

# Generation of Architectural Designs Using Soundscapes: First Findings

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## Abstract

Architectural design process contains a crucial stage called "insight", in which the vital creative phase of the design process begins. Additionally, "design fixation", or simply designing from external stimuli, has been one of the most common methods to approach this phase. Sound as external stimuli for designing, has been used in many historical cases. However, it has never been considered as a design engine for inhabited interior environments. For this reason, some experiments were taken in our School of Architecture designing from a soundscape. This paper will present the first findings of this approach as well as defining the following steps towards a comprehensive study of this phenomena. A first exposition of the background idea in the framework of architectural acoustics representation will be presented. Secondly, the demonstration of the wide range of design possibilities of this method will be shown. Finally, it is going to be exposed the description of the future study.

## Introduction

After the description of the problem, and its analysis by means of a detailed programme, the architectural design process enters upon a phase whose evocative technical description is "incubation" or "insight". As Gilbert Herbert said in 1965, here begins the vital creative phase of the design process, with inspiration, illumination, insight.[1] Many classical authors have written about this process and even today it is one of the main concerns of the architectural design process. In our research we try to present a different approach to this key point.

An important debate in the architectural design process is the use of external sources of inspiration to stimulate the generation of ideas, known as "design fixation".[2] These external stimuli are introduced early in the design process and help designers produce new ideas that would otherwise be unlikely to emerge. Some studies highlight the benefits of using this method: the ideas generated are newer and of better quality. However, the negative effects of this have also been discussed, highlighting the reduction in the variety of ideas generated. In our research we decided to use "design fixation" to obtain better quality results knowing that the variety of these is restricted.

Sound can be one of those architectural ideas generator. We can find some examples in the history of architecture where sound was the generator of architectural ideas. Iannis Xenakis designed the main façade of La Tourette monastery using stochastic methods in a similar way that he used them in his orchestra compositions. Renzo Piano designed the architectural scenario of Luigi Nono musical piece with the

acoustic and spatial requirements of it. Stockhausen and Fritz Bornemann designed a place where spatiality of music was the main topic. Furthermore, some researches have been done regarding the close relations between composers and architects.

In recent years, the influence of acoustics on architecture students has been studied. Sheridan and Van Lengen [3] studied a educative study in which the students experienced the acoustic properties of different spaces in order to make an architectural design proposal. Michael Fowler teaches architectural students about the importance of sound in cities and encourages them to make urban design proposals to generate particular acoustic conditions. [4] Previous studies have been developed using sound for architectural students: implementation of VR environments for acoustic education [5], acoustic studies of outdoor designs [6] and new Audio Virtual Reality format for immersive experience [7].

## Method

A design fixation model was used. As we have explained before, this model consists of showing the student several completed works that have similar requirements to those requested to the student in the exercise. It was considered to use a design fixation model to obtain less diverse results but with more quality and novelty. [8]

The exercise consisted in four phases. In the first phase, which corresponds to design fixation, the professor explains what the activity will consist of. The professor reproduces a sequence of domestic sounds that were recorded and assembled with the intention of describing a spatial sequence.

In the second phase, a pre-test questionnaire is distributed to the students and the results are collected. This questionnaire asks the student about the evaluation of the phenomenological elements of architecture corresponding to the senses most valued in western culture (colour-light, sound and texture). Next, the questionnaire asks about the evaluation of the "drawing the soundscape" method, previously explained by the teacher in terms of effectiveness, efficiency, satisfaction, comfort, imagination and materialization. The results are then collected.

In the third phase, the teacher reproduces a second sequence of domestic sounds other than the first. Next, ask students to draw the architectural space they imagine from that sequence. All students must draw by hand with free technique, in military perspective and on an A3 din. At the end of the session, the exercises are collected.

In the fourth phase, a post-test questionnaire, identical to the pre-test, is distributed to students and the results are collected.

## Results

The results of the second and fourth phase are not discussed in this paper. This paper, however, shows the results of the third phase, that is, the graphic data. [9]

A total of 243 of design possibilities could be derived from the designing process from the studied soundscape. If any suggested change of direction on the path of the walker is interpreted whether to the right, to the left or to the front, we must multiply by 3 each crossroad. This leads to a total of 243 possibilities of architectural designs. Students demonstrated this huge amount of possibilities. This fact can be identified in the graph on the right corner of the panel.

The architectural design process comprehends modifications of the original design, improving it and adjusting its measures. Therefore, the architectural design “cannot be created by starting at the beginning and going on in a “linear” way to the end. On the contrary it is necessary continuously to keep the totality in mind, and to go from the whole to the parts and back to the whole”.[10] Only in some cases “simplicity [is achieved] through elimination of the necessary, through lack of understanding of the complexities of the problem, through failing to see—or choosing to ignore—the real difficulties that must be met and solved”. [1] However, either following a lineal way or a more complex way, in the architectural design process, the initial powerful idea predominates. We have named this idea “insight” at the beginning: “if analysis is the exploration of the problem in terms of its potential for solution, then insight is the first, tentative, predication of that solution.” It can be observed in the panel that some of the students not only drawn the initial sketch but also were able to finish the exercise producing a photorealistic image of the domestic space suggested by the soundscape.

On the other hand, not all the elements present in the soundscape were drawn by the students. In the central area of the panel, one can find an identification of those elements drawn by each student. It is possible to note that architectural spaces correspond to the most drawn items.

## Conclusion

This article has shown, through a teaching experience, the generative capacity of architectural designs from a soundscape. The wide range of design possibilities has been shown. Future work is needed to categorize different kind of drawings, different techniques used and different topologies represented.

## Acknowledgments.

This research was supported by the National Program of Research, Development and Innovation aimed to the Society Challenges with the refer-ences BIA2016-77464-C2-1-R & BIA2016-77464-C2-2-R, both of the National Plan for Scientific Research, Development and Technological Innovation 2013-2016, Gov-ernment of Spain, titled “*Gamificación para la enseñanza del diseño urbano y la inte-gración en ella de la participación ciudadana*

(ArchGAME4CITY)”, & “*Diseño Gam-ificado de visualización 3D con sistemas de realidad virtual para el estudio de la mejora de competencias motivacionales, sociales y espaciales del usuario* (EduGAME4CITY)”. (AEI/FEDER, UE).

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## THE IMPACT OF THE METHOD

**243**

A total of 243 of design possibilities could be derived from the designing process from the studied soundscape. If any suggested change of direction on the path of the walker is interpreted whether to the right, to the left or to the front we, must multiply by 3 each crossroad. This leads to an total of 243 possibilities of architectural design. Students demonstrated this huge amount of possibilities.

## THE DESIGNS OF THE STUDENTS

**75**

students participated in the exercise. They listened the soundscape several times and designed the suggested space in a A3 sheet of paper using military perspective and free hand drawing technique.

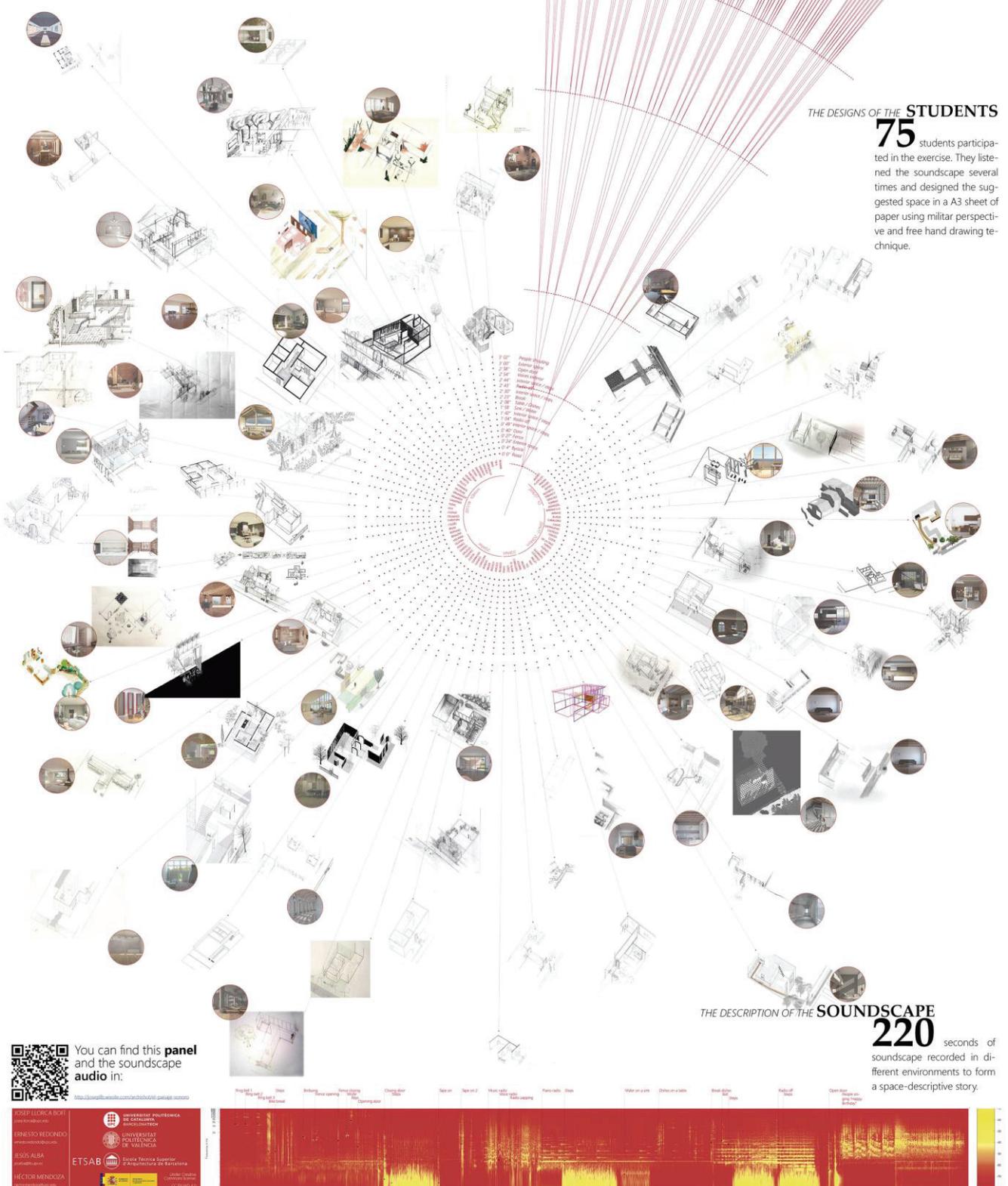


Figure 1: Panel showing the results from the experiment on designing from a soundscape.