Providing for visibility with digital devices when designing theaters

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Our research follows contemporary trends that seek to broaden the use of today’s computer tools beyond simple techniques of representation. In fact, more and more studies are focusing on the use of computer tools in the early stages of the design process. It is therefore possible to integrate some of these considerations when designing a theater. Visibility for all members of the audience is an important aspect of the design. Even though acoustic performance is another key factor in the design of theaters, it has not been considered in this work, which is mainly focused on the question of sight lines.

This work, made possible through the contribution of architects, designers as well as researchers of the GRCAO Group (a Computer-Aided Design Research Group) at the University of Montreal, has three main goals: (1) to find new ways of representing audience visibility through the reorganisation of the space in a theatre, based on modern methods that also take into account the know-how of former civilisations; (2) to take advantage of the digital technologies available nowadays and to integrate them with other approaches proposed to improve theatre design; (3) to find a way of developing simple digital programs that facilitates access to information for architects and architecture students regarding different digital methodologies adopted by theater designers.

Our new method aims to provide new architectural solutions by technological means, with an emphasis on information gathered on audience visibility in theaters. By using this approach, sight lines will no longer be seen as a constraint since it can be considered in the very first steps of the design process. (Figure 1)

We therefore present a cognitive and interactive device whose characteristic is that it can be queried in such a way as to fulfill theater designers’ requirements at the earliest design phases. It has the advantage of giving information on the visual quality of seats and optimizing its location in order to improve audience visibility. (Figure 2; Figure 3)

On the basis of our research results, we propose an initial computer model. This model allows the designer to clearly define the design objectives. Then, a final computer model is proposed, using a functional programming language and a volume representation tool; it meets the designer’s target requirements more adequately. One of the members of our team conducted a historical and exploratory research prior to our joint study; this earlier research introduced a digital design tool that integrates variables that should be identified throughout the design process of a model theater. (Figure 4)

The results we propose lead us to believe that we can rely on computer tools to improve theater design and audience visibility (Figure 5). The system provides real time information for changes in seat locations and their consequences. Subsequent research is contributing to the development of digital devices (that - as we said - can help the designer in the planning of a theater facility while providing for audience visibility), but it also contributes to the development of computer-aided design tools.

Our research process validates our preliminary hypothesis: “In a theater, it is possible to reproduce visual space with a computer-based operational model and determine the location of seats to provide for audience visibility.”

Keywords: Visibility; CAD; Theatrical facility; Digital devices; Sight lines.

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