



TITLE: “Acoustics Value in interior design of Open Air and Closed Theater of “Aida Opera” and it’s Visual Culture”

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ABSTRACT:

Applied Arts play an important role in the refinement of the human’s soul, elevating his creativity and reception of beauty and culture. Interior Design integrates with both Audio and Visual Arts in theater; with its different types of Open Air and Closed Theater.

There is a relationship between the value of sound design and interior design depending on the music show performed whether it was a prose, Opera, or music and whether it is classical music as chamber music or organ music.

Reverberation of Time varies according to volume of halls and also according to different genres of music played, that’s why the materials used in the interior design treatments of walls and ceiling differ according to the type of the theater whether it is an open air theatre or a closed theatre; at this time it differs in its treatments and reverberation of time.

“Aida Opera”- The Master piece of “Giuseppe Verdi”- is considered to be an example of the performances performed on theater. Its **music** was inspired from the ancient Egyptians music; also the **“script”** integrated with the “Music Notes” to represent events performed during the ancient Egyptians era in Egypt. It was performed in different theaters in “The Pyramids Open Air Theatre” and in “The Closed Theatre at the Metropolitan Opera” in Lincoln center for arts in New York.

The Interior designer cooperated with the sound and acoustic designer in directing “Aida Opera” in the open air theatre at the Pyramids in a very artistic and creative way and according to wind movements and acoustics of the open air theatre. Also the interior designer designed the closed theater of Aida opera in the metropolitan opera according to the acoustic design and studying the reverberation of time, and it’s relation with the stage design to ensure audio and visual efficiency.

In conclusion there is a relationship between studying the value of Sound and acoustic design with the interior designing of the open air and closed theatre, also the variation of reverberation of time for the interior design of “Aida Opera” according to the type of theater performed on, and its role in raising the artistic and creative efficiency of both audio and visual cultural arts.



Research Problem:

- The lack of awareness of the value of acoustic design, the artistic creative side of music, and the techniques of sound and there relations with the interior design of the open air and closed theaters; as **Sound is of an artistic value.**

Research Objective:

- Extrapolate the relations between The Acoustic design and Interior design in Open air and closed theatres.
- Achieving the design connection between sound of classical music and its Reverberation of Time with interior design of “Closed Theatres”.
- Achieving the design connection between sound of music and its relations with wind movements and Light in Open Air Theatres.
- Using Interior design criteria of studying sound in its application on “Aida Opera” in “open air” theater at the Pyramids in Egypt, and in “closed theater” at the Metropolitan Opera in New York.

Research Methodology:

- Historical Methodology.
- Descriptive and analytical Methodology.

Key Words:

- Sound - Reverberation Time – Optimal Reverberation – Sound waves – Sound Quality – Opera – Chamber music – Organ music – Orchestral music – Open air Theater – Closed Theater – Written text – Musical Notes.



INTRODUCTION:

Interior designer plays the main role in the whole system of Applied-Arts in interior designing of theatres; whether it was Open air theatre or a closed theatre. The Open Air theatre integrates the earth and the sky in the design, and the closed theatre is enclosed inside Opera houses and in the global theatres. For integration of the creative value of the interior designer; there must be an intellectual connection between the interior designer and the sound designer, as Sound is considered to be a theatrical designing value enclosing in it the musical notes in its rhymes, and the musical sound in acoustics, and both of them possess the cultural relationship of the interior designer.

Sound results from vibrations of the hearing particles, which leave an acoustic impact in the interior design of theatre according to its type, whether it was open or closed theatre. Sound results from different sources such as human voice of a spectator or an actor giving his musical speech on the stage, or sounds of musical instruments and its classical music whether it was Chamber music, Organ music or Opera.

To study the acoustic design and it's relationship with the interior design; we study in this research the Reverberation Time and its differences according to music type, and its relationship with the volume of space, also we study the ability of achieving the Acoustic efficiency inside the theatre concerning material types, and the design of the open air and the closed theatre. There are different criteria to ensure the good sound quality in theatres. These criteria differ in cases of the open air or closed theatres in volume, area, and in the differences of environmental factors around the theatre.

The Case study or the application in this research will be on "Aida Opera" the masterpiece of the composer "Verdi". We will study the relationship between its script and its musical notes, also the different criteria of sound and design of interior design of "Aida Opera" performed in the Pyramids. The design of the theatre was inspired from Ancient Egyptians architecture, also the place of the theatre "The Pyramids" was integrated as a part of the design of the theatre which assures the Egyptian identity.

In this research we will apply also on "Aida Opera" in The Metropolitan opera at "Lincoln center of Arts" in New York. The interior design of "Aida Opera" was inspired from the Architecture of the Ancient Egyptians in the entrances of temples, sculptures and even in the costumes of actors. So "Aida Opera" came as one of the performances which possess the visual and audio artistic unity in enriching the culture of the interior designer and the spectators.



1. Sound Nature:

Sound results according to vibration of small particles of sound waves, which includes movement, stillness and arranged by rhyme in the interior design of space.

Sound results from different sources in theaters:

- **Human Voice:** in Speech (Tenor - Soprano) voices, and the voices of Audience.
- **Sound of the Musical Instruments:** which differs in sound and rhyme according to music piece whether it was classical music, organ music or chamber music.
- **Other sounds:** natural sounds or machines sound.

2. Acoustics and Interior design of Classical Music Hall “Closed Theater”:

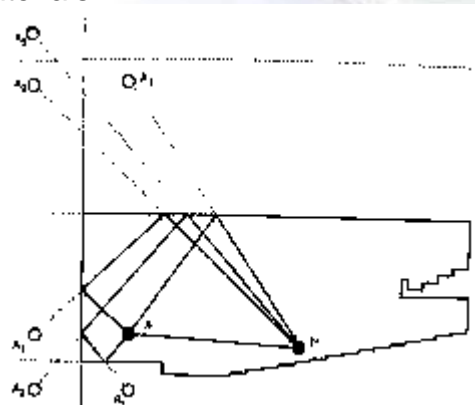
The most important objective in designing a concert hall is the superb sound. Acoustics result from the interaction of various elements: size, volume and proportions of the concert space, number and arrangement of the seats, materials used, surfaces and finishes.

Instruments sounds and the human (singing) voice have to be taken into account, alone and together, and also differences in pitch range (volume, frequency distribution and time of a sound).

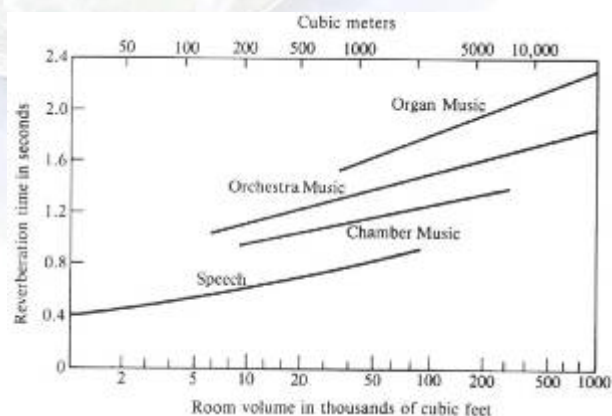
2.1 Optimal Reverberation:

Is important for the quality of hearing: excessive reverberation reduces clarity, and too little reverberation makes music sound dull. It depends on air changes/person.

The acoustics are influenced by hall size, shape and (surface) material used; these can be adapted for different acoustic requirements through the selection of various materials.



(Fig.1) Sound Waves and sources of reflected sound in an auditorium. A= sound source. A1= Source of first order reflected sound.



(Fig.2) Relationship between reverberation time, Hall Volume and music type (Organ music, orchestral music, chamber music, Speech)



4. Acoustics Value in interior design of “Pyramids Open Air theatre” and “Metropolitan closed theatre” of “Aida Opera” performance: (Case Study)

4.1 Short Notes about the "Script" and "Musical Notes":

Documents refer to “August Mariette” as the author of “Aida Opera”, and “Giuseppe Verdi” as the composer who wrote the musical notes of “Aida Opera” his masterpiece of all times.

<u>Characters</u>	<u>Musical Speech</u>
Aida	Soprano
Radamis	Tenor
Amnrees	Contralto
Amonasro	Parton
Ramfees	Bass
King	Bass
Messenger	Tenor
Priest Voice	Soprano

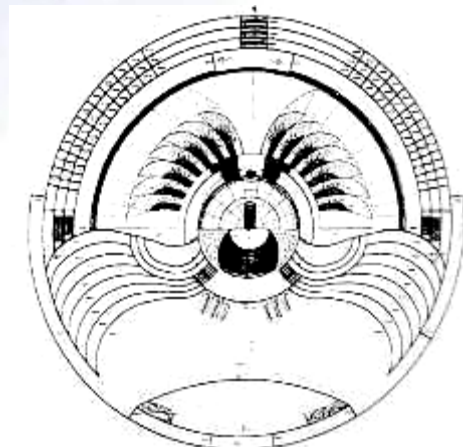
Table (1) shows the characters of “Aida Opera” Performance and the musical speech of each character.

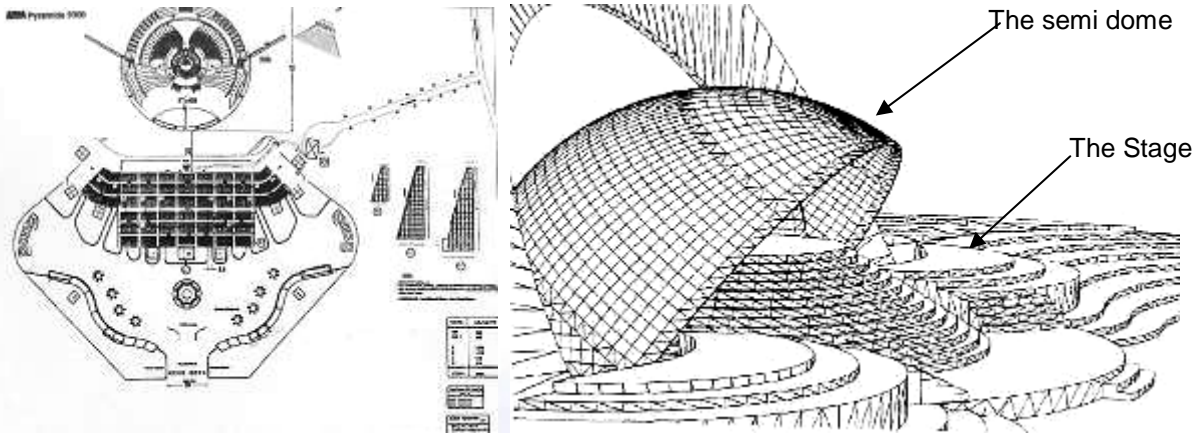
4.2 Interior design of “Aida Opera” performed on the “Pyramids Open Air” theater in Egypt:

“Pyramids Open Air Theatre” is considered to be one of the most important Open Air theatres in Egypt.

- Area of the Theatre in Pyramids= 4200 m², - The entrance possesses 14 Ancient Egyptian columns.
- Height of the Stage= 21m,
- Stage diameter= 64 m.

Fig. (8) Illustrates the Design Circular Plan of “Aida Opera” performed on the Pyramids open air theatre. The design was inspired from the ancient Egyptian style.





(Fig.9) illustrates Architecture and Interior design Plan of the open air theatre of “Aida Opera” at the Pyramids. The interior design of the plan indicates the inspiration of it from the ancient Egyptians.

(Fig.10) illustrates The Interior design on the stage of the open air theatre. The design is inspired from the symbolism of Sun in ancient Egyptians era. The semi dome represented as a closed theatre and this to ensure the quality and the reverberation of sound and it’s transmission to the audience.



(Pic.1) indicates stage design and the effect of lighting in it.

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4.3 Interior design of “Aida Opera” performed on the “Closed theater” of the Metropolitan Opera- Lincoln Center of Arts-New York:

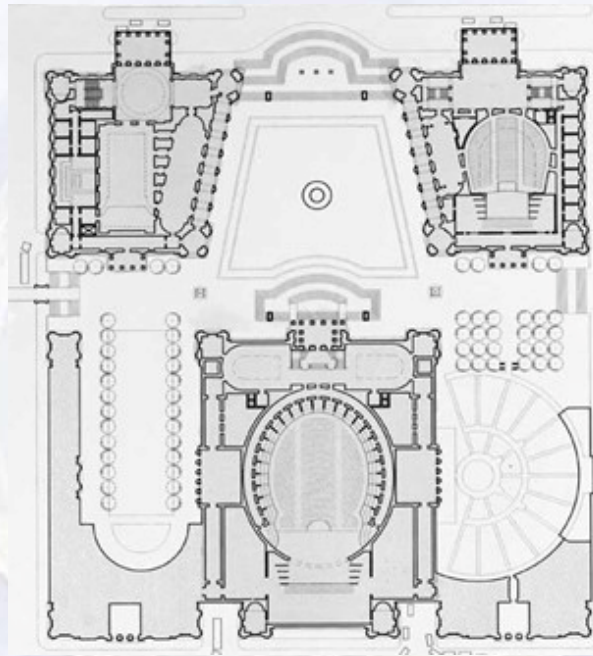
(Pic.2) indicates the whole stage design inspired from ancient Egyptian temples and the Pyramids as a background. Metropolitan Opera is considered to be one of the most important Opera Halls in New York. This Opera House is characterized by the presence of a Main Hall of 3800 seats, also another hall of 195 seats only.



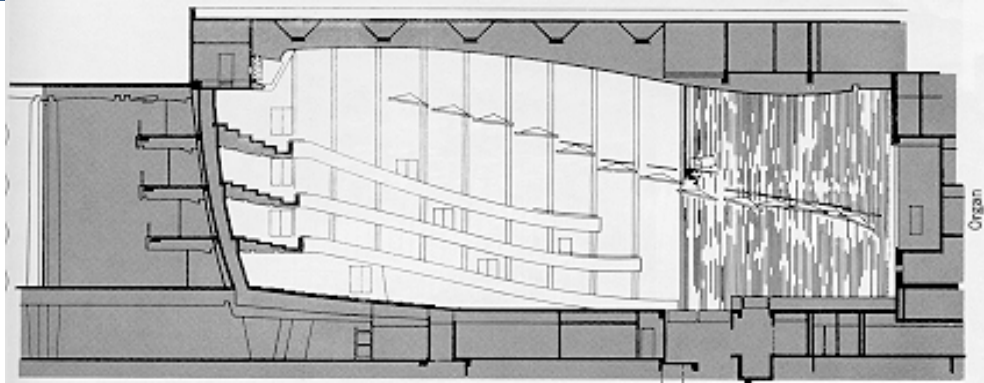
Acoustics design was taken into consideration during both Architecture and interior design of the Opera Hall in order to ensure acoustic efficiency in different places inside the opera Hall.



(Fig.3) Illustrates Metropolitan Opera in Lincoln Center of Arts – New York



(Fig.11) illustrates Architecture and Interior design Plan of the closed theatre of “Opera Metropolitan”.



(Fig.12) illustrates vertical Section in the Metropolitan opera. The section shows Stage, ceiling, walls and seats design according to Acoustics of Closed theatres which ensure the efficiency of sound.



(Pic.4) illustrates stage design inspired from the ancient Egyptian Temples, also sculptures of statues in this era.

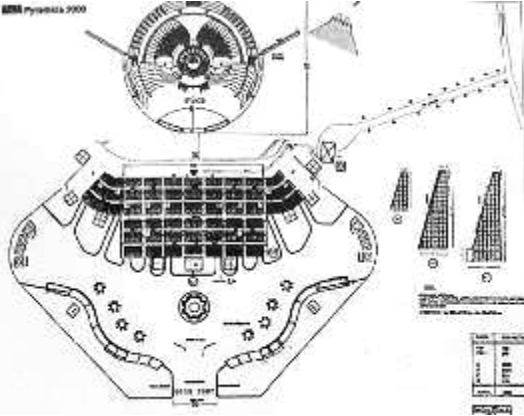
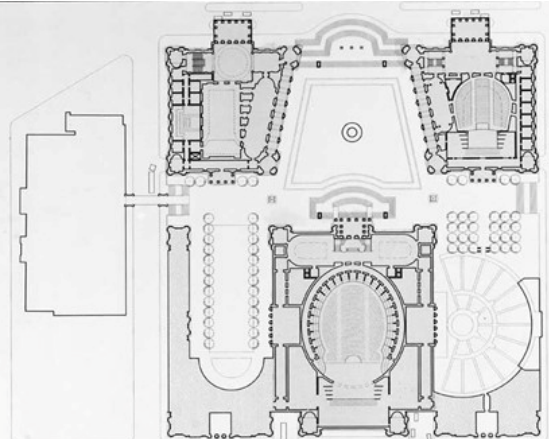
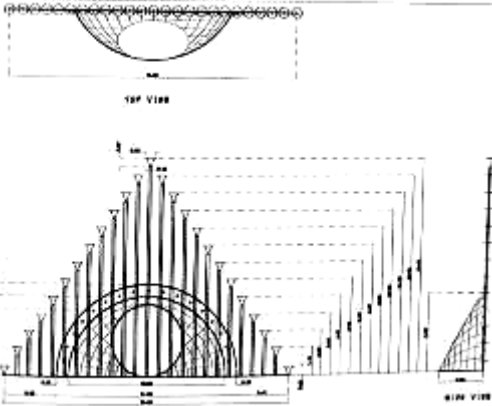
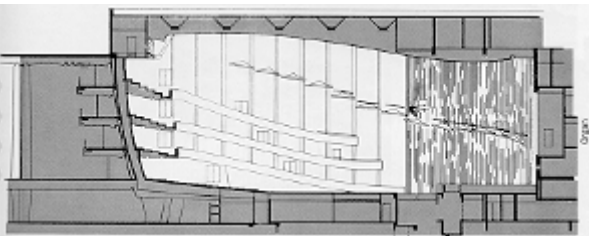


(Pic.5) indicates the whole stage design inspired from ancient Egyptian temples and the effect of light on stage.



Acoustics Value in “Aida Opera” performance differs according to type of theatre performed on. In the end the researcher reaches a conclusion in the form of a comparison that illustrates the Acoustics value and its relation with Interior designing of theatres.

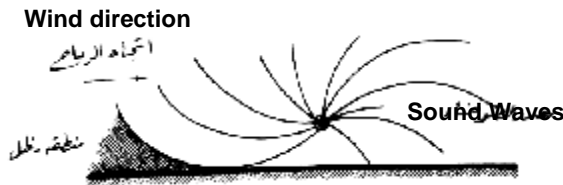
Comparison between Interior Design of Open Air and Closed Theatre of “Aida Opera” Performance

	“Open Air Theatre”	“Closed Theatre”
About the Theatre	<p>Pyramids Open Air Theatre- Egypt</p>	<p>Metropolitan Opera- Lincoln Center of Arts-New York</p>
	<p>- “Aida Opera” was performed in 1997 in the Pyramids Open Air theatre.</p>	<p>- “Aida Opera” was performed in 2011 in the Metropolitan Opera at Lincoln Center of Art.</p>
Interior design of the Theatre		
	<p>(Fig.13) illustrates Interior Design Plan of “Aida Opera” performance at the Pyramids Open Air Theatre.</p>  <p>(Fig.15) illustrates Interior design Elevations of “Aida Opera” Performance inspired from Sun (Pyramids Open Air Theatre).</p>	<p>(Fig.14) illustrates Interior Design Plan of “Aida Opera” performance at the Metropolitan Opera.</p>  <p>(Fig.16) illustrates Interior design Elevation of “Metropolitan Opera” as an example of the closed theatre.</p>



Comparison between Interior Design of Open Air and Closed Theatre of “Aida Opera” Performance

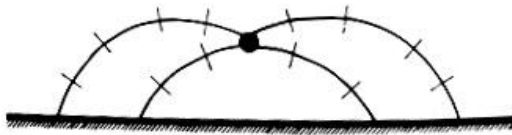
Acoustics in Theatres - Reflections of Sound Waves in Theatres



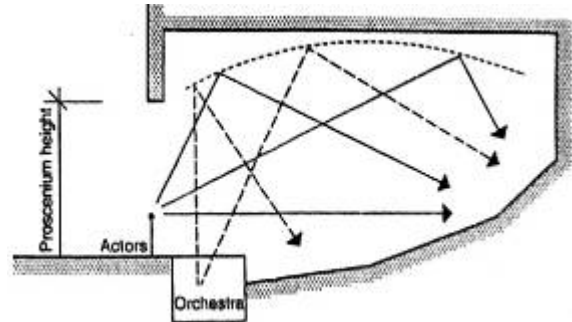
(Fig. 17) illustrates wind direction and its effect in spreading of sound, also the refractions of sound waves.



(Fig.19) illustrates spreading of sound waves during the day.



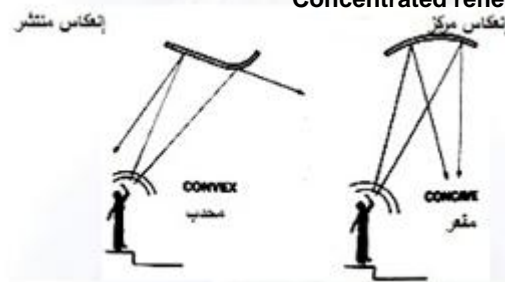
(Fig. 22) illustrates spreading of sound waves during the night.



(Fig. 18) illustrates reflections and refractions of sound waves inside the closed theatre

Spreading reflections

Concentrated reflections



(Fig. 20 - 21) illustrates ways of sound reflections on ceilings of closed theatres. These types of ceilings were applied on the ceiling design of Metropolitan Opera Hall.

Fig (20) shows spreading reflections of sound waves on the convex ceiling.

Fig (21) shows concentrated reflections of sound waves on the concave ceiling.

“Aida Opera” Performance



(Fig. 6) illustrates Interior Design of “Aida Opera” Performance at the Pyramids Open Air Theatre. The Design was inspired from the Holy Sun of Ancient Egyptians and its symbolism in spreading light and warmth.



(Fig. 7) illustrates Interior Design of “Aida Opera” Performance in Metropolitan Opera. The design was inspired from temples of Ancient Egyptians with its glorious sculptures



RESULTS:

- 1- Sound is considered as a main value in interior designing of theatres, also it has a strong relationship with visual and audio culture for the interior designer and the audience.
- 2- The assurance of the importance of acoustic design value and its relationship with theatres in both open Air and closed theatre.
- 3- The relationship of classical music which performed in open air and closed theaters with reverberation of time and volume of the hall; as The Reverberation of time is directly proportional to the volume of the hall. Thus we may arrange the classical music from the lower reverberation time to the highest as follows:
 - Speech (Tenor – soprano), Chamber Music, Opera, Symphonies, Organ Music.
- 4- Differences in acoustic design and treatments of the interior design in open air and closed theatres are as follow:
 - **Open Air Theatre:**
 - Wind movements must be studied in both day and night and their relation with spreading and refraction of sound.
 - A control room with microphones must be in the open air theatre for the controlling of sound.
 - **Closed Theatre:**
 - Reverberation of time must be studied for each music and it's relation with the volume of the hall.
 - Designing of ceiling and its curvature, also wall and ground treatments must be taken into consideration to ensure good quality of sound.
- 5- The importance of acoustic design value with visual and audio culture of “**Aida Opera**”, as there is a relationship between the script which was written by “**August Mariette**” and the “Music notes” which was written by “**Giuseppe Verdi**” and the interior design of the theater which was performed in different theatres around the world such as “The Pyramids Open Air” theatre and the “Closed theatre” of “Metropolitan Opera” in New York.

Recommendations:

- The researcher recommends the importance of visual and audio arts cultures for its creative and culture repertoire, and to be performed in interior spaces of good quality visually and acoustically.



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