



POLITECNICO
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Honors thesis

Master in Architecture Heritage Preservation and
Enhancement

Abstract

**The ancient theatre of Thyndaris
virtual re-creation of the acoustic evolution**

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The topic of enhancement of ancient theatres has found a renewed interest in these early times, because of its aim to recreate virtually the acoustics of glorious spaces deleted by time, of whom remain now some ruins, often incomplete.

Ancient theatres have been built considering the needs of spectators and actors for what concerns acoustics and visibility, that led to determine the equations for an optimised design: an example could be the estimation of the maximum slope that allows a good vision and hearing. In these early times the interest for ancient theatres began to be more widespread, starting from the scientist François Canac who determined the 10 rules that guide the process of design for these building.

The aim of this study is to go over the history of the theatre of Thyndaris again, and to recreate the acoustics that this offered to its spectators, for what concerned music and speech.

The function of a theatre is not only to host its public and actors indeed, but it plays an active role for spreading the passive acoustics. To obtain this result, it has been necessary to learn some topics discussed in ISO 3382-1, 2009 and to see what has already been discovered on the acoustic measurements of the theatre of Thyndaris, so that I could be able to calibrate a virtual model on Odeon that provided closer results to the acoustic measurements that were already been taken for reverberation time, strength and clarity. This provided the right T20 and G values, that verified the Just Noticeable Different parameters determined in the ISO norm.

After obtaining the virtual model for the simulation of the Theatre of Thyndaris in 2015, the year in which the measurement were taken, it has been possible to proceed with the simulations of past times as well, modifying geometry and material displacement according to the case.

This kind of research has been carried out by other European countries as well, and it is still one of the main topics in the acoustics conferences, like the one that took place in Patras in 2011 in which the results of project ERATO were demonstrated. It has been possible to compare the simulated values of Thyndaris with the ones of some of the theatres discussed in this kind of meetings.

The simulated values have been used to recreate a virtual tour on <https://app.lapentor.com/sphere/teatro-antico-di-tindari> to show in a better way the perceptive difference between the audio files obtained from the convolutions in every historical age. This was obtained merging rendering simulations and the audio tracks extracted from the convolutions between the anechoic files and the impulse response for each of the considered historical times.



Fig.1: The ancient theatre of Thyndaris in 2015

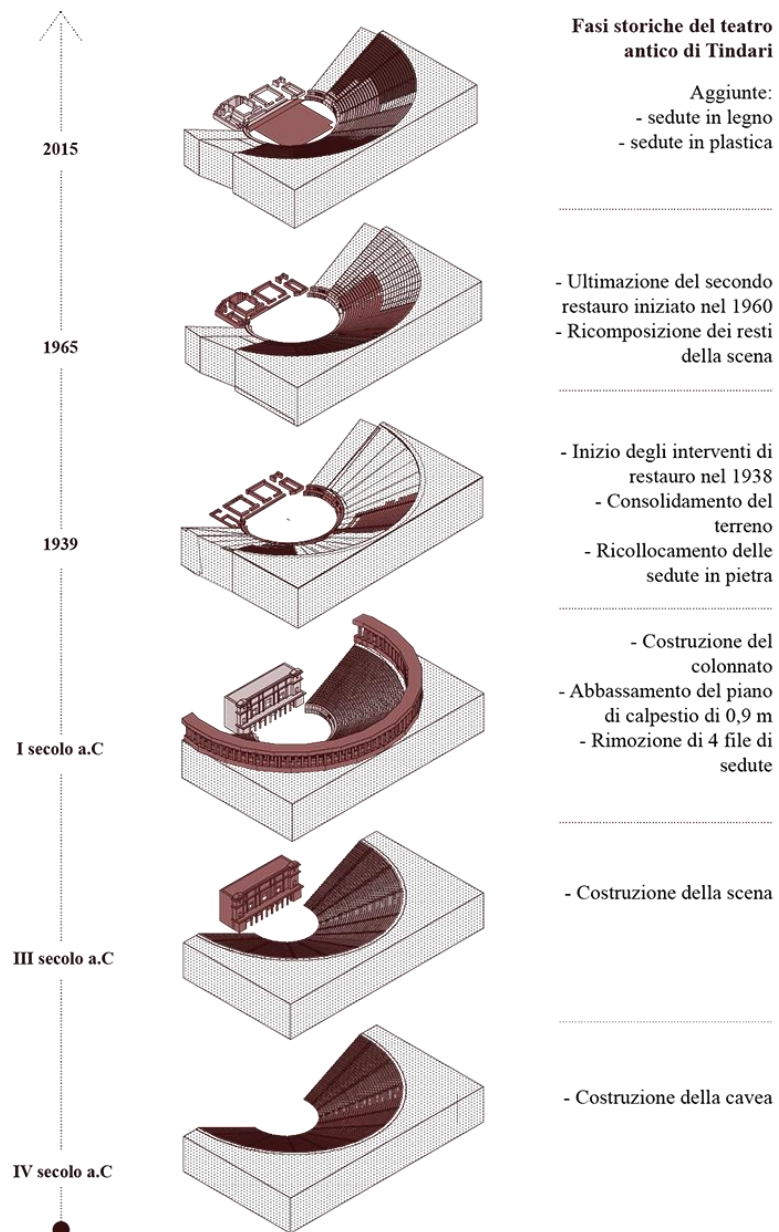


Fig. 2: The architectural development of the ancient theatre of Thyndaris



Fig. 3: A scene of the virtual tour: the theatre in III century BC

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