Lecture 5: Emergence, Resonance & Optimal Acoustical Properties

Emergence:

1. the process of coming into view or becoming exposed after being concealed.

2. the process of coming into being, or of becoming important or prominent

In philosophy, systems theory, science, and art, emergence is a phenomenon whereby larger entities arise through interactions among smaller or simpler entities such that the larger entities exhibit properties the smaller/simpler entities do not exhibit. An emergent property of a system, in this context, is one that is not a property of any component, but is a feature of the system as a whole. Emergence plays a central role in theories of integrative levels and of complex systems.

Emergence shows that the instabilities and sudden jumps to new forms of order are the result of small fluctuations that are amplified by feedback loops, until the system as a whole becomes unstable. When that happens, it may fall apart because of the instability, but much more frequently it will not break down but break through to a new state of order. These processes are known as "self-organization" because the resulting structures are organized by the "internal rules" of the system, not by anything outside.

Example:

The formation of soap bubbles when you shake a mixture of soap and water. The resulting structures form spontaneously because they are thermodynamically more stable than the original ingredients.

Dynamic self-organization include the spontaneous emergence of new forms of order. This spontaneous emergence of new order at critical points of instability, "emergence," is the key characteristic of dynamic self-organization, and is one of the hallmarks of life. Creativity is a key

property of all living systems. It is the nature of life itself to reach out into new territory and to create novelty.

Examples of Emergence:

Starling murmurations (see video)

In singing we have many examples of dynamic self organization:

Vibrato

Modification of vowels

The responsiveness of the respiratory system to attenuate to what you wish to say

Resonance:

Representation of the spectrum over overtones in singing

The singer's formant:

An increase in energy around 3000 Hz (between 2800 and 3400 Hz) which allows singers to be heard and understood over an orchestra.

Optimal Acoustics

Optimal Acoustics arise when we create the conditions where a new organization can arise spontaneously- it is ensuant, rather than pursuant. The desirable acoustical properties emerge spontaneously, and also reliably.

If you organize your singing in a way that is maximized for dynamism and emergence, you qualities that are emergent in the vocal mechanism: resonance, agility, and also the qualities we

value in operatic singing and other acoustic singing: particular resonance, vibrato and dynamic tuning.

Tuning

An ever changing dynamic system that is continually responding and renewing itself provided the system is free to do so. Your whole self, including your brain, ears, vocal mechanism, respiratory mechanism attenuate to do this.

Analysis of typical strategies such as muscular manipulation and positioning (placement, modification, posture, etc.) reveals that though there are observable results, they are limited both in scope and reliability, and they do not produce the full dimension and harmonic spectrum the way that creating the conditions for the emergent self organization does. They are fixed strategies applied to a dynamic system.

It also addresses the plasticity of the human brain and how we learn. New connections are made all the time in the brain, and we now know that we can grow new neurons. We are inherently dynamic and creative.

Note: It also explains why our skills are sometimes temporarily disrupted when we are learning a new way of coordinating, because we are disorganizing and reorganizing to access those skills in a new way/ via a new pathway.

<div align="center">Design Thinking and Feedback Loops</div>

Cupcake

A concept from design thinking that proposes that starting with something simple and complete allows you to get faster and better feedback. If you can sample a cupcake version of the bigger cake, you have a faster feedback loop by which you can make changes and improvements.

"Usage is oxygen for ideas."

Emergent Warm ups

Designed to create the conditions for optimal coordination and optimal emergent acoustical qualities. They can be done simply, providing a very clear, simple, and quick feedback loop.

Warm ups and Experiments

1 Yuh yuh yuh

On inhale and exhale

Encourages self-organization and alleviates fatigue

Invites free movement of the tongue, the vocal tract, hyiod bone and attachments

2 All of our bones vibrate with singing

Send air up, ask for whole self movement

3 Vibrato

Asking for free movement, allowing the vibration to self- organize

4 Agility

Ask for very loose airflow and movement, see what emerges

5 Hard palate movements

Waking up the hard palate attachments

Think the vowel and see if anything moves

Example of lively hard palate movements:

https://www.youtube.com/watch?v=rTFUM4Uh_6Y

Example of emergent vowel modification

https://www.youtube.com/watch?v=VyiC6bIqxFY

"I invite you not to cling. I invite you to open to the next moment and allow it to have its own richness. Nothing will kill the glow faster than clinging to past moments."
Ram Dass