



Partnership for Innovation in Education

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CINCINNATI POPS ORCHESTRA

The Cincinnati Pops Orchestra is recording a new CD. But the acoustics in Music Hall are suffering. Heavy construction and an aging infrastructure are disturbing its sound. What can be done to improve the acoustics? Can you help fulfill this assignment?

Situation

The Cincinnati Pops Orchestra was getting ready to record St. Saen's *Carnival of the Animals*. However, with the new city streetcar construction affecting Music Hall, the historic building's acoustics were suffering. The Pops Sound Designer decided to begin looking for ways to improve the Hall's musical sound. Can you help her?

Introduction

Anne Cushing-Reid, the Senior Director of community engagement and learning for the Cincinnati Symphony Orchestra and Cincinnati Pops, could not wait to get started on the next project in the Cincinnati Pops concert line-up – Camille Saint-Saens' *The Carnival of Animals*.

The musical suite of fourteen movements captured in symphony the characteristics of fourteen vastly different animals. She knew families, and children in particular, would love this and that there was great opportunity to educate and connect with them through this relevant piece. She knew this would be a natural fit for families and hoped that it would be a significant boost CSO's efforts to increase family involvement.

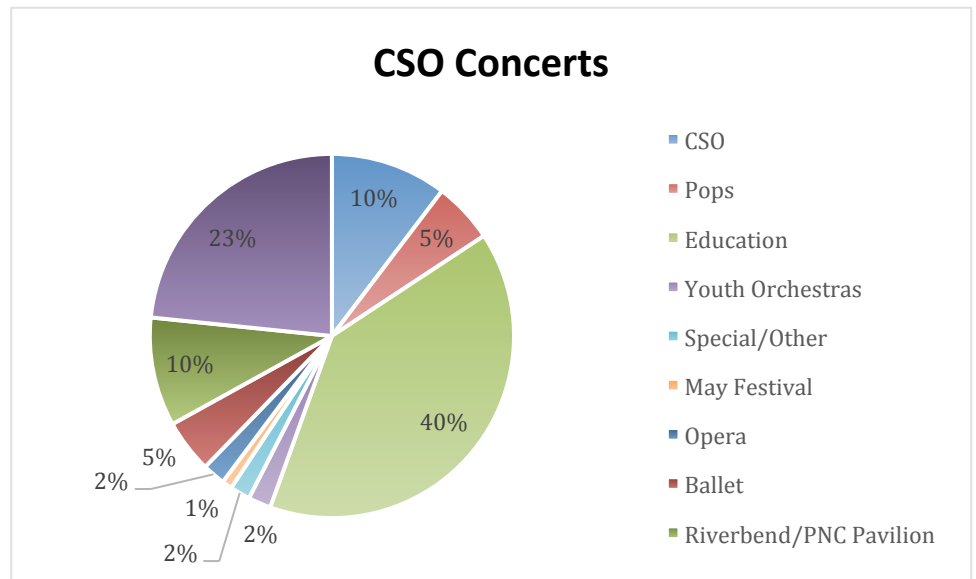
She, along with Conductor John Morris Russell, CSO Violinist Stacey Woolley, and Sam Strater, Director of Artistic Administration, had begun to plan out the possibilities for this project. In addition to their usual outreach to families and the community, they were just awarded an education grant to incorporate this concert

into an integrated science curriculum. “The *Carnival of Animals* is a wonderful opportunity to cultivate the love of music in our youth and show how it ties into so many aspects of life, including the sciences,” said Anne.

Knowing she and her CSO staff would need to focus on the details of marketing and preparing the orchestra for the *Carnival of Animals* concert; Anne called upon a team of educators to research and create the accompanying curriculum for this project that would ensure a deeper lesson in and connection between music and science.

This team would have to learn not only about the making the *Carnival of Animals* but also would have to extract lessons in science from the musical work. They would have to determine how the *Carnival of the Animals* recording could serve as a catalyst for kids to learn more about music and animals, focusing on science and ecosystems.

Background



CSO Pops Orchestra

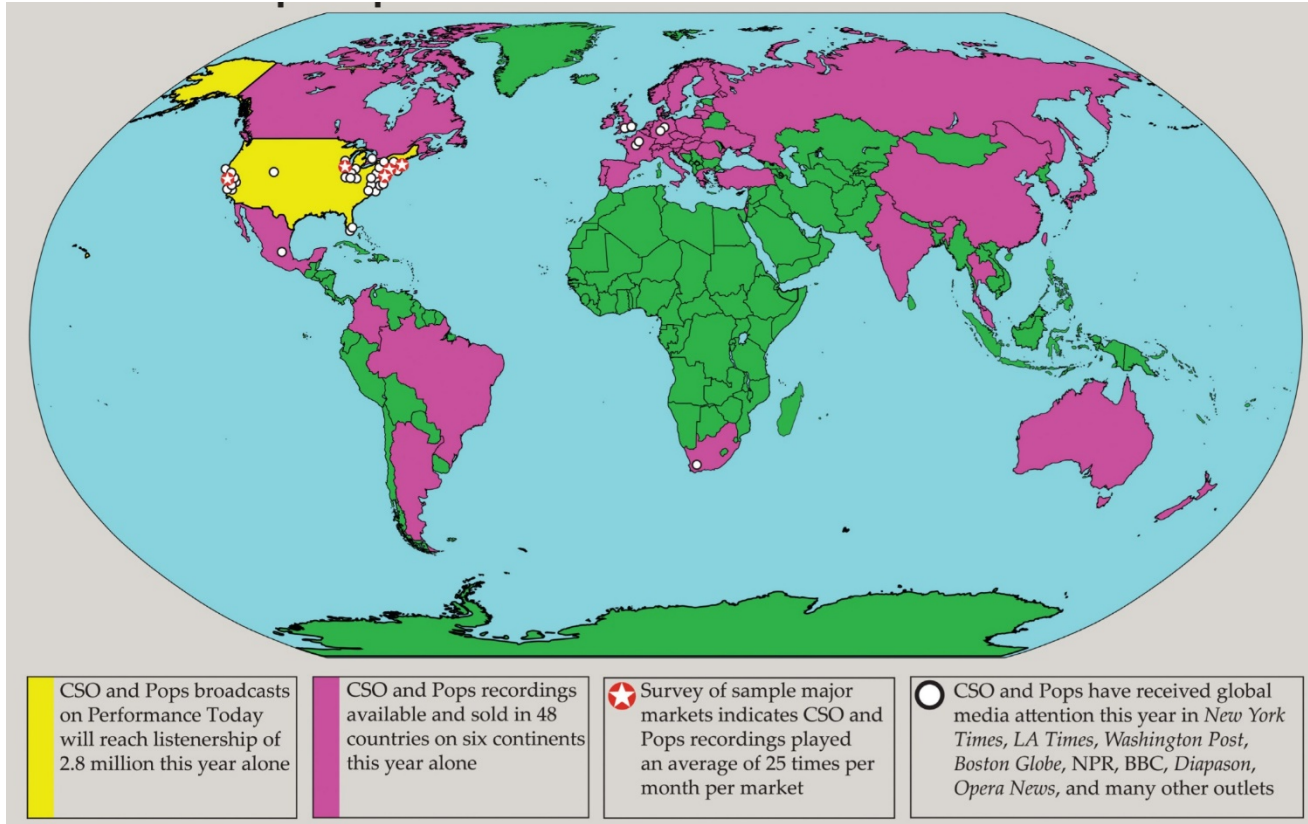
Cincinnati Pops Orchestra is a well-established and integral part of the arts scene in Cincinnati and beyond. Founded in 1895, the Cincinnati Symphony Orchestra is the fifth oldest orchestra in the United States. The Cincinnati Symphony Orchestra (CSO) founded the Cincinnati Pops Orchestra in 1977 with Erich Kunzel, Founder and Conductor Emeritus.

A pops orchestra is an orchestra that plays popular music (generally traditional pop) and show tunes as well as well-known classical works. Pops orchestras are generally organized in large cities and are distinct from the more highbrow symphony or philharmonic orchestras. The Cincinnati Pops members are also

the members of the Cincinnati Symphony, and the Pops is managed by the same administration.

Over the past 40 years, the Cincinnati Pops Orchestra has regularly performed for packed houses in Cincinnati's Music Hall and established worldwide recognition through tours and critically acclaimed, best-selling recordings on the Telarc label.

The Cincinnati Pops has gained new fans the world over through tour performances (Japan and Taiwan in 1990 and again in 1997, plus domestic performances that include frequent concerts at New York's Carnegie Hall)



recordings on the Telarc label, and television specials for PBS.

An estimated 30 million people have viewed eight national telecasts of the Cincinnati Pops on PBS, and the Orchestra has more than 100 available recordings, 56 of which have appeared on the Billboard charts, a record unmatched by any other orchestra, and sales of over 10 million units. The Pops' Copland: Music of America

- CSO FACTS – Worldwide Reach**
- CSO and Pops broadcasts on Performance Today will reach a listenership of 2.8 million this year alone
 - CSO and Pops recordings are available and sold in 48 countries on six continents
 - CSO and Pops have received global media attention this year in *New York Times*, *LA Times*, *Washington Post*, *Boston Globe*, NPR, BBC, *Diapason*, *Opera News* and many other outlets.

won a 1998 Grammy Award, and four other Pops recordings have been nominated for Grammy Awards.

Erich Kunzel directed the Pops orchestra until his death in 2009. Today the Cincinnati Pops is under the direction of Conductor John Morris Russell and is one of the world's most active classical pops ensembles, performing 20 or more subscription concerts during the Music Hall season and 10 subscription concerts at Cincinnati's Riverbend Music Center, the orchestra's outdoor summer home.

CSO and Pops are rightfully proud of the large and diversified audience they reach. Support and attendance for the symphony industry nationally has struggled over the years but Cincinnati has worked hard to reach out to the public and continues to thrive. While national trends show declines in attendance and waning support from younger audiences, CSO and Pops attendance has continued to increase (see CSO FACTS – Attendance).

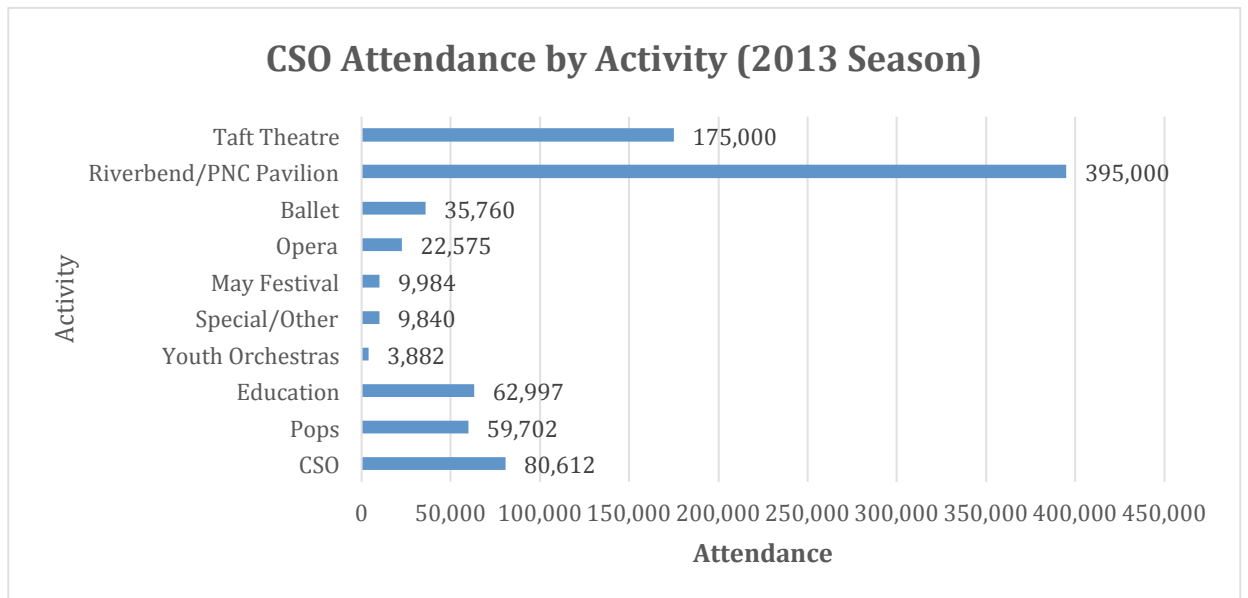
CSO FACTS – Attendance

- CSO and Pops average attendance has increased by 16% and 8% respectively over the past three seasons

While Nationally...

- The percent of the population that attends classical music events declined 29% between 1982 and 2008
- Aging audience: Median age of concertgoers increased from 40 to 49 between 1982 and 2008

Just last season, over 850,000 people attended 445 concerts or events hosted by CSO and Pops. Of these, just over 120,000 were children and families attending education programs and Pops (See CSO Attendance Chart below).



Anne knows that programs like *Carnival of Animals* are part of the reason for the CSO and Pops success story and that educational outreach and community engagement are key for continued success. As can be seen in the facts below, CSO

CSO FACTS - Education and Community Engagement

- Over 65,000 served through community engagement activities in FY12, an increase of 30% over prior year
- 50 school districts across OH, KY and IN served annually
- CSO musicians and ensembles serve over 13,500 students in the classroom throughout the tri-state each year
- An extensive regional presence through community concerts, master classes and ArtsWave Presents programs help create vibrant neighborhoods

musicians and ensembles serve over 13,500 students in the classroom throughout the tri-state each year (see CSO FACTS – Education and Community Engagement below). Adding a curriculum to the *Carnival of Animals* would help CSO and Pops increase their reach in the classrooms even more.

Camille Saint-Saens' *Carnival of Animals*

The Carnival of the Animals (Le carnaval des animaux) is a musical suite of fourteen movements by the French Romantic composer Camille Saint-Saëns. Written for private performance by an ad hoc ensemble of two pianos and other instruments, the work lasts around 25 minutes. Saint-Saëns composed the Carnival of the Animals in February 1886 in a small Austrian village. It is scored for two pianos, two violins, viola, cello, double bass, flute (and piccolo), clarinet (C and B \flat), glass harmonica, and xylophone.

Saint-Saëns regarded *Carnival of Animals* as a fun piece that he wrote for his students. As the title suggests, the work follows a zoological program and progresses from the first movement, *Introduction et marche royale du lion*, through portraits of elephants and donkeys ("Those with Long Ears") to a finale reprising many of the earlier motifs. The fourteen movements are:

- I. **Introduction et marche royale du lion (Introduction and Royal March of the Lion)** - Strings and two pianos:
- II. **Poules et coqs (Hens and Roosters)** - Strings without cello and double-bass, two pianos, with clarinet: This movement is centered around a pecking theme played in the pianos and strings
- III. **Hémiones (animaux véloces) (Wild Asses: Swift Animals)** - Two pianos: The asses depicted here are quite obviously running, an image induced by the constant, feverishly fast up-and-down motion of both pianos playing scales in octaves.
- IV. **Tortues (Tortoises)** - Strings and piano: A satirical movement which opens with a piano playing a pulsing triplet figure in the higher register. The strings play a slow rendition of the famous 'Galop infernal'

- (commonly called the Can-can) from Offenbach's operetta *Orpheus in the Underworld*.
- V. **L'éléphant (The Elephant)** - Double-bass and piano: This section is marked *Allegro pomposo*, the perfect caricature for an elephant.
 - VI. **Kangourous (Kangaroos)** - Two pianos: The main figure here is a pattern of 'hopping' fifths preceded by grace notes.
 - VII. **Aquarium** - Violin, Viola, Cello, (Strings without double-bass), two pianos, flute, and glass harmonica: This is one of the more musically rich movements. The melody is played by the flute, backed by the strings, on top of tumultuous, glissando-like runs in the piano.
 - VIII. **Personnages à longues oreilles (Personages with Long Ears)** - Two violins: This is the shortest of all the movements. The violins alternate playing high, loud notes and low, buzzing ones (in the manner of a donkey's braying "hee-haw").
 - IX. **Le coucou au fond des bois (The Cuckoo in the Depths of the Woods)** - Two pianos and clarinet: The pianos play large, soft chords while the clarinet plays a single two-note ostinato, over and over; a C and an A flat, mimicking the call of a cuckoo bird.
 - X. **Volière (Aviary)** - Strings, piano and flute: The high strings take on a background role, providing a buzz in the background that is reminiscent of the background noise of a jungle. The cellos and basses play a pick up cadence to lead into most of the measures. The flute takes the part of the bird, with a trilling tune that spans much of its range. The pianos provide occasional pings and trills of other birds in the background. The movement ends very quietly after a long ascending scale from the flute.
 - XI. **Pianistes (Pianists)** - Strings and two pianos: This movement is a glimpse of what few audiences ever get to see: the pianists practicing their scales.
 - XII. **Fossiles (Fossils)** - Strings, two pianos, clarinet, and xylophone: Here, Saint-Saëns mimics his own composition, the *Danse macabre*, which makes heavy use of the xylophone to evoke the image of skeletons playing card games, the bones clacking together to the beat.
 - XIII. **Le cygne (The Swan)** - Two pianos and cello: The lushly romantic cello solo (which evokes the swan elegantly gliding over the water) is played over rippling sixteenths in one piano and rolled chords in the other (said to representing the swan's feet, hidden from view beneath the water, propelling it along [citation needed]).
 - XIV. **Final (Finale)** - Full ensemble: The finale opens on the same tremolo notes in the pianos as in the introduction, which are soon reinforced by the wind instruments, the glass harmonica and the xylophone. The strings build the tension with a few low notes, leading to glissandi by the piano, and then a pause before the lively main melody is introduced.

Carnival of the Animals is the 93rd Cincinnati Pops album and also features the world premiere recording of "Waiting for Wings," a musical adaptation of Lois Ehlert's immensely popular children's book composed by Jason Robert Brown and Georgia Stitt.

The scientific recording elements of *Carnival of Animals*

The creation of music with a symphonic orchestra requires the knowledge of many scientifically studied concepts. These concepts include understanding a) how sound is made through the musical instrument, b) how sound carries in a room, and c) how an orchestra with multiple instruments mirrors the interdependence of our ecosystem.

Understanding Sound

Sound is defined as a vibration of an audible mechanical wave of pressure that travels through the air (or another medium) and can be heard when reaching a person's or animal's ear. Sound is the reception of such waves and their perception by the brain.

Frequency: The rate of vibrations in different pitches.

Pitch: The highness or lowness of a sound.

Sound energy: Audible energy that is released when you talk, play musical instruments or slam a door.

Sound wave: A longitudinal pressure wave of audible or inaudible sound.

Vibration: When something moves back and forth, it is said to vibrate. Sound is made by vibrations that are usually too fast to see.

Volume: When sound becomes louder or softer.

Wave: A disturbance that travels through a medium, such as air or water.

Echo: the repetition of a sound by reflection of sound waves from a surface,

Acoustics: Capturing Symphonic Music

In addition to these basic concepts, the curriculum should include elements of how sound or acoustical engineers are able to have the sound of an orchestra, with so many instruments playing at once, resonate so beautifully throughout a theater. This includes understanding the acoustics, which is the interdisciplinary science that deals with the study of mechanical waves in gases, liquids, and solids including vibration, sound, ultrasound, and infrasound. More specifically, you will need to incorporate concepts of architectural acoustics, which is the science and engineering of achieving a good sound within a building. These concepts will help with overall sound control.

Art Imitating Life – The Ecosystem

An orchestra is an interdependent ecosystem. An ecosystem is defined as a community of living organisms (plants, animals and microbes) in conjunction with the nonliving components of their environment (air, water and mineral soil), interacting as a system.

Removing one animal or plant from an ecosystem disrupts the food chain, just as removing an instrument from the orchestra can affect the total sound. Similarly, biomes, defined as contiguous areas with similar climatic conditions in science are similar to the way that musical instruments can be classified and are grouped together in an orchestra.

The Problem

Anne Cushing-Reid and her staff want to help the Orchestra in developing a better acoustic and sound experience at Music Hall for their recording of the Carnival of Animals by Camille Saint-Saens. The Carnival of Animals features many different types of sounds, mimicking animals and their habitats. How can you help develop a perfect “listening” space for this recording?

QUESTIONS TO BE RESEARCHED:

- When thinking about playing various instruments...
 - How is each instrument making its sound?
 - What is pitch? How do instruments make higher-pitched or lower-pitched sounds?
 - What are vibrations?
 - Why do animals hear better than humans?
 - How does sound carry in an orchestral theater? (Sound waves, echo etc.)
 - When an orchestra plays an outdoor concert in the summer, how must they adjust their tuning?
 - When a band plays outside in the cold, how will they need to adjust their pitch?
- Comparing ecosystems and the *Carnival of Animals* – How are the two similar/Different?
 - What is an ecosystem? What are biomes? What animals/plants go within biomes?
 - What are the different ecosystems on this planet? What are the different types of symphonies?
- How do instruments interact in an orchestra? How do animals interact in an ecosystem? And how each of these compare w

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