

# Chapter 1. Meeting 1, Foundations: Music and Music Technology

## 1.1. Announcements

- 21M.380: Music Technology: Contemporary History and Aesthetics

## 1.2. An Intertwined History

- Since humans have made music with things other than the voice, technology and music have always been interrelated
  - Instruments and interfaces
  - Storing and communicating music
  - Conceptualizing and producing music
- Old problems repeatedly find new solutions
- New problems emerge, leading to new solutions
- New solutions cause new problems

## 1.3. Example: The Drum Machine

- Developed out of need to have auto-accompaniment for home organs
- Earliest solutions used transistors to produce poor imitations of drum sounds
- 1980: Roland TR-808 Rhythm Composer



Image courtesy of [dAvid](#) on Flickr.

- hobnox: Audiotool: Software recreation of hardware  
<http://www.hobnox.com/index.1056.de.html>
- New sounds were embraced by some, and influenced new musical styles
- The interface permitted a new way of thinking about rhythm and rhythmic cycles
- As others tried to solve this problem, new solutions emerged
- As new solutions emerged, musicians created new problems

## 1.4. Technology is Messy

- “Technology is messy and complex. It is difficult to define and to understand. In its variety, it is full of contradictions, laden with human folly, saved by occasional benign deeds, and rich with unintended consequences.”

“Yet today most people in the industrialized world reduce technology’s complexity, ignore its contradictions, and see it as little more than gadgets and as a handmaiden of commercial capitalism and the military. Too often, technology is narrowly equated with computers and the Internet ...” (Hughes 2004, p. 1)

- What is technology?

## 1.5. The Particular Problem of Technology in the Arts

- The arts have always exploited new technologies for new creative agenda
- Discrete measures of success or utility for individual artistic technologies do not exist
- Success or utility for individual technologies may not directly relate to the qualities or innovations of the technology
- Success may be more a result of the operator
- Success may be more a result of aesthetic criteria

## 1.6. Historical Considerations of Technology in the Arts: Benjamin

- Often a tension exists in the application of new technologies in the arts
- The mechanical reproduction of art works
  - Walter Benjamin (1936), “The Work of Art in the Age of Mechanical Reproduction”
  - Reproduction destroyed the “aura” of a work
  - Reproduction permitted a *democratization* of art
  - “Mechanical reproduction of art changes the reaction of the masses toward art. The reactionary attitude toward a Picasso painting changes into the progressive reaction toward a Chaplin movie. ... The conventional is uncritically enjoyed, and the truly new is criticized with aversion.”
- Reproduction reduces the acceptance of innovation, encourages homogeneity

## 1.7. Historical Considerations of Technology in the Arts: Russolo

- Often new technologies suggest new artistic forms
- The hope of new artworks through new technologies that transform society
  - Italian futurists in first decades of twentieth century: F.T. Marinetti, Umberto Boccioni, Giacomo Balla, Luigi Russolo
  - Luigi Russolo (1913), “The Art of Noises”
  - “In the nineteenth century, with the invention of the machine, Noise was born. Today, Noise triumphs and reigns supreme over the sensibility of men. ... To excite and exalt our sensibilities, music developed towards the most complex polyphony and the maximum variety, seeking the

most complicated successions of dissonant chords and vaguely preparing the creation of musical noise. This evolution towards ‘noise sound’ was not possible before now.”

- Technology makes new types of sounds and materials musical

## **1.8. Historical Considerations of Technology in the Arts: Les Paul**

- Guitarist, amateur engineer, tinkerer
- 1940s: experiments with adding and bouncing tracks in direct to disk recording
- 1948: produced “*Lover (When You're Near Me)*” album with this technique, combining up to 8 guitars
- Modifies an Ampex Model 300 mono tape recorder to record multiple individual tracks
- By 1953 develops first 8 track recorder
- Fundamentally changes approaches to recording and making music
- Experimentation and innovation by amateurs

## **1.9. The Inherent Sonic Ambiguity of Contemporary Music**

- Is there a necessary connection between what is heard and how it is made?
- Does it matter how the sounds we hear are produced? Do technologies (combined with techniques) contribute to the value of the final musical product?

## **1.10. Aesthetics**

- Can we make musical judgements independent taste?
- Can we make objective musical judgements?
- Cavell, after Kant: there is a difference between reasoned and supported arguments about aesthetic works and statements of personal taste, “a retreat to personal opinion” (Cavell 2002)
- Subjective observations (personal opinions) are valuable, but we can try to do more

## **1.11. Listening**

- What are we hearing, how was it made? What musical features are dependent on or independent of technology?

- Audio: Kid Koala, "Like Irregular Chickens."

## **1.12. Listening**

- What are we hearing, how was it made? What musical features are dependent on or independent of technology?
- Audio: Cage, "Sontata V"

## **1.13. 21M.380: Objectives**

- Gain a critical understanding of the recent history of music technology
  - Focus on innovations from the 19th century to the present
  - Focus on music and performances, and what roles technology plays
  - Learn specific technologies, musicians, innovators, and composers
- Develop critical listening skills from a wide range of musical traditions
- Develop ability to evaluate claims about aesthetic and technological advancement
- Gain hands-on experience and creativity with select music technologies

## **1.14. 21M.380: Prerequisites**

- Curiosity
- Experience in computer science, electronics, and music theory can be explored in individual projects

## **1.15. 21M.380: Four Divisions**

- Fundamentals
- Recording and distribution

- Instruments and interfaces
- Languages and representations
- Excluding: Generative music systems

### **1.16. 21M.380: Themes**

- A feedback system exists between technological development and musical innovation
- There is no necessary connection between a musical product and the means of musical production
- Technological and musical developments do not follow a linear path
- Musical devices are often coerced from other disciplines
- Musical technologies are often abstracted toward more general tools.
- Idiomatic uses of technological devices often result in innovative musical expressions

### **1.17. 21M.380: Course Meetings and Materials**

- Two types of meetings
  - Topic meetings: focused on material in readings, listening, and themes, combining lecture, discussion, demonstration, and listening
  - Discussion and workshop: focus on discussion, hands-on experimentation, and improvisation
- Materials for demonstration and exploration
  - Software: PD, Supercollider, Martingale, Audacity, and Freesound
  - Circuits: breadboards and ICs, small amplifiers, speakers, toys
  - Acoustic and mechanical constructions
- Lecture Notes
  - [Posted in OCW]

## 1.18. 21M.380: Assignments: Reading

- 1. Braun, H. 2002. *Music and Technology in the Twentieth Century*. Baltimore: The Johns Hopkins University Press.
- 2. Collins, N. 2009. *Handmade Electronic Music: The Art of Hardware Hacking*. 2nd ed. New York: Routledge.
- 3. Holmes, T. 2008. *Electronic and Experimental Music*. Third ed. New York: Routledge.
- Numerous additional readings from many disciplines.
  1. Bimber, B. 1990. "Karl Marx and the Three Faces of Technological Determinism." *Social Studies of Science* 20(2): 333-351.
  2. Brown, B. 1981. "The Noise Instruments of Luigi Russolo." *Perspectives of New Music* 20(1-2): 31-48.
  3. Collins, K. 2007. "In the Loop: Creativity and Constraint in 8-bit Video Game Audio." *twentieth-century music* 4(2): 209-227.
  4. Fouché, R. 2006. "Say It Loud, I'm Black and I'm Proud: African Americans, American Artifactual Culture, and Black Vernacular Technological Creativity." *American Quarterly* 58(3): 639-661.
  5. Ghazala, Q. R. 2004. "The Folk Music of Chance Electronics: Circuit-Bending the Modern Coconut." *Leonardo Music Journal* 14(1): 97-104.
  6. Horning, S. S. 2004. "Engineering the Performance: Recording Engineers, Tacit Knowledge and the Art of Controlling Sound." *Social Studies of Science* 34(5): 703-731.
  7. Lessig, L. 2005. *Free Culture*. New York: Penguin Books. Internet: <http://www.free-culture.cc/freeculture.pdf>.
  8. Loy, D. G. 1985. "Musicians Make a Standard: The MIDI Phenomenon." *Computer Music Journal* 9(4): 8-26.
  9. Nielsen, S. H. and T. Lund. 2003. "Overload in Signal Conversion." *AES 23rd International Conference*.
  10. Oswald, J. 1985. "Plunderphonics, or Audio Piracy as a Compositional Prerogative." *Wired Society Electro-Acoustic Conference*. Internet: <http://www.plunderphonics.com/xhtml/xplunder.html>.
  11. Pinch, T. J. and W. E. Bijker. 1984. "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other." *Social Studies of Science* 14(3): 399-441.

12. Roads, C. 1980. "Interview with Max Mathews." *Computer Music Journal* 4(4): 15-22.
13. Sousa, J. P. 1993. "Machine Songs IV: The Menace of Mechanical Music." *Computer Music Journal* 17(1): 14-18.
14. Sterne, J. 2006. "The mp3 as cultural artifact." *new media & society* 8(5): 825-842.
15. Walser, R. 1995. "Rhythm, Rhyme, and Rhetoric in the Music of Public Enemy." *Ethnomusicology* 39(2): 193-217.

### **1.19. 21M.380: Assignments: Listening**

- Listening assignments are critical
- Reading notation and scores are not required
- Take notes when you listen
- What to listen for: duration, instrumentation, method of production, recording or performance context, notable sonic events, form, temporal design and proportions, aesthetic or historical contexts, and/or critical and subjective responses

### **1.20. 21M.380: Assignments: Discussion Leader**

- Two students are assigned to cover reading and listening assignments for each class
- Must be available to lead discussion, answer questions, and provide a resource to class
- Must distribute minimal notes to the class.

### **1.21. 21M.380: Assignments: Music Technology Case Study**

- A research paper into the development, use, exploitation, or deployment of any musical technology
- Must, at least in part, employ approaches to investigating the aesthetic and cultural context and construction of the music technology.
- Complete draft: 3 November
- Final draft: 24 November (before Thanksgiving)

## **1.22. 21M.380: Assignments: Sonic System Project and Presentation**

- An original sonic system that functions as either an instrument with a performance interface or as a static or dynamic musical work
- May explore any software or hardware system or interface; can extend class examples or produce completely original works
- Includes a short written report describing approaches and design
- Preliminary demonstration: 12 November
- Final presentation: 3 December

## **1.23. 21M.380: Assignments: Submission**

- All assignments are submitted digitally via email attachment (or Forum posts)
- All assignments are due at 11:59:59 PM on due date
- Late within 1 week: 20% reduction; no assignments accepted after 1 week

## **1.24. 21M.380: Attendance**

- Mandatory and essential
- More than one unexcused absence incurs a 3% grade reduction

## **1.25. 21M.380: Exams and Quizzes**

- All short written answers
- Quizzes will be announced, and frequent
- Quizzes will be based on reading, listening, and course content

## **1.26. 21M.380: Grading**

- Reading and Listening Discussion Leader: 20%
- Music Technology Case Study: 25%
- Music Technology Case Study Draft: 5%
- Sonic System Project and Presentation: 20%

- Sonic System Project Draft: 5%
- Quizzes: 15%
- Participation: 10%

### **1.27. 21M.380: Additional Policies**

- Read entire syllabus
- Common courtesies
- Computers in class
- Academic integrity

### **1.28. 21M.380: Contact**

- Always feel free to contact me with any problem or concern with this class

### **1.29. Us**

- Backgrounds, experiences, goals

### **1.30. PureData and Martingale**

- There will be frequent demonstrations of sound and sound processes
- These will be done mostly in PureData (PD), also in Supercollider
- All PD and other code examples will be made available through an open source library called Martingale: <http://code.google.com/p/martingale>
- Those familiar with SVN can join and submit code

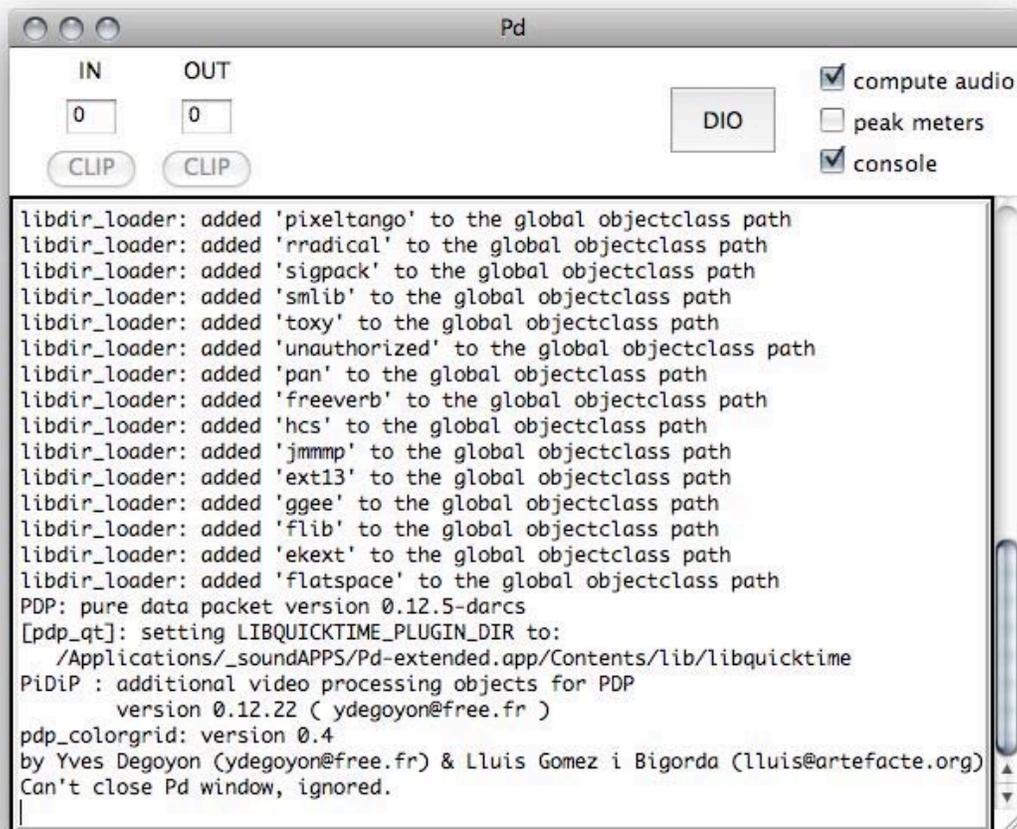
### **1.31. Downloading PD**

- Best to install on your own computer
- Processor performance matters: you may need to tune system

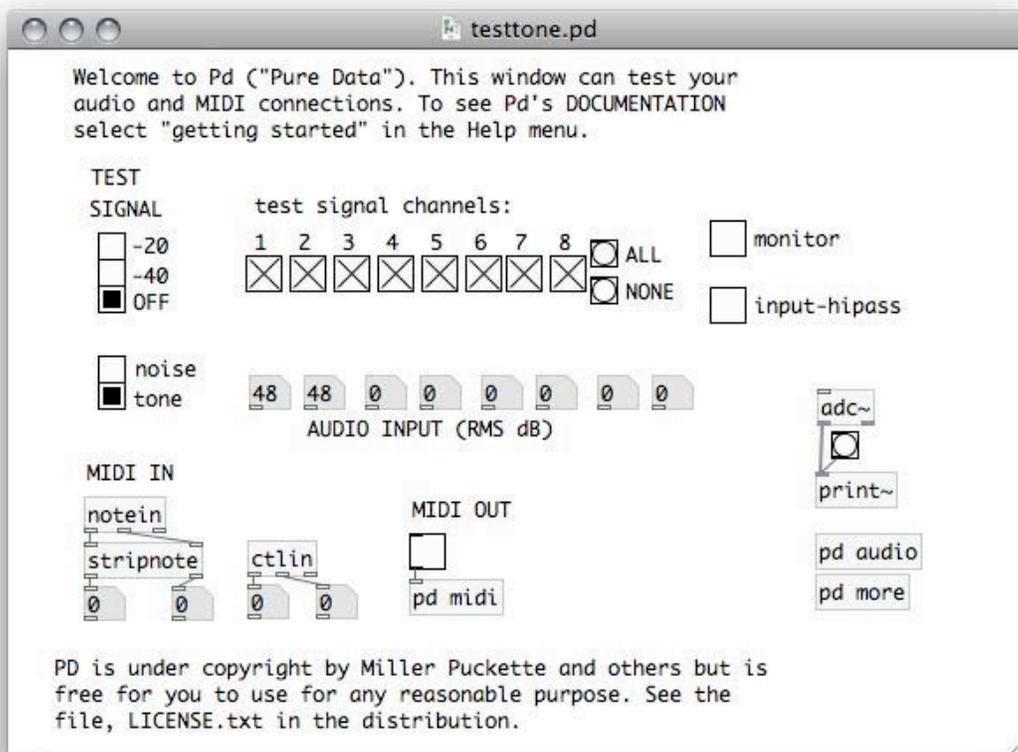
- Download PD-Extended for your platform: <http://puredata.info/downloads>

## 1.32. Installing and Testing PD

- Follow default install instructions (unless you know what you are doing)
- Open application; should see the “Pd window”



- Select: Menu: Media > Test Audio and MIDI



- Find “TEST SIGNAL”; click boxes next to -40, -20, listen (raise system volume, unplug headphones, etc.)
- If the tone is distorted, rough, or broken sounding, contact me
- If there is no sound, go to Menu: Preferences > Audio Settings
- Try to select a different “output device 1”
- If this fails, quit and repeat
- If this fails, contact me

### 1.33. Listening

- What are we hearing, how was it made? What musical features are dependent on or independent of technology?
- Audio: John Oswald, "Dab"

### **1.34. Listening**

- What are we hearing, how was it made? What musical features are dependent on or independent of technology?
- Audio: Aphex Twin, "Cock/Verlo"

### **1.35. Discussion Leaders**

- [Content removed for OCW publication]

### **1.36. For Next Meeting**

- Read *entire* syllabus
- Listening: only La Monte Young
- Reading: Holmes, Sousa
- Discussion leader assignments will go out via email

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