

CAMPUSWIDE HONORS PROGRAM
COURSE PROPOSAL

Academic Year 2016-2017

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Experiments in Music

The word “experiment” can refer to a particular scientific method of testing, or it can mean any sort of trial with an unpredictable outcome. In this class we’ll study those two types of experiment as they have been applied in music. One is the attempt to explain our cognition of music by means of scientific experimental methodology. The other is the attempt to expand the domain of music by exploring previously unknown ways of making it. Our intention in this class is to learn about music more profoundly by studying it from both scientific and artistic vantage points. We will read about selected significant scientific and cognitive experiments, and will listen to and discuss notable examples of experimental music.

We will begin by discussing the two interpretations of the word “experiment” appropriate to this class. One interpretation of the word refers to the use of scientific research methods to prove or disprove an hypothesis developed from a research question. Its application in this class will be to determine the usefulness of scientific method in the study of music. To what extent can we know or demonstrate “true” facts about music? What are the advantages and limitations of such an approach? The other interpretation of the word is the everyday usage meaning to try something new and unknown to see what happens. This is also a form of empirical research, but does not necessarily follow rigorous experimental procedures or have a fully defined research question that it strives to answer. This approach to music composition and music making became common in the twentieth century. These two activities—the scientific study of musical phenomena and cognition, and the use of novel and untested compositional techniques—will be the focus of the course.

Topics will include:

What is sound? What is noise? What is music?
Human hearing, acoustics, and psychoacoustics
History of mathematical and scientific approaches to music
Psychoacoustic and cognitive experimentation in music
Modernism in music of the 20th century
Experimentalism and conceptual music and art
Algorithmic composition, with and without computers
Epistemology of the mind; epistemology of music
What is the future of music?

Students will be responsible for assigned readings and listenings every week, will be expected to provide a brief written summary of the key points of each, and will be expected to contribute actively presenting their ideas in class seminar sessions.

In the latter part of the quarter students will form groups in which they will propose and conduct musical experiments. Students can choose between a) formulating an hypothesis about music cognition or a particular musical phenomenon and then designing an experiment to test that hypothesis in a rigorous way and reporting on the experimental findings, or b) devising a concept for an experimental music composition (an idea for generating music in a new way, or for generating a new sort of sonic experience) and then realizing that concept in an actual performance or recording and writing a summary explanation/evaluation of the piece. In either case, the project will require that the students research prior work that has been done in their area of inquiry, make an experimental plan, run the experiment, and evaluate the result in writing.

Students will be evaluated based upon 1) weekly written responses to the readings, 2) informed participation in class discussions, 3) the design and implementation of the experimental project, and 4) an individual written summary of the experiment and its results.

Syllabus

Week 1: What do we mean by “Experiments in Music”?

Topics:

- The scientific/experimental study of music; experimental music creation
- What is sound? What is noise? What is music?
- The basics of sound and hearing
- Pythagoras: The harmonic series, the derivation of a musical scale
- Helmholtz: Acoustics, complex tones, hearing

Week 2: From modernism to experimentalism

Assigned Readings:

Aaron Copland. “How We Listen”. *What to Listen for in Music*.

Luigi Russolo, *The Art of Noises*.

Joel Chadabe. “The Great Opening Up of Music to All Sounds”, chapter 2 of *Electric Sound: The Past and Promise of Electronic Music*.

Assigned Listenings:

Igor Stravinsky. *Le Sacre du printemps*.

Anton Webern. *Symphony*, op. 21.

Topics:

- Modernism in the arts, and in music specifically

- Debussy/Wagner to Stravinsky/Schoenberg:
New dissonant sounds, new musical languages
- The path from modernism to experimentalism:
Theremin, Varèse, Schaeffer

Week 3: The scientific study of music

Assigned Readings:

Oskar Blakstad, *Experimental Research*.
 Saul McLeod. *Experimental Method*.
 Hermann Helmholtz. *The Sensations of Tone* (excerpt).
 Gordon Shaw. *Keeping Mozart in Mind* (excerpt).

Topics:

- Experimental method and conclusions
- The “Mozart effect”: the experiment and the resulting media phenomenon (the reporting, the popular distortion, the commercialization).
- Seminal experiments in sound/music cognition: Fletcher and Munson, Bregman, Krumhansl, et al.

Week 4: American experimentalism

Assigned Readings:

Susan Key and Larry Rothe. *American Mavericks* (excerpt).
 John Cage. “Experimental Music: Doctrine”. *Silence*.
 John Cage. “The Future of Music: Credo”. *Silence*.
 Pauline Oliveros. *Software for People* (excerpt).

Assigned listenings:

Charles Ives: *Three Places in New England*, mvt. 2.
 Edgard Varèse. *Ionisation*.
 John Cage. *Sonatas and Interludes*.

Topics:

- The early American experimentalists: Ives, Varèse, Cage, Ra
- Polytonality, polyrhythm, percussion and noise
- The next generation of American experimentalists
Subotnik, Oliveros, Wolff, Reich, Lucier
- Concrete music, electronic music, process pieces

Week 5: Electronic and computer music

Assigned readings:

Michel Chion. *Guide to Sound Objects*, section 1, chapter 1.
 Pierre Schaeffer. *In Search of a Concrete Music* (excerpt).

Brian Fennelly. "A Descriptive Language for the Analysis of Electronic Music".
Perspectives of New Music.

Assigned listenings:

Pierre Schaeffer. *Étude aux chemins de fer*.

Luciano Berio. *Thema (Omaggio a Joyce)*.

The Beatles. *Revolution 9*.

Topics:

- Recording technology and the birth of *musique concrète*
- Electronic music synthesis and composition
- "Understanding" concrete and electronic music
- The cultural role of experimental music

Week 6: Algorithmic composition

Assigned Readings:

Lejaren A. Hiller. *Experimental Music* (excerpt).

Iannis Xenakis. *Formalized Music* (excerpt).

David Cope. *Experiments in Musical Intelligence* (excerpt).

Assigned Listenings:

Iannis Xenakis. *Pithoprakta*.

David Cope. *Horizons*.

Topics:

- Systematizing the compositional process
- Mathematical bases for compositional systems
- Artificial intelligence and artificial creativity

Week 7: Designing and planning a music experiment

Assigned readings:

Daniel Levitin, "Experimental Design in Psychoacoustic Research".

Lisa Margulis. *On Repeat* (excerpt).

Assigned listenings:

Christopher Dobrian. *Entropy*.

Topics:

- Formulating a research question; formulating an hypothesis
- Designing a musical experiment
- Discussion of student project proposals

Week 8: Music and the mind; cognitive science and neurology

Assigned readings:

Lawrence Zbikowski. "Cross-domain Mapping". *Conceptualizing Music*.

Isabelle Peretz. "The nature of music from a biological perspective". *Cognition*.

Topics:

- Cognitive cross-domain mapping
- Principles of Gestalt psychology in music
- Metaphor and cliché in music appreciation
- Neurological processing of auditory patterns

Week 9: Experimental music today

Assigned readings:

Christopher Dobrian. "Musical Composition as Experiment (and vice versa)".
Conversations on the Artistic Process.

Christopher Dobrian. "A Method for Computer Characterization of 'Gesture' in Musical
Improvisation". *Proceedings of the International Computer Music Conference*.

John Croft. "Composition is not Research". *Tempo*.

Assigned listenings:

Christopher Dobrian. *There's Just One Thing You Need To Know*.

Christopher Dobrian. *Gestural*.

Chris Vik. *Kinectar*.

Topics:

- Human-computer interactivity in music performance
- Alternative music controllers
- Gestural control of sound; virtual instruments
- Artificial life and emergent systems

Week 10: Project presentations

Topics:

- Presentation and critique of student experiments in music

Week 11: Project summary article due

There will not be a final examination in this class. Instead, students are expected to turn in a paper summarizing the research, methodology, and findings of their own experiment in music. Although the experiment is carried out as a group project, each student is responsible for her/his own summary paper, presented in a format comparable to a (short) UROP Journal article including abstract, prior work, goals, methodology, findings, and listing of works cited. The paper is due by the end of the final exam time listed in the Schedule of Classes.

Grading Criteria

- 1) Weekly written responses to assigned readings and listenings. The writing will consist of a summary of the content of the week's material, and a critical evaluation of its significance. It will be evaluated based on demonstrated effort, thoroughness, and clarity of communication. (For students for whom poor writing ability appears to be a problem, the professor will give helpful critique and advice.)
- 2) Participation in class discussions. Students will be asked to respond to questions about the lectures, readings, and listenings presented, and should be able to demonstrate their familiarity with, and thoughtful consideration of, those materials.
- 3) Design and implementation of the experimental project. Students will work in small groups to plan either a) an experiment testing an hypothesis, or b) an experimental composition; they will research relevant prior work and will carry out the experiment, to be presented in the tenth week of class. The project will be evaluated based on demonstrated effort, thoroughness of initial research, attention to good experimental practices, careful implementation of the planned experimental methodology, and preparation of final presentation.
- 4) Individual written summary of the experiment. The paper must discuss prior research, goals, methodology, and results, and must include a brief bibliography of sources consulted. Since the experiment itself will be graded separately, the paper will be graded for its demonstrated effort, thoroughness, and clarity, independent of the relative success or failure of the experimental project.

Readings

- Bregman, Albert. *Auditory Scene Analysis: The Perceptual Organization of Sound*. Cambridge, MA: MIT Press, 1990.
- Cage, John. "Experimental Music: Doctrine." *Silence*. Middletown, CT: Wesleyan University Press, 1961, pp. 13-17.
- Chadabe, Joel. "The Great Opening Up of Music to All Sounds." *Electric Sound: The Past and Promise of Electronic Music*, chapter 2. New York: Pearson, 1996.
- Cope, David. *Experiments in Musical Intelligence*. Middleton, WI: A-R Editions, 1996.
- Copland, Aaron. "How We Listen". *What to Listen for in Music*, pp. 9-19. New York: McGraw-Hill, 1939.
- Croft, John. "Composition is not Research". *Tempo*, v. 16, pp. 6-11. Cambridge: Cambridge University Press, 2015.
- Dobrian, Christopher. "Musical Composition as Experiment (and vice versa)". Irvine: *Conversations on the Artistic Process*, 2012.
- Dobrian, Christopher. "A Method for Computer Characterization of 'Gesture' in Musical Improvisation". *Proceedings of the International Computer Music Conference*. Ljubljana: International Computer Music Association, 2012.
- Fennelly, Brian. "A Descriptive Language for the Analysis of Electronic Music". *Perspectives of New Music*, Vol. 6, No. 1, 1967, pp. 79-95.
- Helmholtz, Hermann. *The Sensations of Tone, as a Physiological Basis for the Theory of Music*. London: Longmans, Green, and Co., 1912 (originally published 1877).

- Hiller, Lejaren Arthur. "The Aesthetic Problem". *Experimental Music: composition with an electronic computer*. Westport, Conn.: Greenwood Press, 1979 (©1959), pp. 10-35.
- Holmes, Thom. *Electronic and Experimental Music: Pioneers in Technology and Composition*. New York; London: Routledge, 2002.
- Key, Susan and Rothe, Larry. *American Mavericks*. San Francisco; Berkeley: San Francisco Symphony, in cooperation with the University of California Press, 2001.
- Krumhansl, Carol. *Cognitive Foundations of Musical Pitch*. New York: Oxford University Press, 1990.
- Levitin, Daniel. "Experimental Design in Psychoacoustic Research." *Music, Cognition and Computerized Sound: An Introduction to Psychoacoustics*, chapter 23. Perry Cook, ed. Cambridge, MA: MIT Press, 1999, pp. 299-328.
- Levitin, Daniel. *This is Your Brain on Music: The Science of a Human Obsession*. New York: Dutton, 2006.
- Margulis, Elizabeth H. *On Repeat: How Music Plays the Mind*. New York: Oxford University Press, 2014.
- Nyman, Michael. *Experimental Music: Cage and Beyond*. Cambridge; New York: Cambridge University Press, 1999.
- Oliveros, Pauline. "On Sonic Meditation." *Software for People: Collected Writings 1963-1980*. Baltimore: Smith Publications, 1984, pp. 138-157.
- Peretz, Isabelle. "The nature of music from a biological perspective". *Cognition*, 100:1, May 2006, pp. 1-32.
- Russolo, Luigi. *The Art of Noises (futurist manifesto)*. New York: Something Else Press, 1967. (Originally published in 1913.)
- Sacks, Oliver. *Musicophilia*. New York: Alfred A. Knopf, 2007.
- Shaw, Gordon. *Keeping Mozart in Mind*. San Diego: Elsevier Academic Press, 2004.
- Xenakis, Iannis. *Formalized Music; Thought and Mathematics in Composition*. Hillsdale, NY: Pendragon Press, 1992. (Original English publication, Bloomington: Indiana University Press, 1971. Previously published as *Musiques formelles*, Paris, 1963.)
- Zbikowski, Lawrence. "Cross-Domain Mapping." *Conceptualizing Music: Cognitive Structure, Theory, and Analysis*, chapter 2. New York: Oxford University Press, 2002, pp. 63-95.
- Zorn, John. "The Game Pieces." *Audio Culture: Readings in Modern Music*. Christoph Cox and Daniel Warner, eds. New York: Continuum International Publishing Group, 2004, pp. 196-200.