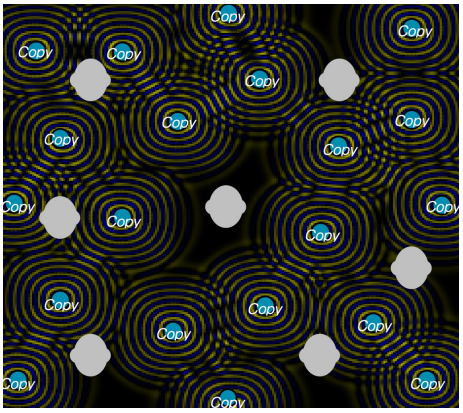
THE MUSIC OF SOUND

PHOTO: HENRY DIROCCO

CREATING NATURAL SOUND FIELDS FOR THEATRE

/// BY FITZ PATTON

/// *August Osage County*: David Zinn, set design; Japhy Weideman, lighting design; Clint Ramos, costume design.



/// A theatre sound field made of 20 copies of the same recording. Every audience member hears the same sound, as well as copies of that sound at various distances. Most stereo recordings present one sound from two different perspective points and do not constitute two unique content streams.

When you head for the hills, a pack on your back, and the open sky before you, you escape into the immersive all-senses-surround-field of the natural world where every sight, smell, and sound is richly textured, alive, and different. The sound of rushing water at brookside, a cicada-filled forest canopy above, or the sun-drenched open meadow all transform us because we're immersed in something stable and yet endlessly different. The sounds are full of information about the time of day, the relative brilliance of the sun, the wind, humidity, potential presence of rain. Most importantly, it is all around us—thousands of small, endlessly varying, living sound sources.

Whether the crashing waves and rain of Australia's wild western coast, or the rich, verdant, cotton-filled air of the Mississippi Delta, the piercing cold of the high Colorado Rockies, or the windswept plains of sun-burned Oklahoma, the creation of a natural soundfield for a play is an exhilarating challenge. It's an opportunity to escape to another place, listen more deeply, and experience space and time more vividly through sound alone.

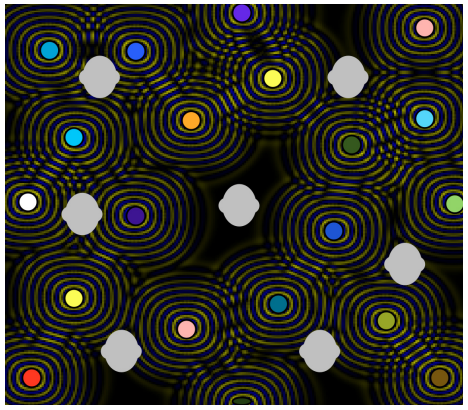
SOUND AS SPACE

In nature, we hear thousands of living creatures around us, all from unique positions in space. Their sound illuminates the acoustic qualities of the space and describes for us a three-dimensional listening field with our mind at its center. How can we communicate this experience accurately to an audience member in a theatre?

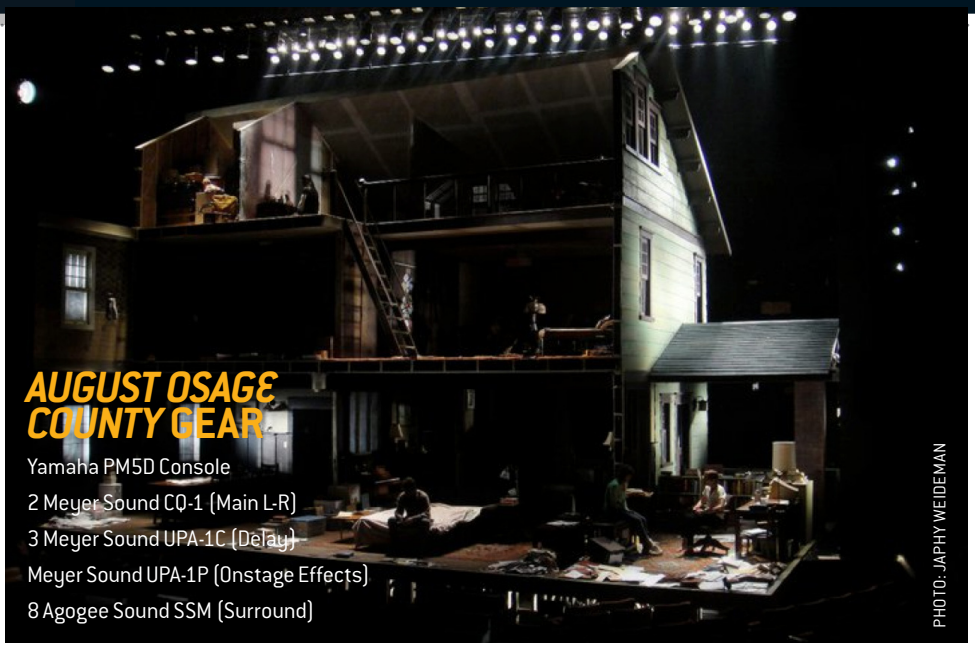
You might begin with a recording of an entire meadow—afternoon cicadas, for example—but as you copy that recording to all of the speakers in your theatre, you are not only proliferating copies of the same sound to all positions in the space, but you are also copying the listening perspective, captured within that recording, to all the positions as well, surrounding your audience member with copies, at various distances, of the same sound and recording perspective.

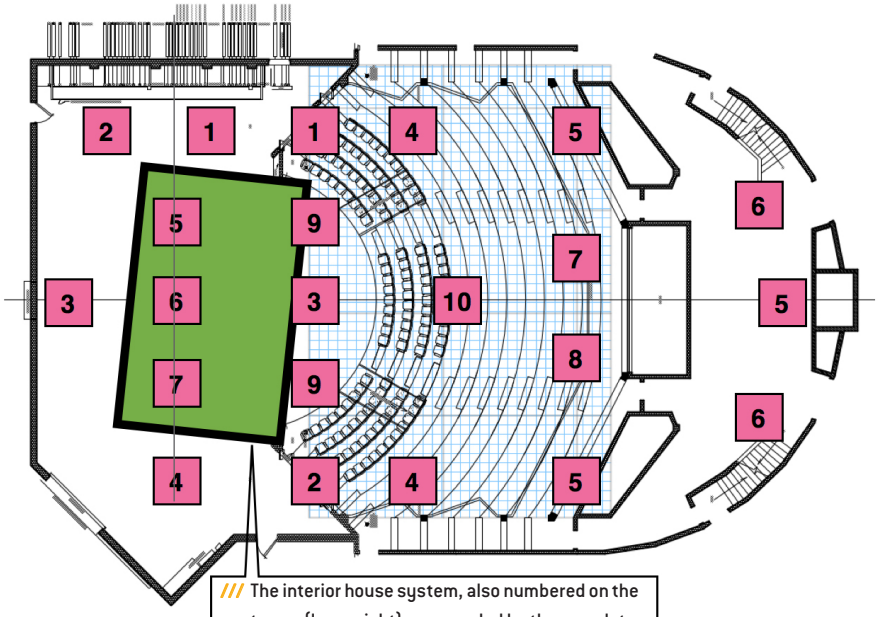
It turns out that designing this sound accurately means designing the space as well, and designing the space means taking a different approach to designing the sound.

Installations for The Old Globe Theatre in San Diego, CA, and Westport Country Playhouse in Westport, CT were developed both to stand on their own as installed sound spaces and to be cueable as sound envelopes for the plays for which they were conceived. To express these designs as sound spaces, where the spatial relationships of the



/// A theatre sound field made of 20 unique sound streams: Every audience member enjoys a unique listening position within a dense field of unique sounds. Here sound is used to create space, or to reveal it, exactly as it does in nature.





/// The interior house system, also numbered on the next page (lower right), surrounded by the complete sound system surrounding the house and audience.

speaker arrays are designed into the sound files themselves, the natural world was first atomized into its smallest components and then reassembled using music notation and prime number relationships to create an immersive, stochastic natural sound space that could be scaled in tempo/density and dimensionality, expressing those sounds *as* a space, achieving a more comprehensive and realistic result.

SOUND AS MUSIC: *AUGUST OSAGE COUNTY*

Having spent a good deal of my youth in Oklahoma, the opportunity to design the sound space for Sam Gold's ambitious production of *August Osage County* at The Old Globe Theatre was a welcome challenge, an opportunity to virtually travel home by recreating the vivid beauty of that open, sparsely peopled, and windswept landscape within The Old Globe Theatre and to communicate that memory emotionally, honestly, and accurately.

The tempo of a cicada field is a fluid, direct expression of the temperature of the air and the time of day. A.E. Dolbear, a professor at Tufts College, published the first equation for using crickets to calculate temperature in 1897. We used this equation for our cicada field:

Field Cricket: Temperature = 50 + [(Chirps per minute-40)/4]

The average daytime temperature in Oklahoma in August is 93°, while the average nighttime temperature is 69°. This suggests a speed of 212 chirps per minute during the day and 116 chirps per minute at night. In addition to stable fields of activity during the scenes, our production also featured a 90-second sound immersion experience that drew a complete 24-hour natural sound cycle in which the cicada field would accelerate from its slowest speed to its fastest and then back again.

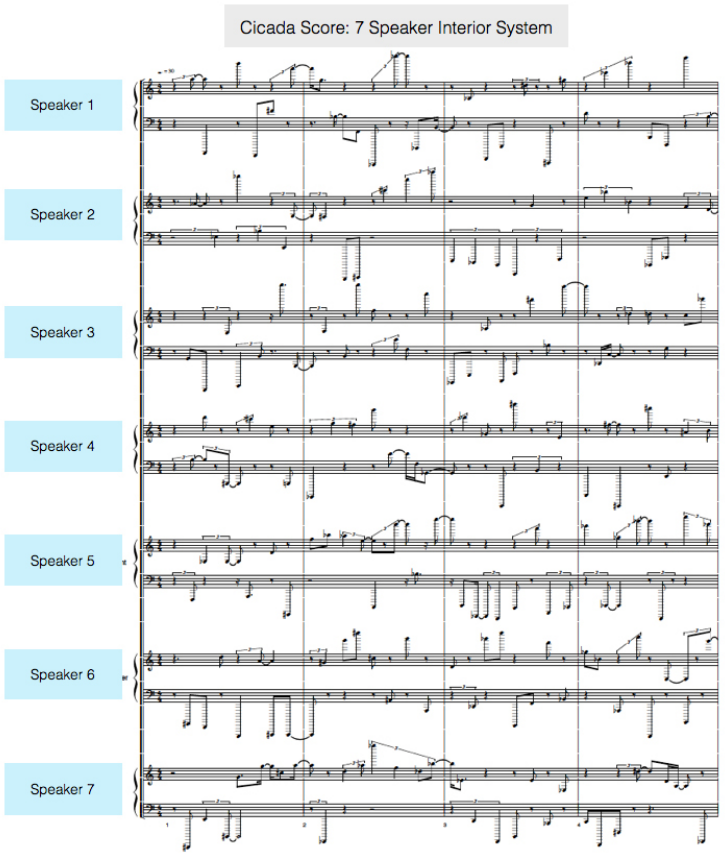
By atomizing the cicada field to its smallest component, the single cicada call, and then reassembling the whole field using sequences of notes (streaming in prime number ratios relative to one another) to trigger these calls in stable

yet semi-random patterns, we can assume control of its speed and accurately tell the aural story of the living, breathing Oklahoma landscape surrounding David Zinn's stunning three-story house, built-to-scale within the theatre.

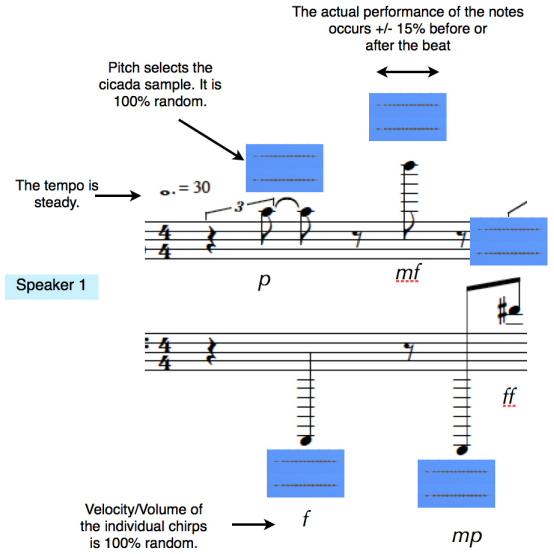
Rendered to perfection by The Old Globe's design support and technical department (production director Robert Drake, technical director Ben Thoron, and associate technical director Wendy Bersansky), the set for *August Osage County* presents a sizable achievement for the 18-show-per-year regional powerhouse. Old Globe resident audio engineer Erik Carstensen installed 20 DPA 4061 area mics and seven channels of sound within the set, as well as 17 channels of sound surrounding the set and audience for a total of 24 channels of independent content.

This stochastic sound field was organized around a firm rhythmic grid. Each speaker received a unique stream of cicada calls (24 streams for the theatre), and each stream was related to every other stream by prime numbers. Prime numbers ensure that no two insects ever sound at exactly the same time.

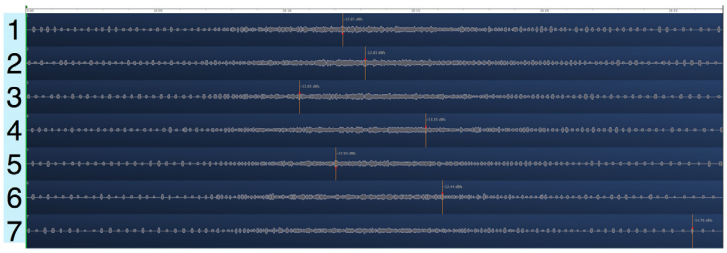
The resulting score looked like this:



/// Score for the seven-channel interior cicada system: The tempo of the score determines the speed of the cicada field. Each note initiates a cicada sound, while the pitch of the notes determines the volume of the sound.



/// A closeup of the score pictured below, left: This score line creates the sound of a single cicada. During transitions, this particular cicada is sent to a hidden speaker in the dining room or speaker channel one.



/// The seven channel audio file created by the score: Every event here is an individual cicada sound. This field accelerates from 118 chirps per minute to 212 and then back to 118, reflecting a 24-hour time cycle of a typical August evening in Oklahoma.

/// The interior house system used to represent the cicada sound-field within the house during transitions: The cicada score shown above was used to produce the sound field for this space.

PHOTO: HENRY DIROCCO

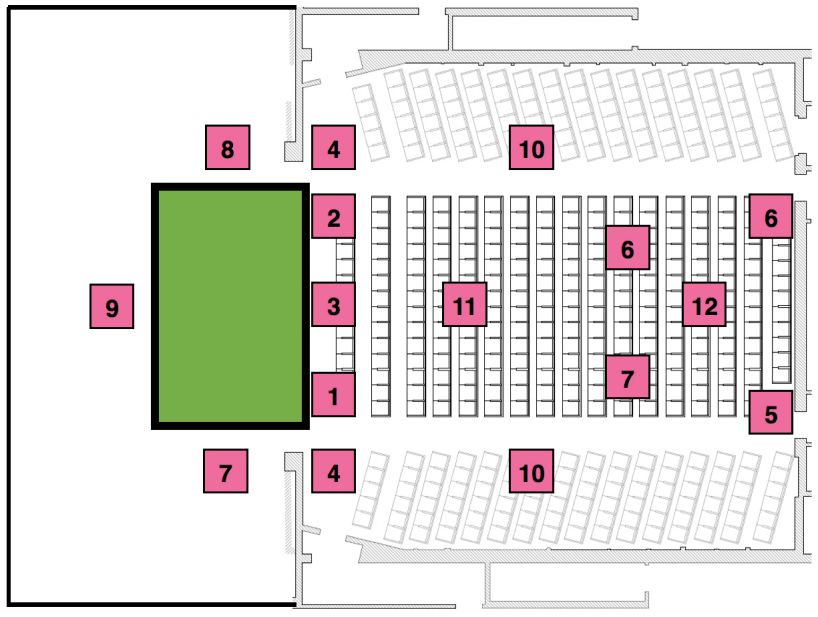
SUDDENLY LAST SUMMER GEAR

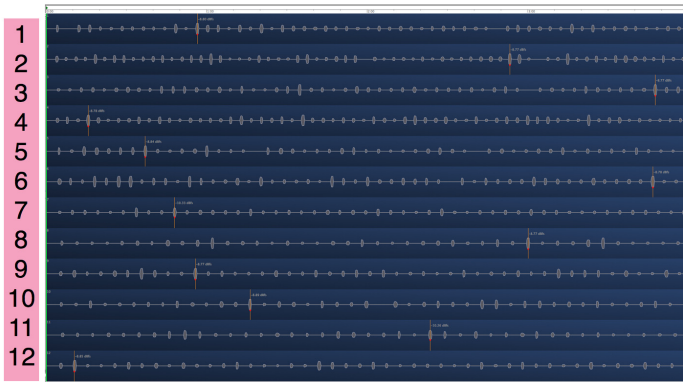
1 Crest Audio XR-20 Console
17 EAWJF80 (Under/Over Balcony and Onstage)
2 EAW MK2294 (Lower Proscenium)
2 EAW SB250P (Subwoofer)
4 EAW MK2264 (Center Cluster and Upper Proscenium)
4 Meyer Sound MM-4 (Front Fill)

SUDDENLY LAST SUMMER AT WESTPORT COUNTRY PLAYHOUSE

The opportunity to expand this technique to a far wider range of sounds, provided by David Kennedy's operatic production of Williams' one-act masterpiece *Suddenly Last Summer*, was substantial. Here we established a 12-channel format for the entire theatre. In addition to cicadas, we added stochastic multichannel rain, wind, tree frogs, sea gulls, and 12-channel multi-tap representations of the score to dimensionalize them within the speaker canopy. Some of these sound files are depicted at lower right. Interestingly, a single file of this kind floats the entire sound system, bringing a substantially larger amount of sound content to the theatre with no additional programming effort.

An additional technique employed on this production was the use of 12-channel multi-tap delay and feedback patterns to express two-channel sounds (stereo recordings of the music score and other stereo material) as a 10-channel field of patterned repeats. In this case, the same sound is echoed across the sound system, arriving at each speaker at a slightly different time and possessing a slightly different character at each arrival point through the use of feed-

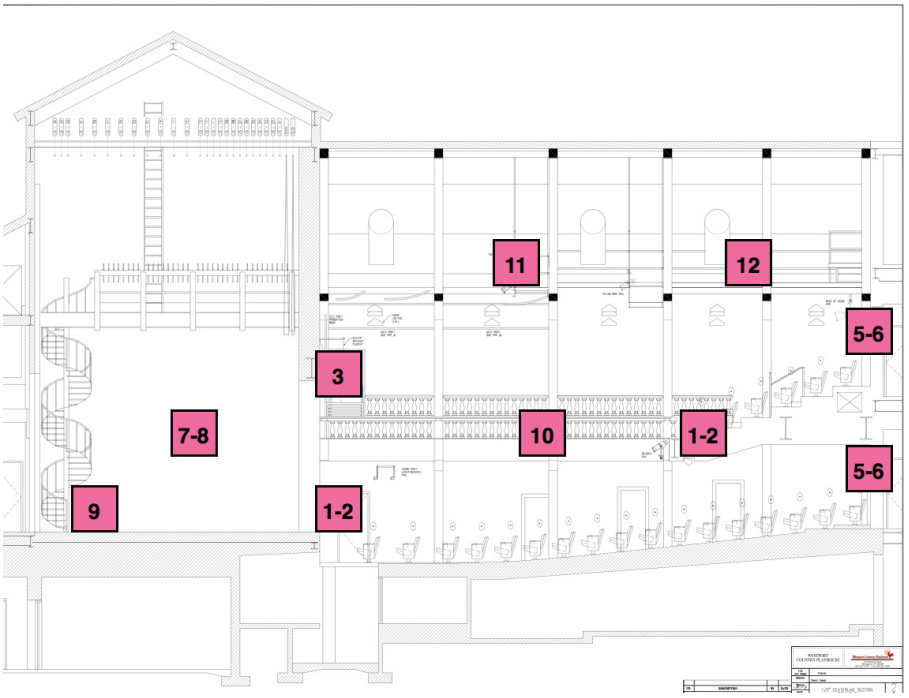




/// A 12-channel stochastic tree frog canopy for Westport Country Playhouse (above): This single file (left) addresses the entire sound system, saving substantial programming time.

back patterns where various speakers were paired with one another to create a dense web of call and response. While this sound field has a single subject—a single piece of content—the delay and feedback patterns allow us to use that sound to create space, to reveal space, and to express that sound, perceptually, as a volume of space as well as a piece of music.

Fitz Patton has designed and scored more than 210 productions in 20 cities. He was most recently heard on Broadway in The House of Blue Leaves. *In 2010, he was awarded Lucille Lortel and Drama Desk awards for* When the Rain Stops Falling *at Lincoln Center's Mitzi Newhouse Theatre. He teaches and designs at Barnard College of Columbia University, where he installed a text-based, motion-activated environmental sound sculpture that explores the boundary between theatre and public space.* LD



/// The Westport house and system in section view.

/// *Suddenly Last Summer*: Narelle Sissons, set design; Matthew Richards, lighting design; Ilona Somogyi, costume design.

PHOTO: NARELLE SISSONS