. Because human activity has its natural

geometry, it tend to shape the space in ways that reflect this .The second idea is that how space works for people is not simply about the properties of this or that space, but about the relations between all the spaces that make up a layout. For example, how people move will be affected by the configuration of spaces within a layout; that is, the way it offers sequences and choices in a more or less intelligible way.

## II. RESEARCH DESIGN



## III. RESEARCH METHODOLOGY



#### IV. HISTORY OF MUSEUM SPACES

##### 18<sup>TH</sup> CENTURY:

The intricate relationship among museum galleries, artefacts and visitors has evolved since museums first emerged in the eighteenth century. When European royal families preserved their collections and displayed them for private visitors, an underlying motivation was to impress visitors with their royal possessions.

##### 19<sup>TH</sup> CENTURY:

Public museums in nineteenth-century. Europe still conceived the relationship between viewer and collections as one that intended to impress visitors. Nineteenth-century museums displayed their collections by classifying artefacts and specimens according to how they were studied. The museums were conceived as places as much for research as for spaces diffusing knowledge.

These missions were achieved through specific display techniques such as dense arrays of historically classified artefacts in monumentally scaled museum halls. These display techniques suggested that museums exposing the collections within their classifications were enough to educate visitors. This consideration implied that the visitor was considered by those museums a mere receiver of the knowledge presented, and therefore visitors were offered a passive relationship with the artefacts exhibited.

##### 20<sup>TH</sup> CENTURY:

By the early twentieth century, techniques for displaying artefacts had changed by considering observers while forming display strategies. Change in display techniques came with modern works of art, which were to be studied and understood in a de-contextualized environment. As a result of this shift, early twentieth-century museums favored neutrally colored surfaces of room-scale galleries, placing works of art at eye level and spaciouly bringing these works to the visitor's "field of vision". Thus, museums aimed at bringing displays into visitors' direct experience without mediating the relationship between viewer and objects. This means that museums refused to present works of art by framing them in their historical or social context; rather, they allowed objects to speak for themselves without background information.

#### V. SPACE SYNTAX

*Space syntax* analyses always consider a *2D layout model*. This tool is used to spatially analyse the planning network[2]. The word 'tool' is defined as a means to collect evidence and data from the sample of the study. It is an instrument used in the present case study which is qualitative. In the present study, conducts case studies taking two art museums/ galleries and uses '*space syntax*' as a tool to establish the findings. Syntactic studies are increasingly looking at the interaction between the two aspects of spatial layout: *The layout of objects within spaces and the layout of the relations between spaces*, and showing them to be both highly interdependent and powerful in their ability to shape the experience of the visitor. To do this we must introduce some simple theoretical ideas which are too recent in their genesis to have yet had a great influence on empirical studies. These ideas concern certain intermediate properties of spaces between the local and the global through which we can assign each space in a layout a

typological identity according to how each fits into a local complex and so acquires potentials for occupation and movement.

The first step of space syntax is a formulation of an access graph. The graph contains space coding in a circle and the directions in lines. Then this access graph is converted into J- graph. Through this graphs Total depth (TD) which is the total number of connections between nodes corresponding with their levels. Mean depth (MD) is the average depth of the node. Relative asymmetry (RA) is found to know which space is integrated and which one is isolated. A values depend on the spatial arrangement of spaces, the relative depth, and also on the size of the system, If K values differ in he samples, then Real Relative Asymmetry( RRA) is calculated. RRA is the ratio between RA and Dk. DK is a common factor that is based on the size of the system. RRA is calculated by  $RRA/DK$ . K can be calculated using Hillier and higher RRA value indicates the space is more isolated while lower RRA value indicates that space is more integrated with other spaces. The control Value (CV) helps in finding out the degree of influence exerted by a space in the whole system and helps in understanding the space [4].

The typology of spaces according to their embedding in the layout

- The spaces with a single link. These are dead-end spaces through which no movement is possible to other spaces. Such spaces have movement only to and from themselves. They are known as “*a spaces*” [3].
- Spaces with more than one link but which form part of a connected sub-complex in which the number of links is one less than the number of spaces. Such spaces cannot in themselves be dead-end spaces but must be on the way to at least one dead-end space. These types of spaces are called “*b spaces*” [3].
- Spaces with more than one link which form part of a connected sub-complex which contains neither type “a” nor type “b” spaces, and in which there is the same number of links as spaces. These are known as “*c spaces*”. Movement from a c-type space through a neighbor need not return through the same neighbor but must return through exactly one other neighbor [3].
- Spaces through a neighbor have the choice of returning by way of more than one other neighbor. These are known as the “*d spaces*” [3].

The basic formulas listed below which helps in analyzing the Spatial layout

- $TOTAL\ DEPTH = LEVELS \times NO.OF\ SPACES\ CONNECTED$  [4].
- $MEAN\ DEPTH = TD / (K-1)$  [4].
- $RA = 2(MD-1) / K-2$  [4].
- $RRA = RA / Dk$  [4].
- $i = 1 / RRA$  [4].
- $NCn = NO.OF\ CONNECTIONS$  [4].

- $CV_n = 1 / NC_n$  [4].
- $CV = \text{CONNECTION BETWEEN SPACES} + CV_e$ [4].

## VI. SELECTED CASE EXAMPLES

Two museums are selected as case examples:

- Musee du Quai Branty it is contemporary museum typology designed by Jean Nouvel.*
- National Art gallery it is of traditional museum typology designed by Henry Irwin*

These museums were chosen because they fulfil a number of criteria necessary to address the research within the scope of art museums. Accordingly, since the focus of this study is on current museum layouts, the selected art museums had to be from a contemporary museum context and thus it represents the contemporary understanding of presenting art collection. Hence the National Art gallery museum is selected. At the same time to compare the spatial configurations of a traditional museum typology with the contemporary typology, Musee du Quai Branty museum is also selected.

## VII. CASE STUDY DESCRIPTION

### A. MUSEE DU QUAI BRANTY-FRANCE:

This is a museum which is built to express emotions. This is a place with the cast-off works from Australia and the Americas. It is a place of poetic and uniqueness. Architecture is unpredictable in this design with an unexpected way of architecture. Windows are very *large and transparent*, tall pillars which are arranged in a random manner; wooden sunscreens support photovoltaic cells etc. The exterior wall of the museum was *Green walls* with greeneries. New museum alongside the *River Seine*, *presence of the Eiffel Tower*, *the view from every angle is given and every credit is to Ar. Jean Nouvel*.



Figure 1 – Exterior view of Musee Du Quai Branty

The glass wall separates the Museum parallel to the river road creates privacy. The main uniqueness is the *hindrance of the space* and making the human movement to look further what is there, the architect provided a space of public space in the ground floor with the provision of the ramp to move forward to the first floor. This museum space makes visitors hold a lot. This Building is more of a contemporary look integrated with traditional elements[5].

In major museum movement of space is mostly in a linear movement which makes the human movement in a restricted path and enhances the flow of movement in a gallery one by one. The Movement of gallery design is most interestingly done in this museum, which has a choice to move through any gallery randomly without any controlled movement flow. The *play of light and darkness* is maintained both in the moving space and objects to enhance the space. The gallery is arranged in a *linear manner* along its length. The movement between the galleries is also connected in a great manner.

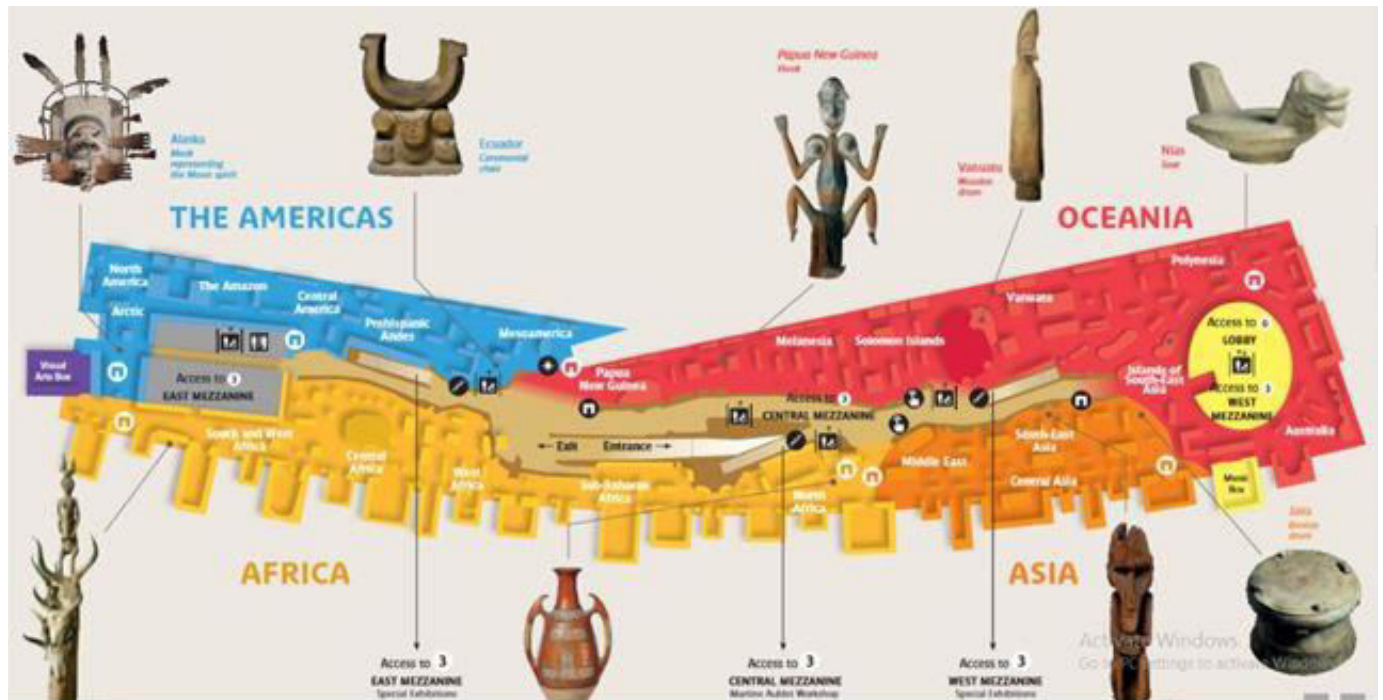


Figure 1.2 – First-floor plan of Musee du Quai Branté museum

## B. NATIONAL ART GALLERY-CHENNAI:

The *National art gallery* is the part of *Government museum* located in *Egmore, Chennai*. This Museum is the second oldest museum in India[6]. The Museum consists of spaces like Front building, Bronze gallery, Children's Museum, National art gallery, Contemporary art gallery and Connemara library etc

The National art gallery is built during *Queen Victoria's golden jubilee Celebration*. This museum consists of Mughal paintings and artworks and the paintings of *Raja Ravi Varma*. It also consists of Tanjore Paintings.

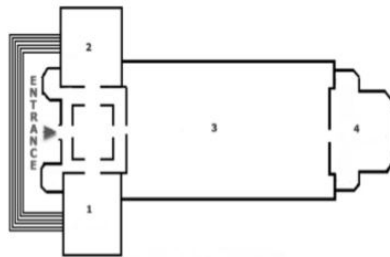


Figure 1.3 –Ground floor plan

## VIII. ANALYSIS OF CASE STUDY

TABLE 1: SPACE CODING

Spaces	Legends
Exterior	EXT
Passageway	P
Gallery space	G
Gallery space-1	G1
Gallery space-2	G2
Gallery space-3	G3
Gallery space-4	G4
Galleries at mezzanine-1	Gm1
Galleries at mezzanine-2	Gm3
Galleries at mezzanine-3	Gm4

A. MUSEE DU QUAI BRANTY-ACCESS GRAPH:

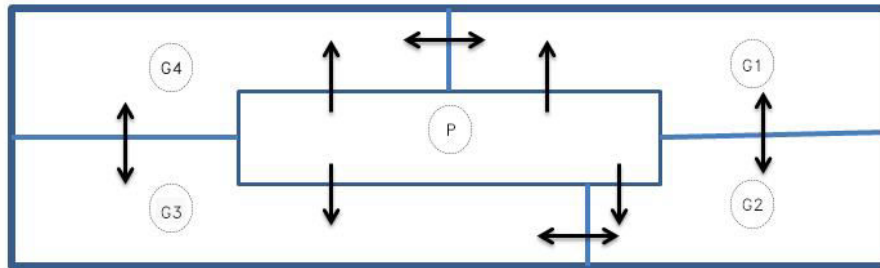


Figure 1.4 – Access graph of Musee du Quai Branty museum first floor

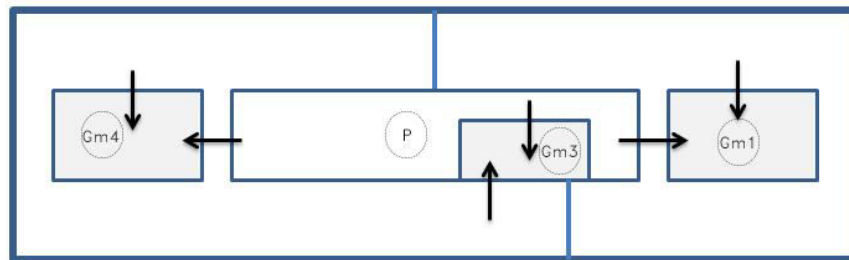


Figure 1.5 – Access graph of Musee du Quai Branty museum mezzanine floor



B. MUSEE DU QUAÏ BRANTY- J-GRAPH:

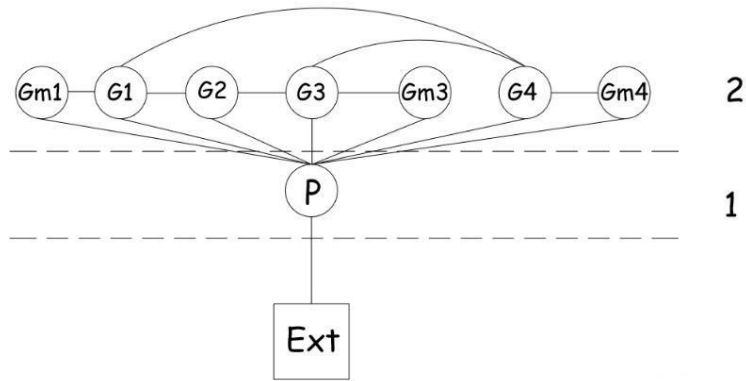


Figure 1.6 – J-graph of Musee du Quai Branty museum

C. MUSEE DU QUAÏ BRANTY- NATURE OF SPACES IN J- GRAPH:

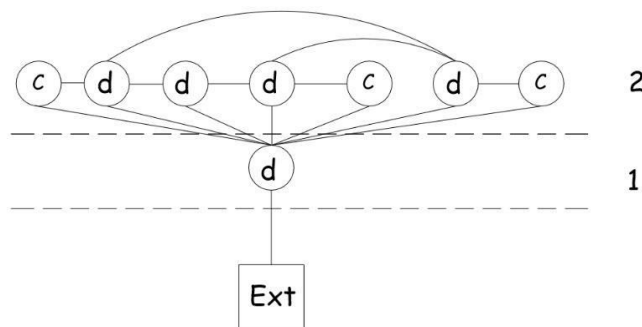


Figure 1.7 – J-graph of Musee du Quai Branty museum indicating the nature of spaces

TABLE II

Values	Musee du Quai Branty
K-value	9
Total Depth	15
Mean Depth	1.875
RA value	0.25
RRA value	0.788
i value	1.269

## D. NATIONAL ART GALLERY-ACCESS GRAPH:

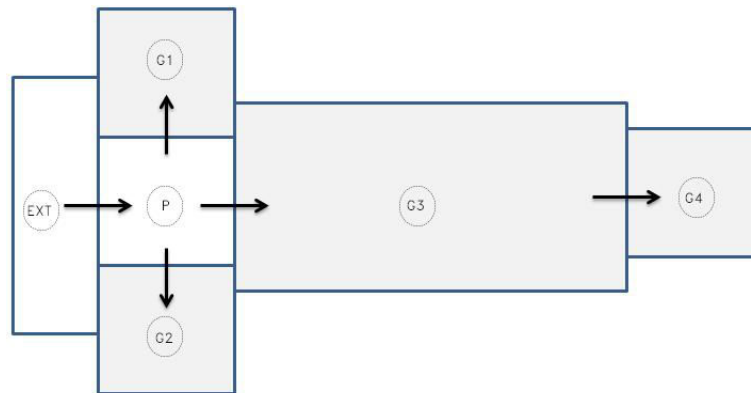


Figure 1.8 – Access graph of National art gallery

E. NATIONAL ART GALLERY J-GRAPH:

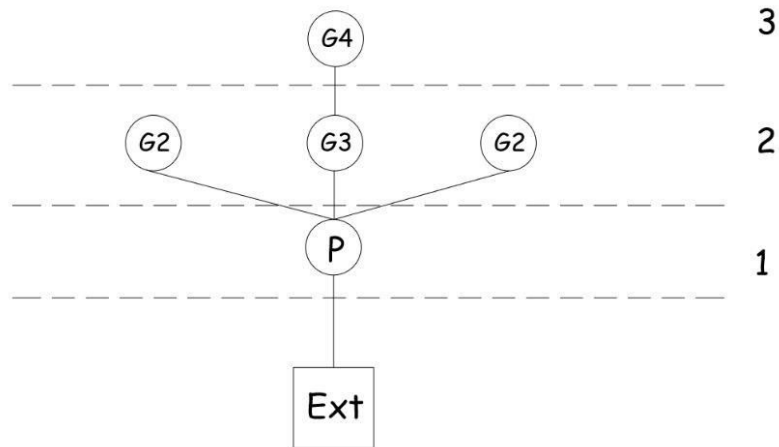


Figure 1.9 – J- graph of the National art gallery

F. NATIONAL ART GALLERY –NATURE OF SPACES IN J-GRAPH:

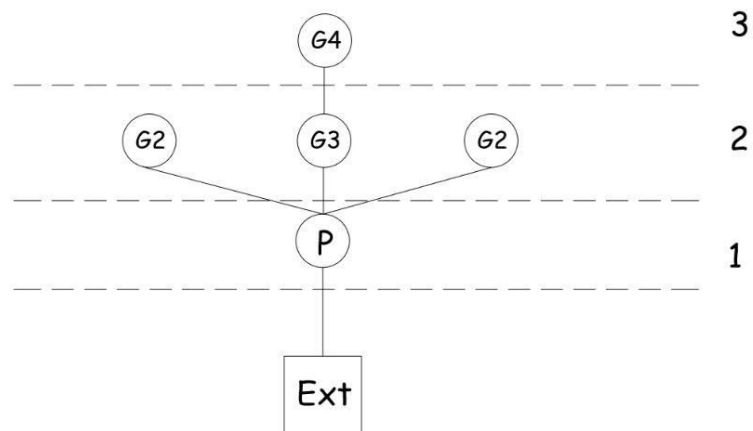


Figure 1.10 – J-graph of National art gallery indicating the nature of spaces

TABLE III

Values	National art gallery
K-value	6
Total Depth	10
Mean Depth	2
RA value	0.5
RRA value	1.433
i value	0.697

## IX. COMPARITIVE ANALYSIS

TABLE IV

Values	Musee du Quai Branty	National art gallery
K value	9	6
Total Depth	15	10
Mean Depth	1.875	2
RA value	0.25	0.5
RRA value	0.788	1.433
i value	1.269	0.697

From the above table, Musee du Quai branty has more integration value '1.269' compared to the National art gallery which is of '0.697'. So, hence the museum *Musee du Quai branty* is of more integration and has more permeability and visibility of space compared to the National art gallery. An attempt has been made by the investigator to critically compare the spacing effect in the two museums taken in the case study by using space syntax as a tool and concluding about the permeability property of spaces inside the museums.

## X. CONCLUSION

From the above analysis, the muse du Quai branty museum consists of *more 'c and d spaces'* in it. '*c and d spaces*' has the ability to connect spaces. According to the plan of *Musee du Quai branty museum*, the gallery spaces have a choice to move wherever the human needed and the choice of movement is made in it in a clear way. The arrangement of galleries places a major role in this movement inside the museum space. Comparatively, it has the movement only in two levels which are mostly interconnected.

In *National art gallery*, there are more '*a spaces*', which is a dead-end space and the movement inside the space is restricted and the flow is of linear pattern whereas the humans had to go through every space to see galleries the choice of moving is not made in a clear way as of in *Musee du Quai branty museum*. Thus, the *spatial configuration in art museums /galleries should provide more choices of movement enabling the visitor to have surprises and interest whenever they visit the museum.*

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