Space
Interconnecting Museology and Architecture
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"How people negotiate their way through museums and galleries can have considerable implications for how they relate to and interpret exhibition content.... An important question for exhibition design is how museum space can be organised so as to best elicit the kind of responses that exhibition-makers intend."

SHARON MACDONALD, 2007

The starting point of this paper is a key issue raised by the opening of the Acropolis Museum in Athens (2009): the gap between the museological discourse and its spatialization in the new museum, designed by Bernard Tschumi. The design was criticized for failing to give clear spatial expression to the museological intentions and guide visitors in their reading of the displays. But is this the only role for space in mapping curatorial ideas into display layout? Can spatial design add more than it takes away? The context of these questions is the much broader issue, central to this paper, of how the layout of space in museums and galleries interacts with the layout of objects to express intended messages or realise specific effects. This is set against a background of museum literature that has increasingly drawn attention to the importance of space in creating the experience of visiting and linked spatial design to the constructivist theory that sees museum learning as 'meaningful experience' rather than 'defined content outcome' (Hein 1998, 2006). This theoretical background is amplified by the current museum reality with its high degree of experimentation in display arrangements (as in the Staatsgalerie, Stuttgart, 2010) and the conscious use of space in relation to an innovative curatorial approach (as in the new Ashmolean, Oxford, 2009). The paper focuses first, on developing a wider understanding of the relation between the spatial design of museum and gallery buildings and the conceptual and spatial organisation of their displays; and second, on how the way in which they combine creates different kinds of visitor experience and give a museum its distinctive spatial, intellectual and social character. This argument will be made through the analysis of two pairs of museums, all preeminent: the National Museum of Modern Art in the Pompidou Centre, Paris, Tate Modern, London, the National Archeological Museum and the new Acropolis Museum in Athens. The paper will use syntactic methods of spatial analysis and visitor observation, set into the context of museum visitor studies. It interprets the results drawing on the work of the educational sociologist Basil Bernstein. Specifically, it will use the concepts of classification and framing (Bernstein 1975), which are common to the museological and architectural literatures, and applies them to both the curatorial and the spatial discourses, also adding the concept of invisible pedagogies (Bernstein 1975) as being useful to the understanding of museum space. These concepts will suggest an interpretation of the different ways in which space can contribute meanings to museum exhibitions, and how they are expressed in observable and quantifiable aspects of visitors’ spatial behaviour and experience as they explore space and displays. Returning to the initial question, Bernstein’s ideas will also enable us to propose how the design of the Acropolis Museum adds to the museological narrative a spatial experience that acts as an invisible pedagogy.
Keywords: Spatial design, Museology, Pedagogy, Visitor spatial behaviour

1. Introduction

The starting point of this paper is a key issue raised by the opening of the Acropolis Museum in Athens (2009): the gap between the museological discourse and its spatialization in the new museum, designed by Bernard Tschumi. The design was criticized for failing to give clear spatial expression to the museological intentions and guide visitors in their reading of the displays. But is this the only role for space in mapping curatorial ideas into display layout? Can spatial design add more than it takes away? The context of these questions is the much wider issue of how the layout of space in museums and galleries interacts with the layout of objects to express intended messages or realise specific effects. Setting out from both recent spatial thinking in museology and the current museum design reality, and through the analysis of four case studies, the paper seeks to develop a more general understanding of the complex relation between the spatial design of museum and gallery buildings and the conceptual and spatial organisation of their displays and how the way in which they combine creates different kinds of visitor experience and give a museum its distinctive spatial, intellectual and social character.

2. Space in the recent museum literature

Museum literature in recent years has increasingly drawn attention to the importance of space in creating the experience of visiting. Falk and Dierking (1992) see the physical context as one of the three contexts, together with the personal (visitor's experiences, knowledge and interests) and the social, that create the 'interactive experience' model, and add that 'space is created, and in fact de-defined, by the design. At the level of exhibit, at the level of the exhibition and finally at the level of the building, the visitor's experience is influenced by the creation of space' (2000: 123). Hein (1998) and Black (2005) also argue that architectural space provides an intelligible framework, so that visitors can 'successfully process their (logistical and conceptual) experience' (Hein, 1998: 160) and, through the clear organizational structure, have 'the power to select for themselves what to see' (Black, 2005: 149) and so 'create their own meaning' (ibid.:191).

In particular, visitor experience in museums is explored through a focus on its relation to questions of learning and education -often based on the constructivist conception that education is 'meaningful experience' rather than 'defined content outcome' (Hein, 2006: 346) and learning in the museum represents meaning-making by visitors (ibid.:347). So, exhibition layouts are discussed in conjunction to educational theories described by Hein (1998: 25). 'Sequential exhibitions, with a clear beginning and end, and an intended order' (ibid.:27) are seen as based on the didactic, or the stimulus-response, model of education, and exhibitions that 'allow exploration, probably including going back and forth among exhibit components' (Hein, 1998: 33), are seen as organized on 'discovery learning' lines. Both are contrasted to constructivist exhibitions that would have 'many entry points, no specific path and no beginning and end'. It is acknowledged that independently of the
display approach and the curator’s efforts to constrain visitors, the majority tends to create their own exploratory routes, missing out elements, and so ‘creating their own constructivist layouts’ (Black, 2005: 148).

Drawing on Hein’s model of types of learning in museums, Witcomb (2003) introduces the idea of ‘interactivity’ as a mode of display, and a ‘spatial’ approach. She proposes the concept of ‘spatial interactivity’ to complement ‘technological’ interactivity, and describe an exhibition design that encourages exploration, both spatially and conceptually, with the absence of linear display design and strong narrative structure. The circulation structure of the exhibition, which guides visitors’ movement around the museum, while offering route choices, can be compared to a ‘hypertext program, which has multiple entry paths and therefore the possibility of the construction of narrative’ (ibid 145). Visitors are not expected to see every exhibit to understand the ‘message’ but have ‘an active role in the process, becoming co-authors in the production of meanings’ (ibid.:143). This approach can be paralleled, Witcomb argues, to certain genres of television and music video clips, ‘which do not have a tight narrative structure’ but ‘offer a series of vignettes which are creatively juxtaposed in order to “invite narrative interest without providing specific narrative content”’ (ibid.: 144): whether in electronic form or in museums, the sequence of images is serialized though the activity of viewing. So ‘there is always the possibility of an accidental connection. The sequence of images can never fix narrative meaning’ (ibid.:146).

This rejection of the idea of a single meaning, in line with the ‘new museology’ and the constructivist approach is in complete contrast with the linear displays and the strong evolutionary narrative, which Bennett describes as ‘the technology of organized walking’ and associates with nineteenth-century classification systems. ‘Locomotion -and the sequential locomotion- is required as the visitor is faced with an itinerary in the form of an order of things which reveals itself only to those who step by step, retrace its evolutionary development’ (Bennett, 1995: 43). The original display layout of the Glyptothek in Munich, one of the first and most influential museum buildings (1830), could clearly illustrate this point. The sculptures were chronologically arranged following the principles formulated by Winckelmann in his Geschichte der Kunst des Altertums (1764), becoming the first physical expression of his theoretical scheme (MacGregor, 2007: 238). Thus, by moving though the single sequence of galleries, visitors experienced the evolution of art. (This display layout can be interestingly contrasted to the current one discussed below.) But despite the shift from a fixed single meaning to an open-ended narrative, space continues to be seen as a key element in structuring the learning experience of the visitor, and in both contrasting approaches meaning is also constructed though movement in space.

Another related conception that links space to movement is the ceremonial walk through the galleries, which lies behind the notion of ‘script’ suggested by Duncan and Wallach (1980) -the idea that the museum, through its architecture, its layout of spaces, and arrangement of displays, provides a programmed experience, resembling a ritual process, which is performed by visitors through move-
The works of art, they argued, become part of an 'iconographic programme' (1980: 451), which is defined by authoritative texts, in that instance, theories of art history. Discussing this idea more extensively in her book 'Civilizing rituals. Inside Public Art Museums' (1995), Duncan proposes that: 'museums offer well-developed ritual scenarios, most often in the form of art-historical alternatives that unfold through a sequence of spaces. Even when visitors enter museums to see only selected works, the museum's larger narrative structure stands as a frame and gives meaning to individual works' (1995: 12).

On these grounds, she argued that there is an analogy between museums and ceremonial buildings, such as palaces and temples, and furthering the analogy to the curator, she suggested seeing 'the situation of a museum curator as analogous to that of a medieval church official responsible for planning the iconographic program of a cathedral' (1995: 107).

Setting out from Duncan's notion of script, Noordegraaf (2004) analysed the changes in the display layout of the permanent collection in a single institution, the Boijmans van Beuningen Museum, Rotterdam, since its opening in 1849. But unlike Duncan who suggested that visitors enact a 'ritual scenario', Noordegraaf argued that the museum is 'the product of both its designers and its users', and that visitors with their viewing habits, have an active role in shaping the museum space and can even cause layout changes, the 'revision of the script'. The main thrust of Noordegraaf's work was drawing a distinction between three types of script during the twentieth century: the 'visitor-orientated museum script' in the early twentieth century, when the museum was seen as instrument for educating the public; the 'invisible script', that aimed at making visitors forget the mediating role of museum presentation; and in the last two decades of the twentieth century, the 'hybrid museum script' that lacks an overall model, either in terms of spatial and display layout, or is characterized by combination and co-existence of different modes of presentation.

Duncan's approach inspired also the influential work of Staniszewski (1998) 'The Power of Display'. She analyzed the installation design of paradigmatic exhibitions at MoMA (ranging from exhibitions of modern art to exhibitions which served political propaganda), and showed that the exhibition layout and the spatial and visual relations between spaces become tools for the expression of the curator's particular theoretical concept or intent. The comparative analysis of two exhibitions, organized at MoMA by Alfred H. Barr and his successor, René d' Harnoncourt, illustrated the point. More precisely, Staniszewski opposed the linear structure of the 1936 exhibition Cubism and Abstract Art, designed by Barr to the display technique of vistas adopted by d' Harnoncourt at the 1946 exhibition Arts of the South Seas, dedicated to Oceanic cultures. The wide door openings and the structure of wall partitions created a series of overlapping vistas that aimed at revealing contrasts and affinities between objects and cultures and involved visitors in associating objects and making visual comparisons. As d'Harnoncourt remarked, this method of presentation:
'is based on the recognition that the field of vision of the visitor does not have to be limited to the units that are in the path of his immediate physical progress through the exhibition and that any given point vistas should be open to him into these sections of the exhibition that have affinities with the displays in the unit in which he stands' (cited in Staniszewski, 1998: 111).

Similar to the concept of script is the idea of 'museums as texts' proposed more recently by the linguist Ravelli (2006). Expanding the title of her book 'Museum texts', from issues of 'texts in museums' to 'spaces such as exhibitions (which) can be read and experienced as meaningful texts' (2006: 10), she argued that 'an exhibition, created through an organization of exhibits and spaces, a selection and construction of content, and a construal of role relations is a meaningful text: it is a space that visitors move through, and a space which they “read”' (ibid.:123). She is particularly interested in the way exhibitions make meaning through the relative placement of displays and the direction and control of visitor pathways, and in interpreting these, she makes reference of Bernstein's concepts of 'classification' and 'framing', discussed later in this paper. However, authors like Whitehead (2009) have argued that 'display, understood (not read) in a sensorial sense is beyond text' (2009: 37). This, according to Whitehead, poses the problem of the absence of 'an appropriate language to describe display other than display itself', or of 'a metaphor or analogy (that) fully captures its complexity or accounts for this operation, in part because the experience of display is so profoundly sensual, bodily and kinetic (as well as intellectual) as to be beyond mere textual or verbal comprehension' (ibid.:37).

The current awareness of the role of space is reflected in a more recent version of the idea of 'museums as embodied theories' (Whitehead, 2009: 24), advocated often and in relation to different types of museums (Peponis and Hedin, 1982: 21-25; Glicenstein, 2009: 91; Moser, 2010: 27); but what is more interesting is that it is suggested that 'the theories in question can be emergent' from the process of curating 'rather than pre-defined' (Whitehead, 2009: 26). Whitehead explains: that ‘...curators produce meaning (at least for themselves) through the orchestration of various interrelated media or, as it might otherwise be said through the poetics of exhibiting, i.e. “the practice of producing meaning through the internal ordering and conjugation of the separate but related components of an exhibition or display” (Lidchi, 1997: 184)', which include 'the architectural and decorative manipulation of space, the selection, ordering and placing of objects' (ibid.:26).

3. The awareness of space in current museum practice

The intimate relationship between the arrangement of space and the presentation of a collection is not only addressed in the museological literature, but has also become a central issue in current museum practice. The creation of the new Ashmolean Museum, Oxford, in 2009 - a new building designed by Rick Mather, interlinked to the neoclassical building by Charles Cockerell (1845) - was seen as an 'opportunity to look in new ways at the collections and how to display them' (Ashmolean, 2009: 10). The aim was 'to challenge as well as to inform, presenting new ideas and searching questions about the peoples and cultures whose art and artefacts are on display' (ibid.:23), an intention that perhaps
best illustrates Macdonald’s argument that a museum or exhibition is ‘a theory: a suggested way of seeing the world’ (Macdonald, 1996: 14). The development of this new approach was closely related to the spatial design of the new building, characterized by the use of glass walls and bridges connecting galleries on adjoining floors [Figure 1a]. Stretching ‘from Europe in the West, through the Near East and Asia to the Far East, from ancient times until the present day’, the collections are organized based on the theme Crossing Cultures, Crossing Time in a broad chronological order, that is on the idea that cultures interact with and influence one another and ‘share a connected history’. The ‘interlinking of gallery spaces and the carefully constructed views and vistas on and between floors’, argues the Director Dr Christopher Brown, ‘are a powerful manifestation of the ’Crossing Cultures, Crossing Time theme’, so that ‘the relationships between galleries are often as important as the galleries themselves’ (Ashmolean, 2009: 1). Here the emphasis is more on visual than movement relations. ‘The whole building is conceived around strong visual axes, so that, for example, the visitor can look through a window case of ceramics in the China gallery down to glazed tiles from the Islamic world and across to the Ceramics gallery, where lustre-ware and majolica show a different use of the same tin-glaze technology’ (ibid.: 24-25).

The conscious use of space in relation to an innovative curatorial approach in newly designed museums is accompanied by a high degree of experimentation in display arrangements in existing museums. An illustrative example is the Staatsgalerie in Stuttgart, where the sense of ‘inversion’ of historical themes conveyed by the design of the Stirling building is extended to the current display layout (2010). In key strategic locations of the layout (corner galleries, galleries at the end of sequences, or galleries that offer route choices), the chronological narrative gives place to unexpected juxtapositions of works of different periods – ‘harmonious or provocative’: earlier works are set into more modern galleries; as in the case of the juxtaposition of the Herrenberg Altarpiece by Jerg Ratgeb (1519) and Barnett Newmann’s ‘Who’s Afraid of Red, Yellow and Blue II (1967)’ – [Figure 1b], ‘or newer works are set back in time’, as in the case of the grouping of works by Max Beckmann (‘Self-portrait with Red Scarf’, 1917) and Hans Memling (‘Bathseba in the Bath’, 1485).
A similar curatorial approach, a departure from a purely chronological sequencing of the collections, this time for spatial reasons, is found in the Glyptothek in Munich. In contrast to the original arrangement (see above), in the current display layout, the chronological narrative is interrupted so that key works of the collection, like the Archaic pediment sculptures from the Temple of Athena at Aegina, and the Barberini Faun, are placed to exploit spatial possibilities—for example, in central or highly accessible spaces of the layout or at the end of major lines of sight.

4. Linking museological ideas of space and syntactic concepts

This literature review shows the richness of spatial thinking in museology and reveals many parallels between the museological ideas of space and the space syntax concepts, especially those which are increasingly applied in the studies of museums (see review in Hillier and Tzortzi, 2006; Psarra, 2009; Wineman and Peponis, 2010; Zamani and Peponis, 2010). The most important point perhaps is the recognition in the museological literature that architecture affects our experience of museums not only as a physical form or as individual spaces, but also as a system of spatial relations—an idea directly related to the concept of configuration (Hillier, 1996), central in syntactic analysis. Another key and constant preoccupation in museology is the link between spatial layout and movement, which can be paralleled with the theory of layout in syntactic literature and its application to studies of museums. Both literatures also address the role of movement in the production of meaning and the communication of knowledge, and make the link between sequences and choices in the layout and different forms of learning. Common ground is also the idea that the spatial layout can contribute to the intelligibility of a museum setting, while the notion of 'ritual scenario' could be seen as 'long model' (Hillier, 1996: 192-4) since most of what happens is specified by social rules. It could also be argued that the notion of 'hypertext' reflects visual and permeable relations in a layout.

With this in mind, it is proposed in this paper to look at space as the common point of reference between museology and architecture, and to show that through the way the museum building organizes space, it constructs a set of relationships among galleries, determining the way they are explored and used, among objects, affecting the way they are perceived and read, and among visitors, creating possibilities for co-presence and encounter—a key dimension of the way we experience museums, which is less discussed in the museological literature. By understanding these three morphologies and their relations, we can begin to understand analytically the different visitor experiences of museums.

This argument will be made through two paired comparisons, with the first being that between the National Museum of Modern Art in Pompidou Centre, Paris, designed by Renzo Piano and Richard Rogers in 1977, and the Tate Gallery of Modern Art, London, the conversion of an industrial building by Herzog and de Meuron in 2000 [Figure 2a,b]. This will provide the background for bringing in another pair of contrasting cases, archaeological museums this time, the National Archaeological Museum in Athens, originally built in 1889 but extended gradually with additions, and the new Acropolis Museum, also in Athens, designed by Bernard Tschumi and opened in 2009 [Figure 2c,d].
5. The museum as 'a city' and as 'a machine for showing art': comparing Pompidou with Tate Modern

The National Museum of Modern Art in the Pompidou Centre and the Tate Gallery of Modern Art share a set of conspicuous similarities so that their parallel investigation seems self-evident. Both are big scale, national museums of modern art, in buildings that constitute urban landmarks, their ground floors are conceived as a space you walk through, as a 'piazza', and their affinities extend to their collections - both begin with the turn of the twentieth century and continue to the twenty-first. But the experience of visiting the two museums is entirely different, and is described metaphorically by the museums' directors: the museum as 'a city' (Hulten, 1974) - in the case of Pompidou- and as 'a machine for showing art' (Serota cited in Tate Gallery Archive, 1995: 32), - in the case of Tate Modern. So could their obvious similarities hide critical differences?

In comparison to the newly designed Tate, Pompidou has a long and influential history. The original layout was designed as an open plan articulated by movable panels. The intention of the first Director Pontus Hulten, was to create a spatial structure that resembled a city.

'.. that consists of squares, streets, dead-ends…one can move about, pause, start again. The museum that finds inspiration in the form of cities acknowledges the alternation of motivation, interest, and fatigue. One should have the possibility of losing oneself ….

The museum must offer visitors a loose thread to follow' (Hulten, 1974: 337).

This idea of the museum as a place one explores freely was maintained in the re-design of the fifth floor galleries by Gae Aulenti in 1985, which is the current layout.
Looking at the layouts of Pompidou and Tate, [Figure 3a,b] there is a comparable formal style to be immediately observed: both exhibit geometrical order -they are articulated on a modular grid-, and spatial order -they consist of similar spaces (or sequences of spaces) arranged in similar spatial relations. Both have a tripartite structure, and give emphasis to the idea of a visual axis that extends the length of the building [Figure 4a,b]. If we draw the visual fields [Figure 5a,6a] that can be seen as one moves along the axis, we see that in both cases they give clues about the global structure, but as the viewer goes deeper in the gallery, axes become more fragmented, and views shortened. However, what differentiates the two layouts is, of course, the way common elements are linked together, and embedded in quite different configurations. In Pompidou, the dense and multi-directional pattern of spatial connections constructs constantly changing visual relations for the visitor, and allows the simultaneous perception of different spatial locations -a visual structure that seems to invite movement and, by emphasising relations, creates a dynamic sense of space [Figure 5b]; while at Tate the minimally connected spaces create visual fields that tend to be uniform and unidirectional, emphasising spaces rather than relations, and so creating a smooth, successive exposure that seems to encourage local concentration, and generate a more static impression [Figure 6b].
From the point of view of movement, this effect can be shown by simply drawing an unjustified graph of the two layouts. In Pompidou, spaces are organized in small rings along the axis, with many points of route choice, so that visitors, while wandering around, could make choices, change direction and change their mind - a circulation pattern which may be seen as an interpretation of the urban metaphor of Hulten [Figure 7a]. Tate Modern on the other hand, sets out from the key idea that 'a large museum requires a simple plan' (Serota, 1998: 14), so spaces are much more strongly sequenced, organized either in two small rings or one big ring, around a central space; and where there is choice, it tends to lead quickly to a different space in the same sequence [Figure 7b].
Using visual integration analysis, we find that in both cases the main axis constitutes the integration core of the gallery, the most visually accessible spaces of the layout [Figure 8a,b]. But at Pompidou, the axis links spaces on each side, and guides visitor’s exploration, while it also assumes the role of the recurrent space in the sequence and acts as a perambulation space for social encounter. In contrast, at Tate Modern, the axis, partly structured by the south galleries and partly by the escalator space, is not an independent circulation space which one walks through, end-to-end. Unilaterally linked to the central range of rooms, it is in effect engaged in a passive role: it allows visitors to omit spaces; but, once they start their itinerary, it does not provide a structure to the exploration of the galleries. To best clarify this distinction, we could use the syntactic concepts of ‘synchrony’ and ‘description’, two concepts that allow us to distinguish between spaces that look similar but are embedded differently. Synchrony refers to the scale and shape of a space and description, to the whole embedding of the space in its context. So we could say that the main axes at Pompidou and Tate Modern have identical synchrony -both increase axial synchrony- but different descriptions, that is, different syntactic embedding.

These configurational differences are reflected in the way people use the layout. To understand this, we can use a technique common to both museum visitor studies (Hein, 1998: 41-53,100-108; Serrell, 1998:1-16; Gob and Drouguet, 2006: 90-91; Hooper, 2006: 363-366, Macdonald, 2007: 151-152), and syntactic studies of museums (reviewed in Hillier and Tzortzi, 2006: 289-295; Psarra et al., 2007: 70.1-70.16; Kaynar et al., 2009: 94.1-94.14; Psarra, 2009: 137 -210; Tzortzi, 2010: 129-138; Wineman and Peponis, 2010: 86-109): that is, tracing visitors’ routes during their whole visit. In Pompidou these show that each visitor followed a different path -taking advantage of the dense network of connections, and exploring the variety of possible combinations-, with half of visitors skipping half of the galleries. So their routes tend to be individual and exploratory [Figure 9a]. On the contrary, at Tate Modern, visitors follow very similar -even identical- paths, since the route is virtually a natural progression from the entrance to the end of the sequence [Figure 9b].
There is also a by-product effect of the way people move and explore museum space, that is, a social effect, and is created by the spatial design. At Pompidou visitors that split in different directions, can re-encounter each other on the axes, main and interior, at different points of their visit. The urban-like spatial design maximizes opportunities for encounter and intensifies the sense of being together with other people, which is central to our experience of some museums. But a critical dis-
tinction should be made between the axis that synchronises contacts between visitors collectively, and off the main axis where visitors are less aware of each other and the encounters that occur mainly between individuals. The situation at Tate is once again simpler; since people are moving through the same sequence of spaces, they tend to remain with the same group of people. So the layout of Tate Modern appears efficient - it is less probable that visitors will miss rooms - but less socially exciting, as the interface between localised and non-localized movement is broken and patterns of changing natural co-presence in space are not created.

Against this background, we will now turn to the display arrangements to see how the two museums relate their spatial design to the presentation of their collections. In Pompidou the display follows the art historical scheme hanging by movements and artists in a chronological framework, an organization that recalls Alfred Barr’s famous chart (Barr, 1936) outlining the genealogy and interrelations of modern art, placing the emphasis on the supremacy of Cubism and Surrealism. This narrative structure is expressed in the ordered and hierarchical layout, while the rich network of connections mediates additional relationships between works, multiplying affinities and cross-references. Looking at a specific object at Pompidou means discovering new relationships, seeing the same work in different combinations, and perceiving simultaneously various surrounding visual realities [Figure 10].

FIGURE 10. Positioned in the middle of the gallery in Pompidou, D. Smith’s ’Personage of August’ cannot be taken in at a single glance, but affords specific individual images with each new angle, as an effect of the axial dispositions of rooms that are consistently used to enrich the views of objects.
But it is no accident that the key works are systematically placed in the spaces that are directly open to the main axis or those structuring the interior axis, while less well known artists are shown in deeper and more segregated rooms [Figure 11]. It could therefore be argued that space and display, and so the syntactic and semantic aspects of the layout, are in a relation of correspondence: they point in the same direction to support each other, to express the intended message. Over and above the conceptual content of the objects, the articulation of space and the hierarchy of subdivision convey meaning, and serve a display that aims at emphasizing the turning points of the history of modern art. This strategy is also reflected in the observed patterns of visiting: higher densities of movement are found in the more directly accessible spaces of the layout which, as we have seen, show the key works of the collection and which, in turn, attract more viewers [Figure 9a]. It seems that the spatial layout and the exhibition set up work together to channel visitors’ paths to predetermined key spaces, and make some parts of the galleries more occupied than others.

FIGURE 11. The arrangement of the collection along the main axis in Pompidou.
To the art history narrative of Pompidou, Tate opposes an ahistorical, conceptual, arrangement: the collection is organized in separate themes seeking to draw parallels between periods and show continuities across time - as, for example, in the juxtaposition of two 'garden paintings', Claude Monet, *Water-Lillies* (1916) and Patrick Heron, *Azalea Garden: May 1959* (1959) [Figure 12a]. In fact, the critical differentiating feature of Tate Modern is the high degree of autonomy that governs the relation between space and display. Not only there are no strong interdependencies between space and display decisions, but also key spatial principles, similar to those of Pompidou, which have an instrumental role in terms of the organization of space, appear inert in respect to the exhibition set up. The powerful axiality, a key spatial property of the layout, does not add to the narrative, long vistas end in dark spaces or on blank walls, and rare are the visual dialogues between galleries [Figure 12b-c]. So how can we then interpret this relation between a non-linear view of art and linear progression in space? Information is not arranged in sequence, yet the sequence of visiting is largely dictated by the layout, implying a sense of consequence, but one which is completely absent from the anti-narrative structure of the display. There is, however, one linking point between space and display, and that is the restrictive function of space: it ensures that the proposed links between works are read as planned, displays are kept apart, and space is not allowed to add new relations.

**FIGURE 12.** (a) Unexpected grouping of two garden paintings within a gallery of Tate Modern: Monet's *Water-Lillies* and P. Heron's *Azalea Garden: May 1959*, and (b) major lines tend to be end-stopped by blank walls or dark spaces.
This seems to be the key characteristic of Tate. It could be said that the layout is used to *present*, to allow a direct appreciation of works of art. Works are arranged so that the conceptual logic of the display is overlaid on the layout independently of its structure. On the whole, the emphasis is placed on evening out differences, and equalizing the accessibility of galleries, the significance accorded to the works displayed, and most importantly, the densities of space use. The layout minimizes the effort needed for exploring the galleries. Visitors wander through the galleries without thinking of choices: 'One has just to traverse it. He is here. He arrives there. There is nothing else to do'.\(^5\) And, although the groupings of works are unexpected, the links between them are already set up by the curator, which suggests that less intellectual effort is required by the viewer. At Pompidou, the opposite happens. The properties of the layout are not seen as functional ends in themselves that contribute to the clarity of plan and the structuring of movement, but are thought of as spatial means that serve the presentation of the collection. The layout is not used simply to present but to re-present a specific view of art, to become the visible display of the underlying conceptual structure. The focus is directed towards resolving tensions between the open central space and the enclosed galleries, the integrated and the segregated spaces, the collective character of movement on the axes and the more private exploration of the galleries. All this seems to give a clear meaning to the *city-machine* metaphors as referring to spatial and curatorial strategies that are in many ways the inverse of each other; but also suggests that it is the interaction between different dimensions that create the experience of visiting.

6. From instrumental to interactive space: comparing the National Archaeological Museum with the new Acropolis Museum

With this basic distinction between *presenting* and *representing* as background, we can now move to the two archaeological museums, the National Archaeological Museum and the new Acropolis Museum, illustrating two more complex versions of this dual role of space [Figure 2c,d]. The National Archaeological Museum is a classic 'typological' museum\(^6\) with its exterior monumental porch and ionic columns flanked by porticoes, and its interior layout characterized by a regular geometry, a strong axiality and a clear symmetry. The layout is made up of similar rooms with strong visual and permeable connections, forming interconnected rings [Figure 13a].

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FIGURE 13. (a) The layout of the National Archaeological Museum, made up of similar rooms with strong visual and permeable interconnections, forming a large main ring with quite large, and a few small, sub rings, as shown by its (b) unjustified graph.
However, looking closely at the unjustified graph reveals its essentially rigid organization, not easily understood by looking at the plan [Figure 13b]. The layout is in fact a large main ring with quite large rings, and a few small sub rings, which do not form a network of spaces, and so cannot be explored in many different ways. The $d$-spaces (meaning spaces with more than two entrances, lying on at least two rings, so creating choice of routes - see Hillier, 1996) lead either to global choices of sequences of spaces (since they mean traversing a quite long sequence forming a whole region of the layout) or to very local alternatives, and so to secondary route choices (since one has to come back quickly to the same sequence). As a consequence, visitors, who diverge in different parts of the museum through global route choices, are very unlikely to meet again. This structure is further reinforced by the visual relations. If we look comparatively at the space types and the axial organization, we see that distant views cover series of $c$-spaces (meaning spaces with two entrances and lying on at least one ring, so creating sequences - see Hillier 1996) offering visual continuity and allow the visitor to retrieve an overall picture of the linear sequence, but little visual information about the continuation of the route is given at points of choice [Figure 14].

FIGURE 14. View of a sequence of galleries at the National Archaeological Museum, offering visual continuity.

However, what makes this even more significant is the way these spatial sequences are closely related to the spatial distribution and arrangement of the collections. The museum adopts a taxonomic approach, organizing its collections by a combination of principles - chronology (prehistoric), type (sculptures, vases), material (bronze) and provenance (Egyptian) [Figure 15a]. It is evident that there is neither consistent conceptual order to the classification of objects, nor a global narrative. But what we do find looking back at the graph, is a correspondence between the regions formed by the structure of the layout consisting of rings and sub-rings, and the sequence of objects of the same category with the points of intersection between sub-rings mainly identified with a shift from one conceptual theme to another [Figure 15b]. So by choosing a region, the viewer is also making a choice of a category of objects - which are both global level choices. But once the choice is made, visitors have to follow the deterministic local sequence and view the whole category of objects. In other words, strategic spatial decisions are also strategic display decisions.
This can explain the differences we find in the observed patterns of visiting. It should be noted first, that a key factor that affects visitor movement is the closure, in the current layout, of the main vertical axis at the point where it intersects with the main horizontal axis. The effect of this on the spatial structure of the layout can be shown most clearly by visual integration analysis. With the axis open [Figure 16a], the main structure is a central cross axis, while with the axis closed [Figure 16b], it becomes a dominant ring of circulation. Even with this change, there is a strong relation between integration and movement rates, and so galleries like the Egyptian in the deepest part of the ground floor, or the collections on the upper floor, get half -or less- of the visitors observed in the sculpture collection occupying the main ring [Figure 17].

FIGURE 15. (a) The display layout of the National Archaeological Museum, and (b) the justified graph coloured according to the object categories. It is clear that there is a correspondence between the regions formed by structure of the layout consisting of rings and sub-rings, and the sequence of objects of the same category.

FIGURE 16. Visual integration analysis of the layout of the National Archaeological Museum, with the central axis (a) open, and (b) closed.
But what in fact seems to differentiate visitors' morphology of exploration is the striking pattern of variation of viewing in different parts of the museum, a pattern, which we call *selective intensified viewing*. The majority of visitors' traces† [Figure 18a] include certain regions of the plan - between one and three- which they view intensively (in the sense that they make frequent stops close to each other) [Figure 18b], and others that they pass through rapidly. So the same visitor behaves differently according to where he/she is, and the category of object or time period he/she is interested in, independently of the accessibility of spaces. This argument is further reinforced by the fact that visitors' interest in the objects overcomes segregation -as, for example, in the case of the Egyptian collection, which has one of the highest rate of viewing over rate of movement in the museum [Figure 17]. All these characteristics seems to suggest that visitors behaviour is *display-led*, and the role of space is to facilitate this, by structuring choices between the display regions, ensuring the integrity of object categories, and allowing visual communication only within - and not between- them. It has, in other words, an essentially instrumental function, both on the global and the local level.

**FIGURE 17.** Moving, viewing and co-presence densities in the galleries of the National Archaeological Museum.

**FIGURE 18.** (a) The routes of visitors observed at the National Archaeological Museum, (b) an example of the characteristic pattern of selective intensified viewing in which visitors make frequent stops close to each other in some regions of the museum.
In complete contrast to the traditional National Archaeological Museum, the new Acropolis Museum is an innovative architectural building, whose spatial design became, as we saw in the beginning of the paper, a point of debate. The design of the building is strongly influenced by the site: the foundation integrates the archaeological excavation, and the top floor takes the form and orientation of the Parthenon [Figure 19a]. The museum is organized in three levels [Figure 19b], linked in a continuous loop, as shown in the diagram by Tschumi [see below Figure 24b], following a broad chronological sequence, from prehistory to late antiquity. The different floor levels also correspond to the general topography of the Acropolis: the archaeological excavation represents the foot of the hill [Figure 19a]; the ground floor, with the slightly ascending ramp, the slopes of the Acropolis [Figure 20a]; the first floor, the Acropolis except the Parthenon [Figure 20b,c]; and the top floor - the culmination of the route - the Parthenon [Figure 20d]. It is clear that the route though the museum acquires a *symbolic* function referring both to time and topography.

**FIGURE 19.** (a) View of the entrance of the new Acropolis Museum. Its foundations integrate the archaeological excavation with the museum, while the top floor changes its orientation to reflect that of the Parthenon. (b) A sketch by Tschumi (2009: 84) showing the three-level organization of the building.

**FIGURE 20.** (a) The ground floor of the new Acropolis Museum, with the slightly ascending ramp representing the slopes of the Acropolis, the first floor, (b-c) the Acropolis except the Parthenon, and (d) the top floor of the Parthenon.
If we look at the organization of space, its key feature is large spaces linked indirectly to each other [Figure 21]. The transition from one gallery to the next requires shifts of direction and changes of level, and is guided by only limited views. So the relations between the large spaces are not perceived at once, but experienced gradually as the visitor moves around in the museum. Yet, it could not be argued that the rule of the organization of space is the control of visibility. Expansive views of the outside and interior visual connections are systematically offered to the visitor, but well beyond the limits of space he/she is in—as, for instance, in the case of the Parthenon, seen from the entirely transparent top gallery, which becomes the key exhibit of the museum [Figure 20d], or the Caryatides, seen from different locations, distances and angles, as the visitor explores the route [Figure 22a,b]. So the visual relations are not relations of accessibility. Strikingly, the Caryatides, as we have seen, perhaps the most visually prominent space in the museum, is the hardest to find, shown by the fact that one third of visitors observed by this study fail to find it, and a high proportion even get lost and have to back-track. It is of interest, however, that visitors who get there view it intensively, rendering it one of the spaces with the highest viewing densities [Figure 23].

FIGURE 21. The layout of the exhibition floors of the new Acropolis Museum.
But what is more significant from the point of view of this paper is the way in which visual organisation is related to the display. While the museological narrative emphasizes the *historical sequence*, the spatial design *synchronizes time*, by making the sequencing of spaces less obvious and by emphasizing, in contrast, the vertical visual links. These links cut through the different exhibition levels, and so time periods [Figure 22b], adding thus to the narrative *a more integrated understanding* of the history of the Acropolis. Moreover, although the route -an expression of the historical sequence- appears to be continuous [Figure 24a], is in fact a set of choices -as shown in the diagram [Figure 24b]- with divergences and convergences, which allow a degree of 'undisciplined reading' (Tschumi 1996).  

But more significantly, the route consists of a series of local exploratory challenges created by the way objects are arranged -in a different way in each large space: *in parallel*, along the two sides of the axis, on the ramp [Figure 20a]; *off the axis*, asymmetrically and dispersed in space, in the Archaic gallery [Figure 20c]; and *peripherally*, around the core of the gallery (the 'cella' of the Parthenon), on the top floor [Figure 20d]. These exploratory choices on the local level are reflected in the morphology of visitors' movement traces in the different spaces: *oscillating* from side to side on the ramp [Figure 25a], *meandering* among the statues in the Archaic gallery [Figure 25b], and *encircling* the Parthenon sculptures in various ways and directions, at the top level [Figure 25c]. So it could be argued that visitor behaviour in the Acropolis Museum, rather than being *display led* -shaped
by visitors’ display choices - as in the National Archaeological, is space led - shaped by visitors' spatial choices, generated by the layout of objects. It should also be noted that the interaction between objects and visitors extends to the relation between visitors: the local movement patterns bring them together in short encounters, and the rich cross-visibility between levels makes them constantly aware of each other, creating a dense pattern of visual encounter across spatial boundaries.

FIGURE 24. (a) The diagram of the route in the new Acropolis Museum by Tschumi (2009: 83). (b) A syntactic diagram of the route, showing that it offers choices, with divergences and convergences (b).

FIGURE 25. Examples of visitors’ patterns of movement shaped by the spatial design of the display in the different spaces of the new Acropolis Museum: (a) on the ramp, (b) in the Archaic gallery, and (c) in the Parthenon gallery.
So this points to another critical difference between the Acropolis museum and all the previous cases: instead of using space to act as a neutral or practical background (Tate Modern, National Archaeological Museum), or to enhance the impact of objects (Pompidou), objects are being used to create space. The arrangement of objects, over and above their conceptual content, becomes a message in its own right that intensifies the topographical sense-a walk up to the Acropolis [Figure 20a], through the statues in the open air [Figure 20c], or around the Parthenon [Figure 20d], a message, which is communicated by an embodied experience of space.9 Visitors are encouraged to appreciate works not only through seeing, but also through moving, to perceive the Acropolis as a place across history, rather than in history.

7. Seen from a different point of view

With the aim of further illuminating these different encounters between the design of the building and the museological programme, we propose now to look back on our four case studies from a different point of view, and compare them in a new way, drawing on the work of the educational sociologist Basil Bernstein. The suggestion is not new. Two key concepts in the transmission of knowledge have been explored in the study of museums, both in the museological and the syntactical literature (a further linking point between the two fields): the concepts of ‘classification’ -meaning the strength of the boundaries between contents of knowledge- and ‘framing’ -the control of transmission from teacher to taught.

In the museum literature, Ravelli (2006) discusses the relevance of framing to the organization of exhibitions and interprets it as ‘the degree of freedom afforded by visitors in their navigation in the exhibition pathways’ (2006: 165), drawing on the work of Kress and van Leeuwen (1996), who in their ‘grammar of visual design’ use the notion of framing in relation to boundaries between elements in a spatial composition (1996: 214-218). However, as Ravelli notes, this is closer to Bernstein’s notion of classification. In the syntactic literature, Pradinuk (1986) proposes a spatial interpretation of both concepts. Classification is interpreted as the creation of visual relationships between contents, which weaken boundaries, and framing, as the way the control of movement affects relations. Stavroulaki and Peponis (2003) use the two concepts as defining the idea of pedagogy to look at ‘museum layouts as non-discursive pedagogical devices which complement the overt pedagogical aims of interpretative labels, exhibition catalogues and other related documents’ (2003: 66.2). This approach is extended by Zaman and Peponis (2010) to discuss the different ways museological intent is mapped onto space within the High Museum of Art, in Atlanta, from its 1983 original layout to its current layout. They argue that ‘strong classification’ involves ‘clearly demarcating each theme from all others’ and that ‘framing’ is strengthened through the imposition of movement sequence and through the careful control of visual horizon. Thus, ‘pedagogy becomes explicit’ (2010: 875). This is contrasted to the ‘pedagogy (that) remains implicit’ though ‘weak classification’ (the possibility of ‘comparisons across boundaries’) and ‘weak framing’ (the provision of ‘alternative paths’).
Here we suggest that the interaction between the spatial layout and the arrangement of objects can be clarified by applying the concepts of classification and framing to both the curatorial and the spatial discourses [Table 1], and to these add the concept of ‘invisible pedagogies’ (Bernstein 1975). Museological classification can be interpreted as referring to how objects are divided into categories, and how strong the boundaries (used in a metaphorical sense) are in the museological programme, so the Tate on one hand, and Pompidou, the Acropolis Museum and the National Archaeological Museum on the other, would illustrate opposite tendencies. Museological framing could be interpreted as referring to the existence or absence of exhibition narrative (or of sequence in the metaphorical sense). This could suggest a distinction between two contrasting pairs of museums: Tate and the National Archaeological with their non-narrative structure, and Pompidou and the Acropolis, with the more or less rigid narrative.

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<th>MUSEUM</th>
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<tr>
<td></td>
<td>CLASSIFICATION</td>
<td>FRAMING</td>
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<td>How strongly categories of objects are distinguished in the museological programme</td>
<td>Existence or absence of exhibition narrative (or of sequence in the metaphorical sense)</td>
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Table 1. Table applying Bernstein’s ‘classification’ and ‘framing’ to both museological discourse and spatial design of the four case studies.

If we now look at the same concepts from a spatial point of view, we find that in all cases there is a change in either one or both concepts [Table 1], suggesting that spatial classification and framing does not simply reflect the museological. In concrete terms, if we consider spatial classification as the way conceptual boundaries between contents are realised (or not) in physical boundaries or separations, and spatial framing, as the way visual and permeable relations connect the spaces created by these boundaries or separations, we find that in the case of Pompidou and Tate, the two museums are the inverse of each other. In Tate, we have a museological discourse of weak classification and framing, in a space, which strengthens it with its rigid sequence and visual insulation between galleries; and in Pompidou, we have a discourse of strong classification and framing, in a space, which weakens it through alternatives routes and complex visual relations between spaces.

The transformation from the museological to the spatial discourse is even stronger in the other two case studies. In the National Archaeological Museum, space, by its axial and visual organization, reinforces the museological classification and plays an essentially instrumental role in framing -and so maintaining- it. In contrast, in the Acropolis Museum, we find the opposite of what happens in Tate Modern. The strongly classified (in terms of time periods) and strongly framed (in
terms of time sequence) global museological narrative is weakened in both senses by the architecture of the space: in the former, by the way the museological categories are brought together in the large, unbounded spaces of the museum, without clear divisions, and in the latter, by the vertical visual connections between exhibition levels as well as the degree of exploratory reading allowed to exist within the prescribed route. It is this combination of weak classification and framing that is seen by Bernstein to constitute an 'invisible pedagogy' - still a pedagogy, but one where the teacher arranges the context that the pupil is expected to explore. So rather than being explicit, it is implicit, both in the sense that the manner of transmission is less formal and that importance is placed on 'ways of knowing' rather than 'states of knowledge' (Bernstein, 1975: 134).

This argument brings us back to our initial question about the role of the spatial design in the Acropolis Museum in relation to the museological intentions. We can see now that instead of reinforcing the explicit museological narrative by coinciding with it, it contributes to it by 'working obliquely' (Tschumi, 1996: 169) - complementing the sense of chronology with the sense of place, and breaking the linearity of the global route by the complexity of the local experiences. Rather than placing the emphasis on the conceptual structure and the functional ends (the intelligibility of the route), the design prioritizes the architectural means and spatial experience and, in this way, acts as an 'invisible pedagogy' adding to the formal narrative new meanings 'made through the activity of the viewer' (Witcomb, 2003: 144). This suggests that a deeper theoretical knowledge of the interconnection between architecture and museology can inform museum design, and spatial understanding can contribute to the often advocated aim of making visitors 'co-authors in the production of meanings' (ibid.: 143).

8. Notes

1 A theoretical movement of 1980's that emphasized the social role of museums, in contrast to 'the old museology' that was 'too much about museum methods, and too little about the purposes of museums' (P. Vergo, New Museology, London: Reaktion 1989: 3). It entailed particular attention to the way the museum and its exhibitions may be variously perceived, especially by the visitors, so a shift in emphasis from considering the museum and the meaning of its contents as 'fixed and bounded' to seeing them as 'contextual and contingent' (Macdonald, 2006: 3).

2 Sean Rainbird, Director, Staatsgalerie Stuttgart, personal communication, 24 August 2010.

3 The distinction between 'synchrony' and 'description' is due to John Peponis (See Hillier and Hanson, 1984:93; Hillier, 1996: 232).

4 The new display at Tate Modern (2006), which followed the inaugural hang (2000-2005) analysed here, also adopts a non sequential narrative, and proposes, in each of the four wings, dialogues between past and present that are organized around a central display, focusing on a familiar movement of the history of twentieth-century art. Galleries form a continuous sequence around the central space, which entails backtracking, as the system of multiple entry points is now eliminated. Similarly, the aim of the new display of the fifth floor galleries at Pompidou (2010), like the 2003 display arrangement discussed in this paper, aims at providing 'a chronological display that reflects the successive emergence of the most important movements across the century, but punctuated by presentations of the Museum's holdings of major individual artists' (Direction de la Communication, Centre Pompidou, 2010: 4).

In the sense that in the 19th century the museum tended to be a recognizable architectural type, both in terms of exterior appearance and spatial layout.

The observation study was carried out by the MA student Heleni Kouroutsidi in autumn 2010.

The traces show almost no visitor strictly follows the intended route.


9. Acknowledgement
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