ORAL PAPER

Spatial cognition as a tool for the design of mediated spaces

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Introduction

This paper describes a methodology for architects to analyze and evaluate the quality of existing spaces periodically and improve them with the use of digital media. In specific, the methodology guides the re-design of public spaces beyond their function to shelter human activities, targeting the creation of mediated environments that foster communication among people and space. The vocabulary to communicate comes from the fields of architecture, cognitive psychology and information technology.
Initially, the methodology is deployed for the diagnosis of those spatial characteristics that register in and affect the memory people have of space as well as their movement within it. The spatial diagnosis is based on the physical characteristics of space, which are investigated both historically and empirically, as well as on people's perceived imagery that is examined through cognitive mapping techniques. The methodology uses the diagnosis findings for the informed selection of the digital media treatment that is applied as an immaterial layer upon the existing spatial elements. The emerging mediated environment increases the quality of the existing space and consequently improves the experience of people in it.

Background

Architecture has a discreet but powerful influence on the human mind. Geometric forms and spatial relations, regardless of their complexity, gradually unfold to become evident to the thinking eye. The 'liveliness' of a building though is a direct effect of people's actions in it. Without people a building is like a machine lacking the power to operate. It is a variation of the philosophical notion of what does really exist if people are not there to experience it. An empty building is inanimate. The paradox is that a feeling of inertia remains even when people occupy space. The actual building stays inanimate, unless an external factor (e.g. people) moves or causes the movement of its elements—like the puppeteer moves the inanimate puppets.
The spatial characteristics of a building trigger a temporal interest in people's mind. The duration of the first impression is intimately linked with the elaboration of the form and the decoration, both comprising a building's communicative tools. The more interesting the form and the decoration are the longer people's interest will last. But this is an ephemeral glory. After people realize that there is nothing else to see, nothing to engage them longer with space, they cease to 'pay attention' to the building itself. They move it perceptually to the background as a fixed, familiar stage for their activities, while they save memory and energy for computing other stimuli of everyday life (Milgram 1970, pp. 1463–1464). Does this mean that people become oblivious to space after frequent use? Does this mean that architects design only for that first impression?
Going deeper into the domain of cognitive science, one discovers that in the human mind space does not really exist with objective dimensions, but instead it is recomposed conceptually with subjective dimensions perceived through experience. In order for the mind to comprehend what the body is involved with, it extends (Bergson 1988, p. 245) a mental virtual projection from a central point (Tversky 2003, pp. 70–71) and reconstructs a 'caricature' of the actual space, an impression. The key elements of that reconstructed mental image are spatial

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'landmarks' that the mind regards as meaningful. These "cognitive reference points" (Tversky 2000, p. 26) give stimuli to the human intellect and help people immerse themselves in 'their' world (Virilio 1996, p. 7).
Architecture has always been the catalyst in this process, as it constitutes the medium that provides artificial space with meaningful points of reference through representation. Representation is one of the dimensions of architecture. It is another layer in the design process that creates landmarks in space, which are meant to convey messages, passively, to the human user. The form of a structure transmits more abstract messages, aiming toward an overall impression. Decoration on the other hand has a more personalized nature since it encompasses a multiplicity of details, closer to the human scale, that can 'tell' people a story.

Methodology

Background research

The first part of the methodology is about investigating the history of the examined space, from conceptualization, to implementation and up to the present state, using the architect's spatial vocabulary and with reference to the building program. It is a process where structural, decorative, and other elements of space are numerically and objectively recorded to form the platform upon which the diagnosis will be built. The findings are crucial in the sense that they reveal the building's mutation from a 'space' to a 'place.'

Empirical observations

The information at hand from the first part of the methodology can be described as a canvas of an unfinished painting representing an objective reality of the examined space. From that point on, the proposed methodology requires that the architect/researcher works on-site in order to observe the building's operation, the effect that time and people have on the examined space, as well as the actions and the behavior of people in space through time.

Cognitive mapping: questionnaire

This part of the methodology directs the architect/researcher to explore through questionnaires how people read (conscious), experience (subconscious) and remember (memory) the examined space. Moreover the methodology here targets the development of cognitive maps (Downs and Stea 1973), mainly through sketching (Lynch 1960). The questionnaire is based on the potential of all the study participants to provide the inquiry with valuable information about the present state of space as well as with directions for design proposals or even solutions to an acknowledged problem.
The questionnaires involve seven thematic areas targeting information about both the physical and the cognitive relationship of the respondents with the examined space: (a) time-related knowledge of the examined space, (b) the language of the examined space, (c) using the examined space, (d) people–space experience, (e) people's imagery, (f) people–space communication, (g) people's imagination.

Diagnosis findings

All the data gathered from the diagnosis process are analyzed, cross-examined and cross-validated. The outcome is a detailed identification of the present condition of the examined space. The findings are grouped and collapsed to form general and specific conditions that need to be treated. The treatment in particular is directed toward 'healing' the identified problems, boosting up the 'healthy' agents and 'waking-up' space to communicate with people. The directions for the design of the mediated space are collapsed to design goals and, depending on the design approach of the architect, the appropriate digital media and tools are engaged in order to achieve results in the most flexible and effective way.
The safety pin for this process is that it can be repeated in the future to evaluate the 'evaluation.' Even after the application of the treatment is completed, it can still be easily (re)-adjusted. The continuous loops will 'fine-tune' space until the findings ideally reveal maximum qualities to all categories and, most importantly, minimum negative impressions. The ever-evolving progress of people makes this process necessary.

Media treatment

This is the final part of the proposed methodology. It employs research found in the field of information technology, interactive art and the gaming industry. Although the domain of information technology is still overwhelming for the architectural practice, the proposed methodology can be used as a tool for a controlled application of digital media. Whatever the design approach is, it must target the impression of people, increasing the quality of the examined space—the measures of which were established through the previous examination—without affecting its physical elements. The approach employs contemporary media systems, selected for their function and effect (operating system and mechanisms), as well as for their methods and patterns of application. The systems vary from informational systems, to interactive projection systems,

to 'memory' systems, to sensor–actuator systems as well as smart materials or smart assemblies with changeable properties (Addington and Schodek 2005, pp. 212–213).

Results

The proposed methodology was tested within an existing space at the Massachusetts Institute of Technology (MIT), the Lobby of Building 7. The part related to the spatial diagnosis produced a detailed identification of the present condition of the examined space and its relationship with the people who occupy it daily. Three categories were observed and classified as following: findings related to implicit values (e.g. people's feelings, impressions and so on), findings related to explicit conditions (e.g. signage, site related information and so on) and specific design proposals. Two basic design directions for the architect/researcher emerged. The first dictated a more elaborate, in spatial elements, environment so that people can create a more complete (and accurate) mental image of it. The second revolved around the dissemination of information. The media treatment was directed towards a 'sensponding' system (Oungrinis 2006, p. 53) that included large-scale projections with intelligible content, as well as small-scale digital interventions (light effects, audio-visual projections, holograms) for the orchestration of time-related events. The design proposal placed the mediums so as to have overlapping areas of effect in order to maximize their efficiency, while maintaining a discreet character and presence in space.

Conclusions

By bringing together the three diverse, but not entirely distant, disciplines of architecture, cognitive science and information technology in an iterative, adaptive design process and by establishing the presence of the human user in the mind of the architect, this methodology provides the plateau for the development of a vocabulary with which space will be in a position to communicate actively with people.

Escaping the traditional notion of designing a physical space, the notion of actually designing events rather than the 'limits' within which they will occur engenders exciting new directions. People do not understand the mathematical space (Tversky 2003, p. 66). They understand a fictional one by constructing its mental image and by keeping it updated through experience.

Now architecture can aim directly to affect that image. The evolving 'place' can be rendered 'alive'. People can increase their connection with their spatial surroundings. The 'cold' quality of the 'absolute' produced by mathematics can acquire 'warmth' with the projection of illusions attending to various needs and desires. Furthermore, space can be a protagonist in connectivity. It can absorb many of the mediums used today in the same manner that digital technologies absorbed their analog predecessors.

The proposed methodology is a tool for a participatory, synergic design process. In this process, people's mental imagery becomes a very potent medium for architects to use as a mapping device for the application of information technologies. Their design repertoire is expanded as they become able to control media applications in space. The methodology's end product is a fine-tuned, mediated environment produced by 'immaterial' low-cost interventions, able to cover both functional and aesthetic needs and also able to reinforce mental links that people create with space.

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