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TITLE: ANALYSIS AND VISUALIZATION OF THE NEW ARCHITECTURAL SPATIALITY: LIGHT AND SOUND TOPOLOGIES IN MUSEUMS

Selma SARAOUI[1], *Azeddine BELAKEHAL* [2] , *Abdelghani ATTAR* [3] *Amar BENNADJI*[4]

1 and [3] MAA and MCB at the Department of Architecture, University of Bejaia, Algeria. Saraoui,selma@gmail.com
2 Pr, Laboratoire de Conception et de Modélisation des Formes et des Ambiances (LACOMOFA), the Department of Architecture, University of Biskra, Université de Biskra, Algeria.
4 Dr, The Scott Sutherland School of Architecture and Built Environment ,The Robert Gordon University Garthdee Road, Aberdeen ,AB10 7QB,UK.

Abstract:
This work aims at demonstrating that like geometry or anthropology, topology can offer the architectural space a new form of dimensioning and spatiality, this would amount to a participation of daylight and sound ambiences. We will explore this new spatiality in the architectural space and especially the museum space.
The definitions of topology helped us to build a new analysis model based on the notions of 'route' and 'sequence'. To do this, a corpus of thirty international museums was submitted to analysis according to the model. Subsequently support by statistical analysis of the data collected for this corpus. It must be admitted that for the seen ambience, sequential analysis can alone define the luminous topologies and the use of the software will confirm them. However, for unseen ambiences, such as sound, the software is more than necessary to visualize and define sound topologies. This new way of interpreting the space and visualizing it topologically, by taking into account the sensory aspects, can allow us to reach an optimal conceptual model. One can also through these results develop software that can judge the architectural space designed topologically.

Keywords: *daylight*, *Sound*, *topology*, *discontinuities*, *sequences*, *route.*

1 Introduction

Architectural space has always been the center of the most relevant problems in architecture, its importance depends on the role that it plays in the comfort of the human being, by the success of its appropriation.

The definitions of architectural space refer to two main classical aspects, the first is the dimensional and formal aspect which depends on the geometry and the measurements, or to the form of space itself, which is solely geometric. The second refers to space as an anthropological entity as pointed out by j. Cousin (1980) where the human body defines the specialty through the relations maintained between the human body and space.

The drawing is the most replied geometric representation of space, especially if it is on a scale, and it obeys the Euclidean geometry. Drawing tools have expanded considerably, from hand-drawn to the computer-assisted drawing, or the computer assisted design.

Based very recently on the development of the theories of architectural ambiences, space has become subject of the relations between its qualitative and quantitative aspects, and it will be defined according to that (Lam, 1986).

The objective of this new definition is to reconcile objectivity (physical element) and subjectivity (sensory element linked to the feeling of man). At present there is a tendency to present space with all its architectural-temporal references, thanks to software development. This representation of space is called visualization.

If we admit that the visualization allows the presentation of space, are there any other concepts that can link the geometry of space and its sensory component? The answer seems evident in recent geometry, more precisely the non-Euclidean .The topology that supports this new nascent reflection is by definition the continuous transformation within the same space.

Our work aims to use the notion of topology as a tool for defining and presenting architectural space, just like geometry. The topology may possibly offer a new spatiality based on discontinuities obtained by "sequential analysis". We will see later to what degree the visualization by software will participate in highlighting these luminous and sound topologies

1.1. The visualization of seen and unseen in the field of ambiences:

The visualization is widely used in the field of ambiences; it offers a representation of the architectural space very close and in line with reality, with an interest in the physical characteristics of space and the ambience as soon as it appears. It places the user of space always in the centre of all questions related to space. (Siret .D ; Wolonszyn. P, 1998)

It should be noted that the ambiences differ; the seen (visual) ambiences (Millet. M, 1996), in particular the luminous, are easier to detect and to evaluate than the invisible or unseen ambiences such as sound, olfactory or thermal. They provide information related to the existence of the physical signal, and the evaluation criteria depend on the user and his / her way of qualifying the space. However, all these unseen ambiences are simulated; this will confirm or affirm the comments of the users.

We will take in these paper two scenarios, the luminous and sonorous ambiences which, according to Bonnet .G (2005), are similar natures. However, the behaviour of the objects that exist in the architectural space is not the same as the two waves? We note that the light reflection is made just by the effect of mirrors. While the sound wave is reflected by all objects in space.

G. Bonnet (2005) argues that our perceptions of sound and light are different: hearing and visual organs handle information differently. In particular, the eye comprises the crystalline lens, which enables it to form an image on the retina, while the ear does not have this organ. Moreover, when the information coming from our sight and that from

our hearing are in conflict, those from our sight tend to dominate. For the analysis of daylight or sound ambiences, many tools are used. Simulation will remain the most practiced method for its effectiveness in evaluating and visualizing the ambience. (S.Reiter et A. De Herde, 2004)
In front of this very varied palette of visualization types, we note that the latter is only the result of an analysis chosen by the researcher, and defines in advance in the methodology. In our case, we must explore the notion of topology so that we can define the new method of analysis to be adopted.

1.2 Topology as tools of spatiality:

The topology is ancient in architecture, its appearance dates back to the last century as a response to the urban problem of the seven Königsberg bridges. (Sossinsky, A, 1999)
It should be noted that no topological theory specific to architecture had been formulated until then. The essays of definitions that exist are expressed by architects from two angles; the first is that of theorists, and the second is adapted by the practitioners who in both cases revert to mathematics.
Topology in this case is a simple solution to the architectural problems. (Guiseppa.D .C, 2001)
After seeing through the various definitions of the topology, it has been concluded that it is defined as the act of displacement over a period of time. The dynamic movement of the body crosses the duration, creating points, successively, All along the route. This point once created constitutes an event (fig 01).

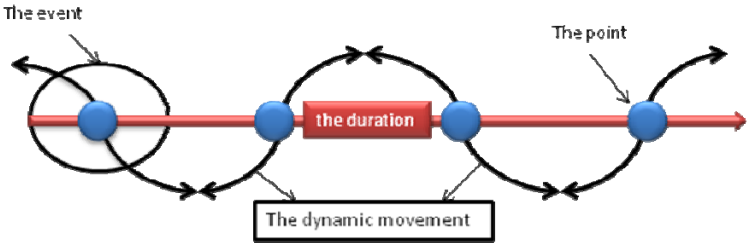


Figure 01: Synthesis of the topology definition

In order to verify this definition in architectural space, It will be necessary that there is a route, So that the duration of the walk can be determined, to arrive at the series of events which are in our case events seen (luminous) and unseen (sound), these events will highlight the primordial element of the Visualization that is the sequence.

1.3. The museum route a sensory composition:

The choice had been made on the museum, the concept of route and promenade are highlighted at the design stage of the project. The visitor of the museum contemplated the beauty of the places and the exhibited works, guided by the daylight of the interior spaces and by the sound composition of the visit. This complementarity is important for the success of the exhibition.
The route varies according to the architect's primary intention, and can also be a result or a constraint that is imposed from the beginning of the design. For this reason we find different types of routes in architectural works all classified according to several criteria. The important aspect in this study is the morphological elements of space, and according to the form we note three types of route (Mariani, R, 2000). : The "linear", the "labyrinth", the "centered".
There are also three types of routes linked to the three levels of exposure according to Jean Davallon:

- The route planned before the exhibition is mounted.
- The proposed route (s): the possible route (s) actually offered to the visitors.
- The lived route: the route chosen by the visitors. (JP Thibaud, 2001)

In the case of our research, we focused on the route lived

2. Methodology and case studies:

2.1. Sequential analysis:

If we refer to the definition of the topology already mentioned in the topology part as a tool of spatiality, comparing it with the characteristic of the museum route, we can admit that the duration is no more than the visiting time of the whole route; the momentary encounter between the visitor and the ambience constitutes an event (Fig 02) that can be luminous or sonorous.

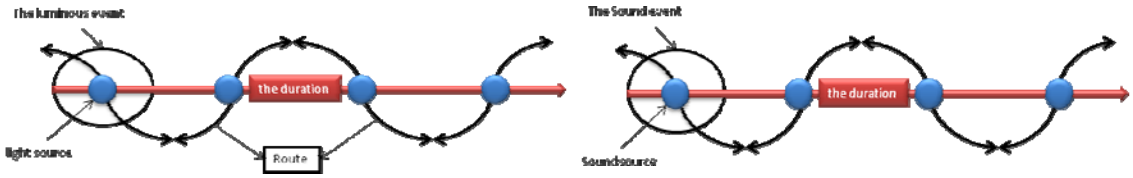


Figure 02: Definition of the sequential analysis for the daylight and sound ambience following the museum route

2.1.1. The construction of the analysis model to be simulated:

For each case study, you must have in addition to the graphic folder all the textual references, photos, analyzes or criticisms already made

2.1.1.1. The The 3D modelling:

It is about reproducing the model of the museum in drawing software, in the details in 3D with the same characteristics of the materials.

We also opted for the use of the technique of the layers to reproduce the following elements:

• The museum route

• The source: in the case of the luminous ambience, the axes of the bays are determined by the red color, in the case of the ambient sound, the location of the sound source which will represent the position of the visiting guide.

• The sequences: for the luminous sequence it is defined by the portion that is marked by the axis of a bay in the wall and whose boundaries are in the vicinity of the axes, of the same route, located halfway between the bays of the sequence in question. And for sound, the portion of the architectural space that is part of a route, identified by the existence of a sound source that is situated at a human height.

Modeling will allow us to describe the sequences for the luminous ambience well before the simulation, for the sound ambience we must first simulate to obtain the characteristics of each sequences, it should be noted that the criteria of the sequences are distributed as follows in Table 01:

Table 01: Description criteria used to analyze sequences

daylight Ambience		Sound Ambience	
Conformation	**Bay**	**Conformation**	**Sound**
Materials, morphology	The type of lighting The orientation, the position, the tilt, the form, the size, The glazing, the percentage, The additional glazing.	The geometry of the shape, The materials.	The sound source The intensity, The Frequency, The direction, The orientation,
			The characteristics of the diffusion sound wave
			The reflection , The refraction, The Absorption, The diffraction,
			The characteristics of the transmission sound wave
			The Direct transmission, The lateral transmission, The Spurious transmission.
			The characteristics of the sounds according to the

			surfaces of incidences
			The direct sound The useful sound: reflected, The sound borders, The echo, The reverberation The masked sound

It was noted that each type of ambiences had been analyzed separately.

2.1.1.2. The simulation:

The role of simulation for this work is to be able to visualize the topologies so that they can be qualified. We can for the luminous the ambience stop at the phase of the description of the sequence; the simulation of the luminous topologies will be done by exporting the model of Ecotect v5 to radiance and are role is optional, it will be used just to confirm Discontinuities.

The role of simulation for this work is to be able to visualize the topologies so that they can be qualified. We can for the luminous ambience stop at the phase of the description of the sequence; the simulation of the luminous topologies will be done by exporting the model of Ecotect v5 to radiance and its role is optional, it will only be used to confirm discontinuities.

In the case of the sound ambience Ecotect v5 software will be used, which will allow us to visualize the sound sequences by simulating them. This phase is more than necessary to be able to describe the sequence.

2.1.1.3. Application example:

The Museum Beyler Riehen (Renzo Piano between 1994 and 1997)

2.1.1.3.1. For the luminous ambience:

a).Step of the sequential analysis:

We took the plans of each level of the museum separately. A layer is superimposed on each plane, and the lived route is drawn with a blue line (Fig 03).

On another layer and with the color red (Fig 03), we place and draw the axes of the zenith and lateral bays. We refer to the various graphic parts illustrating the project, including cuts.

We then determine the axes midway between the axes of the bays, the new axes determine the sequences (Fig 04), which will be named by the letter S and the number that locates the sequence in the route.

For each of the sequences, the descriptor criteria are introduced into a table which serves as a database, including all the variables relating to the route, the space and the bay, which will be called a descriptor of the luminous sequences, By a statistical analysis.

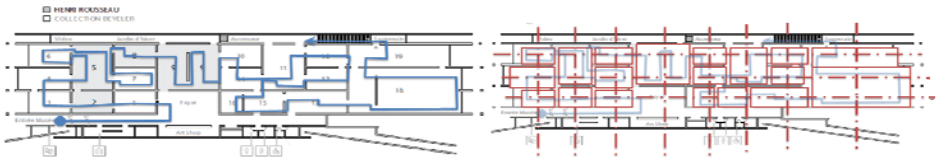


Figure 03: Illustration of the trajectory of the route and the positioning of the axes of the bays

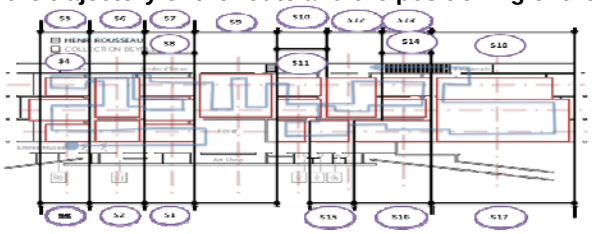


Figure 04: Illustration of the sequence drawing.

b).Steps of confirmation of the topologies by simulation:

Once the 3D model is ready (Fig 05), we make the necessary settings on Ecotect v5, we define the cameras and export under radiance. To get the visualization. We take the hour of visiting the highest visit and we simulated to check the luminous topologies through the seasons. The most critical parts of the route are subsequently taken (Table 02), 05 sequences are defined with their three points of luminance measurement, in this order: the floor, the wall and the ceiling, the curves for the variation of the amounts of light in the sequences are then drawn.

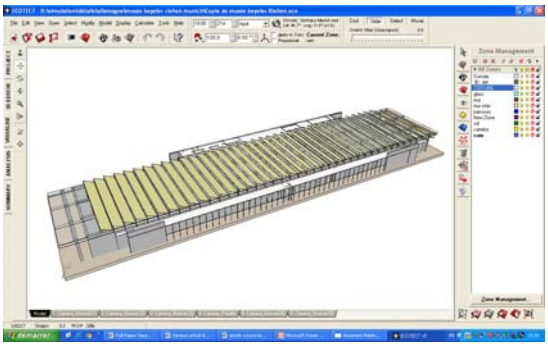
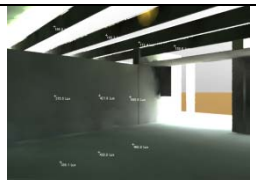
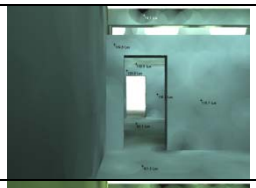
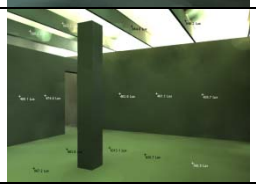
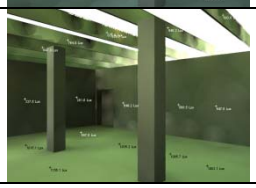


Figure 05: The 3D model of the Beyler Rhein under ecotect v5

Table 02: Simulation of the discontinuities in the luminous sequences case of Beyler Rhein Museum.

Time of attendance 13H	Discontinuities of Space	Continuities of the conformation and the bay	Discontinuities of the shape of the bay	Discontinuities of the shape and type of the bay
Mi saison				
winter				
summer				

2.1.1.3.2. For the sound ambience:

Step of the sequential analysis and simulation:

The plans of each level of the museum were taken separately. A layer is superimposed on each plane, and the route is drawn with a blue line. The modeling is carried out on Ecotect v5 with the different settings. And the sound sources are assigned their positions and heights (Fig 06).

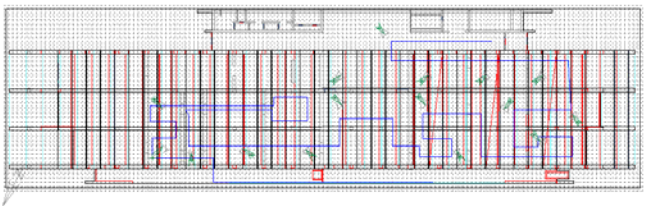
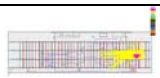
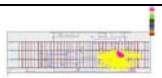
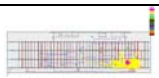
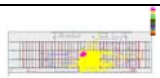
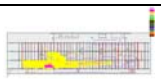
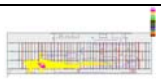
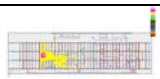


Figure 06: Illustration of the sequential analysis of the sound ambience

The sound sequences are then simulated as a function of the sources in order to obtain the sound discontinuities. For each of the sequences, the descriptor criteria are introduced into a table which serves as a database as Table 03, including all the variables. Called a descriptor of sound sequences

Table 03: simulated sound sequences

Sequence	**S01**	**S02**	**S03**	**S04**	**S05**
Result					
Sequence	**S06**	**S07**	**S08**	**S09**	**S10**
Result					
Sequence	**S011**	**S12**	**S13**	**S14**	**S15**
Result					

The methodological principle of all the work is summarized in this diagram (Fig 07).

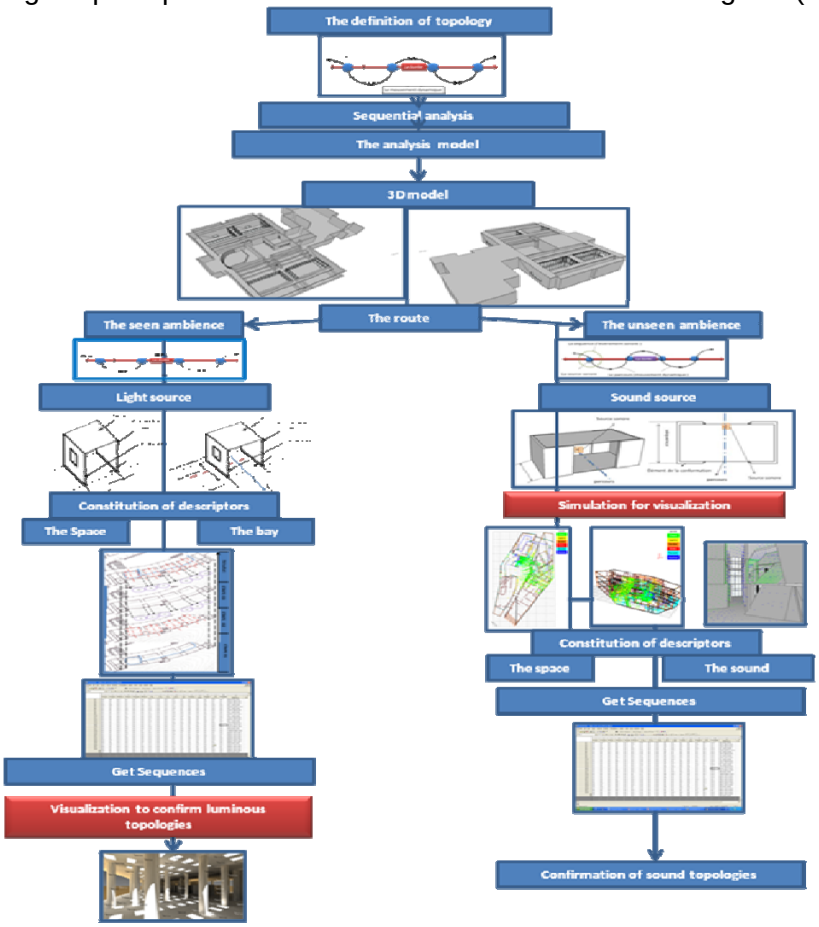


Figure 07: The methodological principle

2.2. The study corpus:

There is therefore a multiplicity of museums, of our era that fulfils this function. The designs are varied, shapes, colors, functions, adding to it the type of exposure.
Our study will select museums that meet a number of criteria: (i) the historical period, (ii) the intention to design the architectural work with the daylight we call "luminous intent", (iii) the Quantity of information available to us (speech, textual, graphics, images ...). And the study corpus will include thirty European museums (Table 04).
The justification for this choice in relation to the sound ambience is at the level of the first criterion of selection, the museums that were chosen were all designed between 1980 and 2008, and this period is characterized by the influence of Museography based on sound, on the design and realization of museums (M. Meyer, 2013). In this research we will only take, the sound sources called human in the natural state.

Table 04: Museums in the study corpus

N°	Museums	Architect	Year
France			
01	Departmental Museum of Prehistory	Roland Simounet	1981
02	Museum of Fine Arts of Grenoble	Olivier Félix-Faure, Antoine Félix-Faure et Philippe Macary Lorenzo Piqueras	1990-1994
03	National Museum of Tayac	Jean-Pierre Buffi	1994-2004
04	Museum of the quay of Branly	Jean Nouvel	2006
05	Museum of Natural History	Paul Chemetov et Borja huidobro	1991-1994
06	Museum of the quay of Branly (competition)	Rudy Ricciotti	1994
Germany			
07	Museum of SAMMLUNG GOETZ Munich	Jacques Herzog et Pierre de Meuron	1989-1992
08	Humbuguer Bahenhof museum ,fur Gegenwart	Josef Paul Kleihues	1988
09	Vitra design museum	Frank Gehry	1988-1989
10	Berlin Jewish Museum	Daniel Libeskind	1999
Spain			
11	Guggenheim Museum Bilbao	Frank Gehry	1993
12	Centro Gallego de Arte contemporaneo	Alvaro Siza	1994
13	Hydraulic museum	Juan Navarro Baldeweg	1989- 1992
14	Museum of Maritime Archeology CARTAGENA	Alberto campo baeza	1998
Switzerland			
15	Jean Tinguely Museum	Mario Botta	1993-1996
16	Museum of Swiss Ethnography	Hanger, Monnerat, Petitpierre	1995
17	Beyeler Riehen Museum	Renzo Piano	1998
Austria			
18	Historical Museum of Salzburg	Hans Hollein	1989-1990
19	KUNSTHAUS BREGENZ museum	Peter Zumthor	1990-1997
Great Britain			
20	American air museum Duxford	Foster partners	1993-1997
Italy			
21	Museum DE MAXXI	Zaha Hadid	2007
22	Ara Pacis museum	Richard Meier & Partners	1995-2006
Netherlands			
23	Bonnefanten museum,Maastricht	Aldo Rossi	1990-1994
24	KUNSTHAL museum, Rotterdam	Rem Koolhaas	1987-1992

Belgium			
25	The Hergé Museum	Portzamparc Christian	2006
Finland			
26	Museum Nykytaiteen Kiasma, Helsinki.	Steven Holl	1993-1998
Sweden			
27	The Museum of Modern Art and Architecture Stockholm	Rafael Moneo	1990-1997
Denmark			
28	North Jutland Art museum, Alborg	Elissa and Alvar Aalto	1998
Greece			
29	Museum of the Acropolis Athens	Bernard Tschumi	2007
Norway			
30	Aukrustsentret museum, Alvdal	Sverre Fehn	1993-1996

3. Results and discussion:

3.1. Results of the sequential analysis for the discontinuities of the luminous ambience:

The notion of discontinuity, as defined above, is directly related to the continuous transformations that affect the characteristics of the luminous ambience along a route.

The sequential analysis made it possible to highlight the discontinuities that exist in our corpus of study (S Saraoui, A Belakehal, 2011). The term "major discontinuities" refers to those that are encountered in a percentage greater than or equal to 50% within the corpus.

There are also a number of existing discontinuities (Table 05), or small discontinuities, that are referred to as minor discontinuities. This is the set of discontinuities that characterize space, namely conformation, in our study corpus.

We observed a single discontinuity of wall morphology with a frequency rate of 17%. The rest of the discontinuities in the characteristics of the wall are absent. In what follows we will highlight only the major and average discontinuities.

Table 05: Summary of light discontinuities

Light topology	major		average		Minor	
	The orientation discontinuity	85%	The discontinuity of the position of the bay	40%	The discontinuity of the shape of the bay	20%
	The discontinuity of the lighting type	80%	The discontinuity of the proportion of the bay	43%	The discontinuity of the inclination of the wall	17%
	The discontinuity of the size of the bay	63%				

3.1.1. The discontinuity of orientation:

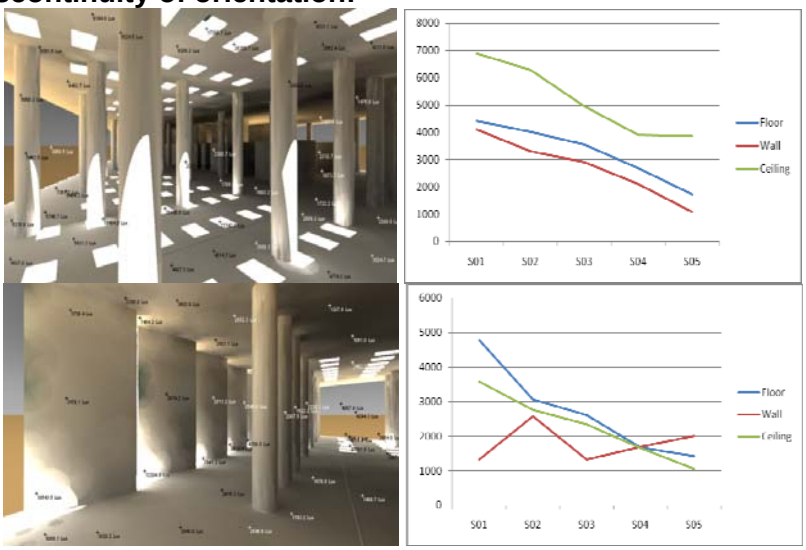


Figure 08: Visualization of the discontinuities of orientation cases of the Museum of Athens

The orientation discontinuity corresponds to the set of orientation variation of the bay along the existing route.

In the museum of Athens (Fig 08), for example, the route is of a linear type. This makes it stable. If we take the first graph we see that the curves are perfectly parallel and decreasing varies between 7000 and 2000lux for the west orientation, this revises to a stability of the sequences with a distance of the bay.

For the second graph the curves are between 1000 and 5000 lux, they tend to part, then approach and finally intersect. For the first three sequences we have just the west orientation, the variation of the illuminance is due to the spatial component, When approaching sequence 04 the influence of the north orientation begins that justifies the darkening of the floor and the ceiling.

3.1.2. the discontinuity of lighting type:

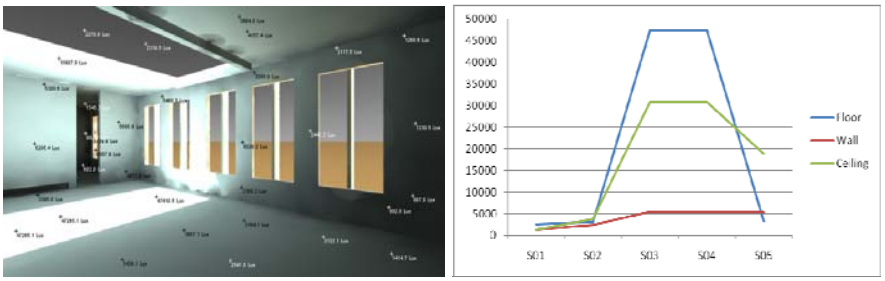


Figure 09: Visualization of discontinuities of illumination type case of the Spain Hydraulic Museum

The second discontinuity observed is that of the type of lighting. In the same route a bay can be in a horizontal or vertical position.

The example of the hydraulic museum in Spain confirms this, we note in the graph that for a stable lateral illumination (Fig 09), the sequences 01 and 02 have the same interval 0 to 5000lux, As soon as there is influence of the zenithal lighting; the interval becomes wider, only the wall will retain these characteristics.

3.1.3. The discontinuity of the shape of the bay:

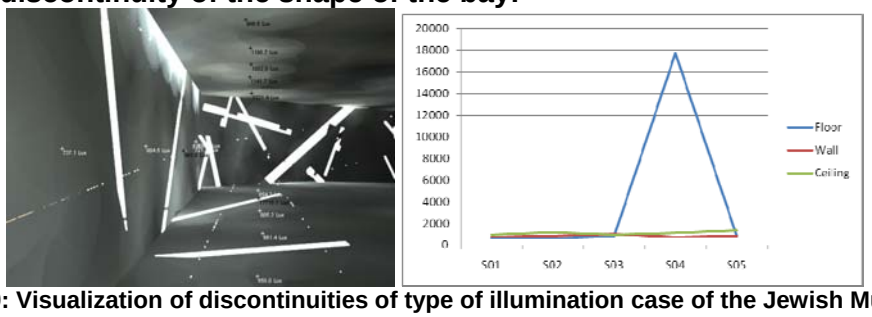


Figure 10: Visualization of discontinuities of type of illumination case of the Jewish Museum in Berlin

The shape of the bay can cause a number of sequential variations in the route. This variation in form appears through a partial or complete change of form.

This is confirmed in the Jewish Museum in Berlin (Fig 10), on the same route, sequences 01 02 03 have practically the same illuminance distributions from 0 to 2000 lux, and the shape of the bay is stable. From the sequence 03 the curve of the ground increases this is due to the change of the shape of the bay.

3.1.4. The discontinuity of the proportion of the bay:

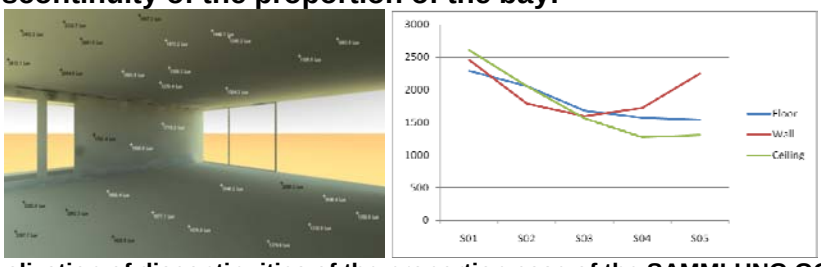


Figure 11: Visualization of discontinuities of the proportion case of the SAMMLUNG GOETZ Munich

A bay can occupy a large or a small area of the wall. Transformation in the dimensions of the bay can also be varied in the route.

This is confirmed in the SAMMLUNG GOETZ, or on one part of the route the bay occupies the whole wall, and in the other one third, if we observe the curves, we observe an interval of 1000 to 2500 lux (Fig 11), no sequence resembles the other.

3.1.5. The discontinuity of the size of the bay:

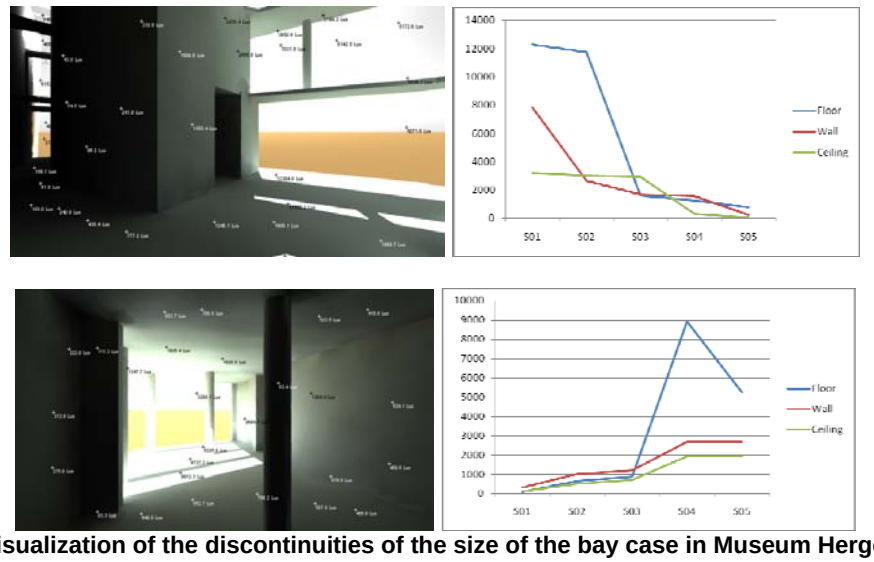


Figure 12: Visualization of the discontinuities of the size of the bay case in Museum Hergé

The size of the bay can also vary in a large number of sequences. In the case of the Hergé museum, at the level of the ground floor there are discontinuities of the size of the bay, which generates a graph with varied sequences (Fig 12). On the other hand, it is

noted in the graph that the sequences 01, 02, 03 are stable, and this is due to the absence of bay, for the change of the quantities of light afterwards.

3.1.6. The discontinuity of the position of the bay:

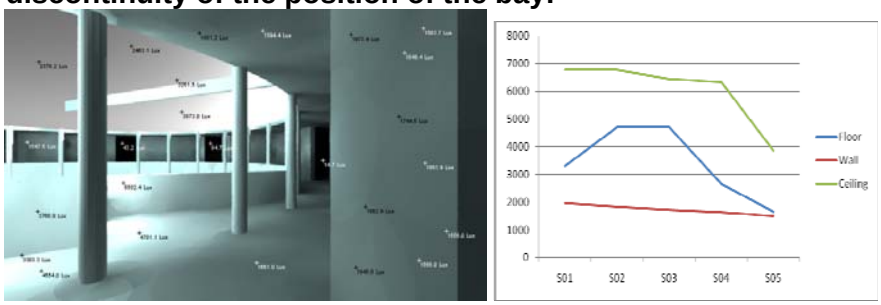


Figure 13: Visualization of the discontinuities of the bay position case of the Historical Museum of Salzburg

The position of the bay in the wall can also vary, because in the same route, one passes from one low window, to another high.

In the Historical Museum of Salzburg (Fig 13) for side-skylight lighting the curves are stable in the same interval, and the ceiling is the most illuminated element. The stability between the sequence 2 and 3 is due to the existence of a zenith opening.

3.2. Sound topologies and their visualizations:

Concerning sound, continuous transformations characterize very essentially the variations of the characteristics of the sound ambience throughout the museum route.

A total of 506 sound sequences were obtained and the discontinuity rates are shown in the table 06 as follows:

Table 06: Summary of sound discontinuities

Sound topology	Major		Average		Minor	
	The orientation discontinuity	43%	The Discontinuity of Refraction	43 %	The discontinuity of Diffraction	13%
	The Discontinuity of Direction	73%	The Discontinuity of Direct Sound	53 %	The discontinuity of Parasitic Transmission	27%
	The Reverberation discontinuity	77%	The Discontinuity of sound borders	43 %	The discontinuity of Echo	20%
	The useful Sound Discontinuity	57%			The discontinuity of Masked Sound	30%

3.2. Results of the sequential analysis for the discontinuities of the sonorous ambience:

3.2.1. The discontinuities of orientation:

The orientation discontinuities are linked to the change in orientation of the sound source along the entire museum route. The sound source will therefore retain the same characteristics, but the sound ambience will vary according to the physical characteristics of the museum space. We can cite the Hergé Museum (Fig14), or the sound sources do not follow the same direction. This generates sound topologies of orientation.

Figure 14: Sound discontinuities in orientation Hergé Museum

3.2.2. The discontinuities of direction:

The sound discontinuities of direction are much related to the route, it is observed if the direction of the sound source does not follow that of the route.

The directional discontinuities vary throughout the route, in some cases the direction of the sources follows that of the route as in the case of the SAMMLUNG Museum GOETZ Munich, and in others it is not that of the route as the case of the Nykytaiteen Kiasma Museum, Helsinki c (Fig15).

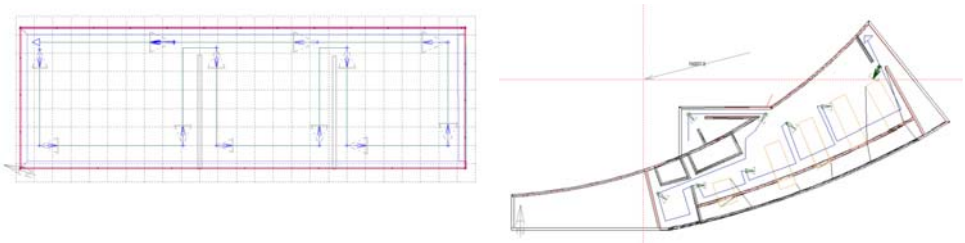


Figure 15: the discontinuities of the direction

3.2.3. The discontinuities of the reverberation:

Reverberation discontinuities are related to the existence of several sound reflections within the same sequence, which are variable from one sequence to another.

For example the North Jutland Art Museum, where reverberation is presents in some sequences, absent in others, and even when it is present it is variable, it is average in sequence 02, and is Low in sequence 08 (Fig 16).

Sequence 02 **Sequence 08**

Figures 16: Sound discontinuities of the reverberation of the North Jutland Art museum Alborg

3.2.4. The discontinuities of its useful (reflected):

The sound reflected is the sound useful in the study of the sound wave, its visualization by the software makes it possible to detect the impact of the sound wave and the limits of the sound wave in space. The discontinuities of the useful sound make it possible to bring out the limits of sound reflection.

In some cases the wave of the useful sound respects the geometrical form of space, which was found at the Nykytaiteen Kiasma Museum, Helsinki ((Fig 17). In other cases, such as the Jewish Museum in Berlin, it goes beyond the boundary of the simulated sequence to the outside or the neighboring sequence (Fig 17).

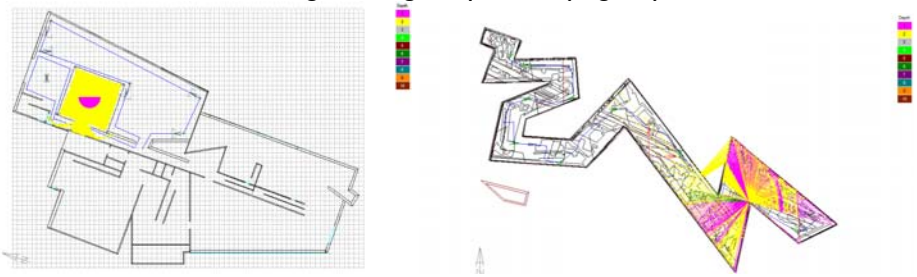


Figure 17: Useful sound discontinuities, Nykytaiteen Kiasma Museum, Helsinki and Jewish Museum

3.2.5. The discontinuities of refraction:

The discontinuity of refraction characterizes the composition of the walls of the sequence; it appears when the sound waves which characterize the sequence undergo a change of angle as they pass through the walls thus changing direction.

This break can be at the level of the outer walls as in the case of the Guggenheim Museum Bilbao, or at the level of the inner walls as in the Ara Pacis museum. (Fig18).

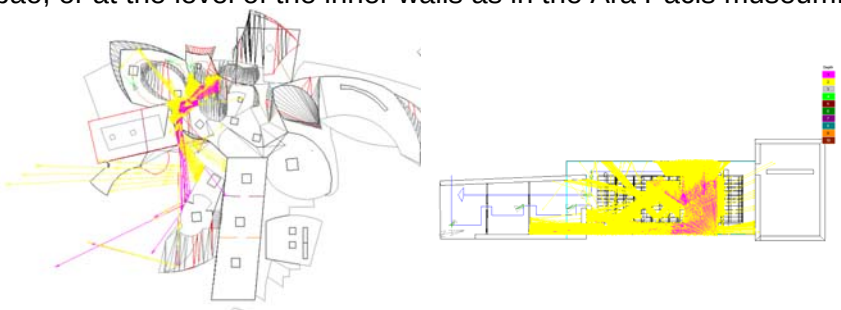


Figure 18: the external and internal refraction discontinuities

3.2.6. The discontinuities of the direct sound:

Direct sound discontinuities are linked to the existence of an obstacle or sound modifying element that prevents the direct wave from passing from the transmitter (guide) to the receiver (visitor). The sound discontinuities related to the direct sound vary according to its intensity each sequence and another; we can cite the case of the historical museum of Salzburg, where the direct sound is strong in most sequences. Museum of Acropolis Athens, where it is medium. and the Museum of Modern Art and Architecture Stokholm, where it is very weak (Fig19).

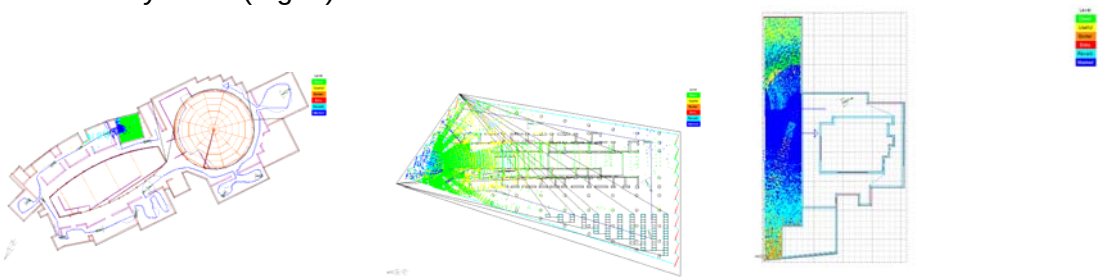


Figure 19: Direct sound discontinuities

3.2.7. The discontinuities of the sound frontier:

The discontinuities of sound borders are linked to the existence of the limits of the audibility zone. It is the places in the conformation or the sound is above or below the audible limits. We will cite the Museum of the quay of Branly (Fig 20) where there are no sound borders and the hydraulic museum where it is present in Sequence 11.

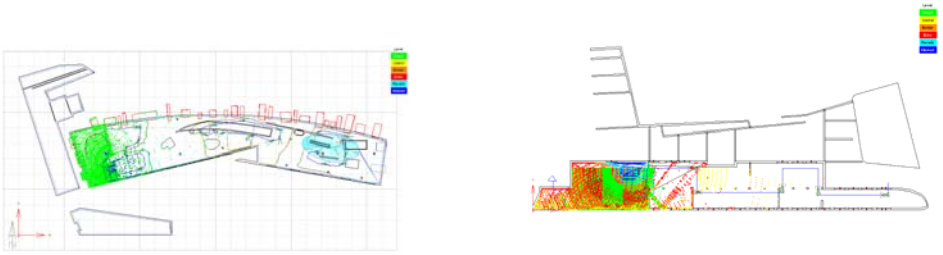


Figure 20: The discontinuities of the sound borders

4. Conclusion:

The visualization in architecture remains one of the tools that allow the representation of architectural space. The development of technology has accelerated the use of visualization especially if it is consistent with reality.

The architectural space will remain a very ambiguous element for all those who have tried to define it, At present, defining tests all tend to be based on the axis of the ambiences, where the subjective and the objective are reconciled.

We have observed from the beginning of our research that topology is a notion very much related to space and used by architects. And that despite the existence of this notion in architectural thought, its definition still remains non-existent, and always refers to mathematics.

We then compared the existing definitions of topology given by architects, to be able to give it our own definition. Our definition concluded that it had connected between the act of displacement on a route and the creation of the sequence.

Based on the concept of the route, the choice was made on museums, where this concept is the key element in the success of design and exhibition after. To do this, thirty international museums chosen according to selection criteria were analyzed by the technique of sequential analysis.

This allowed us to detect a great difference between the analysis of the perceived ambiences such as the luminous ambience and the unseen ambiences such as the sonorous ambience, despite the similarities that can qualify the physical characteristics of the two types of wave ,Visualization is more than necessary in the analysis phase for unseen ambiences, whereas for the viewing ambiences it complements and supports the results obtained by the analysis which is in our case a sequential analysis based on sequence.

The visualization makes it possible in both cases to materialize the sequences of the ambient topology. This implies that the topology can generate new spatiality within the architectural space.

The field of the research will remain open, since the results obtained concerning the sequences can be exported in the field of computer programming in order to create an interface which makes it possible to evaluate the topological sequences of the ambiences while visualizing them.

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