

## EDUCATOR GUIDE

Story Theme: Artist as Inventor  
Subject: Paul Dresher  
Discipline: Music

|  |    |
|--|----|
| SECTION I - OVERVIEW .....             | 2  |
| EPISODE THEME                          |    |
| SUBJECT                                |    |
| CURRICULUM CONNECTIONS                 |    |
| OBJECTIVE                              |    |
| STORY SYNOPSIS                         |    |
| INSTRUCTIONAL OBJECTIVES               |    |
| INSTRUCTIONAL STRATEGIES               |    |
| EQUIPMENT NEEDED                       |    |
| MATERIALS NEEDED                       |    |
| INTELLIGENCES ADDRESSED                |    |
| SECTION II – CONTENT/CONTEXT .....     | 3  |
| CONTENT OVERVIEW                       |    |
| RESOURCES – TEXTS .....                | 5  |
| RESOURCES – WEB SITES                  |    |
| DISCOGRAPHY                            |    |
| VIDEO RESOURCES                        |    |
| BAY AREA RESOURCES                     |    |
| SECTION III – VOCABULARY .....         | 9  |
| SECTION IV – ENGAGING WITH SPARK ..... | 11 |



Musician and instrument inventor Paul Dresher demonstrates his Quadrachord. Still image from SPARK story, February 2004.

## SECTION I - OVERVIEW

### EPISODE THEME

Artist as Inventor

### SUBJECT

Paul Dresher

### GRADE RANGES

K-12 and Post-Secondary

### CURRICULUM CONNECTIONS

Music

### OBJECTIVE

To introduce students and educators to the creative talents of Paul Dresher, the world of invented instruments and their function in contemporary music; to inspire students to consider the possibilities of expression through new music technology

### STORY SYNOPSIS

For 30 years Paul Dresher has been creating not only new music, but sometimes new instruments on which the music is performed. In this episode, Spark explores the electro-acoustic world of Paul Dresher – musician, composer and inventor of new instruments – as he prepares for a performance of a new work at Yerba Buena Center for the Arts.

### INSTRUCTIONAL OBJECTIVES

- To inspire students to consider the creative potential of newly invented instruments
- To introduce students to the work of Paul Dresher
- To challenge students to think “outside the box” of what is considered music
- To reveal how new music is composed and how technology plays a part
- To inspire students to consider technological sounds and acoustic sounds as compatible and part of the same compositional palette

### INSTRUCTIONAL STRATEGIES

- Individual and group research
- Individual and group exercises
- Written research materials
- Group oral discussion, review and analysis

### EQUIPMENT NEEDED

- TV & VCR with SPARK story about composer and musician Paul Dresher
- Computer with Internet access, navigation software, speakers and a sound card, printer
- Cassette player, CD player, or computer audio device and program

### MATERIALS NEEDED

- Access to libraries with up-to-date collections of periodicals, books, research papers and videos
- Different examples of contemporary music (see **Resource** section)

### INTELLIGENCES ADDRESSED

- Logical-Mathematical – the ability to detect patterns, reason deductively and think logically
- Spatial Intelligence – the ability to manipulate and create mental images in order to solve problems
- Musical – the ability to read, understand, and compose musical pitches, tones, and rhythms
- Bodily-Kinesthetic - the ability to use one’s mind to control one’s bodily movements
- Interpersonal – the ability to understand the feelings and motivations of others
- Intrapersonal – the ability to understand one’s own feelings and motivations



See more information on [Multiple Intelligences at www.kqed.org/spark/education](http://www.kqed.org/spark/education).

## SECTION II – CONTENT/CONTEXT

### CONTENT OVERVIEW

For more than thirty years, world renowned experimental musician and composer Paul Dresher has been fashioning remarkable instruments that help him push the limits of contemporary composition. Dresher employs his inventions in works that range from musical theater to contemporary opera to electronic chamber music to film and theatrical scores. SPARK visits the maestro at work as he prepares for an upcoming performance of new music at San Francisco's Yerba Buena Center for the Arts.

Dresher's instruments often begin by experimenting with found or scrap materials. The Quadrachord, one of his recent creations, began with a seven foot long plank of wood, onto which Dresher fastened guitar pickups and extended strings. A second version was made twice as long, and functions as a kind of a giant electric/acoustic slide guitar that can be plucked, bowed, or hammered.

Another such instrument is a giant metronome that Dresher created for his musical theater piece, Sound Stage. Rather than merely replicate a metronome at a colossal scale, Dresher built the massive instrument to produce a complex array of sounds. The finished metronome, which became the centerpiece of Sound Stage, features a box with two fifteen foot swinging pendulums that pluck the strings of a giant harp and strike a series of percussive objects.

With the Electro-Acoustic Band – a high-tech experimental ensemble he founded in 1993 – Dresher performs his own music as well as works of some of the most innovative composers of the last several decades. For their show at the Yerba Buena Center for the Arts, the ensemble tackles three new works by three different composers. It is a difficult task, demanding long rehearsal hours to iron out the bugs in the technology-dependent compositions. In the end the concert is a success, as Dresher and his band render the works sonically complex while emotionally haunting.

Paul Dresher received his BA in Music from UC Berkeley and his M.A. in Composition from UC San Diego, where he studied with Robert Erickson, Roger Reynolds, Pauline Oliveros and Bernard Rands. He has received commissions from numerous institutions, including the US Library of Congress, Saint Paul Chamber Orchestra, Kronos Quartet, San Francisco Symphony, Zeitgeist, Walker Arts Center, University of Iowa, Meet the Composer, and the American Music Theater Festival. Dresher has performed throughout North America, Asia and Europe, including concerts with the Munich State Opera and the New York Philharmonic. He has performed at numerous festivals, including the Festival d'Automne in Paris, Brooklyn Academy of Music's Next Wave Festival, Minnesota Opera, Arts Summit Indonesia '95, Festival Interlink in Japan, and several New Music America festivals. Dresher has also worked extensively with many choreographers to develop original music for dance performance, including Margaret Jenkins, Brenda Way (ODC Dance), Nancy Karp, Wendy Rogers, and Allyson Green.

(SPARK stories about Jenkins and Way can be found on the Web site at <http://www.kqed.org/spark/artists-orgs.>)



Paul Dresher rehearsing on one of his invented Quadrachord instruments. Still image from SPARK story, February 2005.

## THE BIG PICTURE

The history of musical instruments begins with experimentation. All instruments used today were developed by someone experimenting with a new idea, seeking a new sound or asking what was possible with certain materials. Whether stretching strings over a wooden box, blowing air through a reed, or hitting different objects to hear how they sound, generations of musicians have changed and adapted these instruments for their own purposes and creative ambitions. Today, a handful of music pioneers continue to invent new electronic and acoustic instruments, out of curiosity and the desire to find new sounds capable of expressing their compositional imaginings.

For Paul Dresher the concept of a piece of music can determine the kinds of instruments he invents. For Sound Stage, one of his ideas was that all of the instruments on stage should be large sized. This inspired Dresher to conceive a giant metronome whose swinging arm would generate sounds by striking different instruments with each pass. He then asked musicians to layer additional sounds overtop of the sounds of the metronome played on other invented or traditional instruments.

Alternately, Dresher also invents instruments by asking questions, such as “what would happen if we strung four strings over this really long piece of wood?” which is how he developed the Quadrachord. In performance, Dresher juxtaposed the acoustic Quadrachord with a sophisticated electronic marimba called the Marimba Lumina to create complex musical compositions. Developed by Donald Buchla, the Marimba Lumina is both a synthesizer and a MIDI, a Musical Instrument Digital Interface which enables musicians to record and play back music on the synthesizers. Together, these instruments create a wide array of acoustic and electronic sounds with which to experiment.

Composers, musicians and innovators across time have begun in similar ways. The earliest electronic instruments emerged between 1870 and 1915 and used a variety of techniques to generate sound, such as the tone wheel – an electro-magnetic tone generator. The tone wheel was a notched metal disk which rotated at the end of a magnetic rod. As the

wheel spun, the notches created variations in the magnetic field, creating an electrical voltage, whose fundamental musical tone was then amplified. The tone wheel was extant until the 1950s in the body of the Hammond Organ, which contained 86 of these tone wheels, each producing its own fundamental music tone.

The development of electronic instruments in the early 1900s coincided with the advent of the Futurist movement in Europe, a movement of artists who embraced and celebrated industry and innovation over traditional ideas and conventions. Composers associated with Futurism and others turned to the sounds of industry and machines as their aural palette, ushering in experimental music.



Paul Dresher and a colleague work on the large scale, eight foot Quadrachord.  
Still image from SPARK story, February 2005.

In 1906, American inventor Lee De Forest invented the vacuum tube, which quickly supplanted the tone wheel. Used primarily in radio technology, it was soon discovered that one could create sounds from the tubes by a process known as heterodyning. One of the most famous instruments to make use of this phenomenon was the theremin, created by Lev Theremin in 1917. The theremin became quite popular in the 1920s and 30s and ambitious composers took advantage of the new instrument to create works that showcased its amazing sound qualities. A purely melodic electronic musical instrument, the theremin is usually played by moving a hand between two projecting electrodes, creating sound peaks and drops depending upon the proximity to the electrodes. The theremin still has a

loyal following and modern versions are still being produced.

With the invention of integrated circuits in the 1960s, the vacuum tube became virtually obsolete. Engineers such as Robert Moog (inventor of the Moog Synthesizer in 1961) and Donald Buchla used this new technology to create a new generation of popular, easy to use electronic instruments called synthesizers, many of them designed at the request of specific composers seeking alternative instruments that could create completely new sounds that did not exist previously.

Buchla's early experimental synthesizers featured new control panels that were touch and resistance sensitive, a feature made more sophisticated on Buchla's Marimba Lumina, an electronic MIDI controller with a built in synthesizer and illuminated keys and pads that is played with special foam covered mallets.

To match the developments in technology, new genres of musical composition and experimental music emerged, including noise art, musique concrete, sound poetry, serialism, minimalism, and biofeedback, among others. Composers such as John Cage, Philip Glass and Paul Dresher soon had a vast array of new materials and ideas to choose from, and further expanded the exploration of instruments, both traditional and non-traditional by playing them in new ways and interweaving electric and acoustic sounds.

Philip Glass is well known for his minimalist compositions of the 1960s and 70s. As a compositional style, minimalism is focused on the purity and simplicity of sound, as expressed through the key characteristics of minimalist composition: the repetition of simple patterns, the making of subtle modulations in pitch and rhythmic patterning, and the phasing in and out different musical materials gradually over time.

Highly influenced by minimalism, Paul Dresher utilizes many different elements in his compositions, but draws from many different sources. He also uses contemporary digital synthesizers that run on computer software, and MIDI systems that enable the musicians to sample sounds from the acoustic world

and process them digitally, looping, changing and combining sounds in virtually endless combinations.

By combining the most recent technology with his own inventions and working with musicians who are highly skilled at both acoustic and electronic music, Dresher has created over the course of 30 years, a unique performing ensemble that can execute even the most demanding scores, continually expanding the definition of experimental music.

*(See also the SPARK Educator Guides on the Klein String Competition for a history of the stringed instruments, and the Guide on Loren Chasse for a history of sound art at <http://www.kqed.org/spark/education/lessonplans/125.pdf>.)*

## RESOURCES – TEXTS

Cage, John. Silence. Cambridge: MIT Press, 1961.

Chadabe, Joel. Electric Sound: The Past and Promise of Electronic Music. New Jersey: Prentice Hall, 1998.

Duckworth, William. Talking Music: Conversations with John Cage, Philip Glass, Laurie Anderson, and 5 Generations of American Experimental Composers. Da Capo Press, 1994.

Glass, Philip. Music by Philip Glass. Da Capo Press, 1987.

Glass, Philip. Singing Archaeology: Philip Glass's Akhnaten. Wesleyan University Press, 1999.

Goldberg, R. ,Thames and R. Hudson. Performance Art – From Futurism to the Present. London, 2000.

Hopkin, Bart. Musical Instrument Design: Practical Information for Instrument Design. See Sharp Press.

Kahn, Douglas. Noise, Water, Meat: A History of Sound in the Arts. MIT Press, 1999.

LaBelle, Brandon & Steve Roden. Site of Sound: of Architecture & the Ear. Smart Art Press, 1998.

Nyman, Michael. Experimental Music: Cage and Beyond. Cambridge University Press, 1999.

Russolo, Luigi. The Art of Noises. Pendragon Press, 1986.

## RESOURCES – WEB SITES

The Paul Drescher Ensemble Web Site, with company history, performance schedule, and complete works listings. Purchases of Drescher's CD's, videos, books and scores are available through the Web Site.

<http://drescherensemble.org>

New Albion – Paul Drescher's record label -

<http://www.newalbion.com/artists/dresherp>

Home Theater HiFi – A music Web site including a 2004 article on Paul Drescher by Jason Victor Serinus -

[http://www.hometheaterhifi.com/volume\\_11\\_4/feature-interview-paul-drescher-11-2004.html](http://www.hometheaterhifi.com/volume_11_4/feature-interview-paul-drescher-11-2004.html)

ArtsSF – A San Francisco-arts dedicated Web site, including an article on Paul Drescher by Paul Hertelendy from 2004 -

<http://www.artssf.com/drescher0731.html>

London Musicians Collective – A rich music Web site, including an article by Hugh Davies on Luigi Russolo, an instrument inventor affiliated with the Futurist movement at the turn of the 20<sup>th</sup> century -

<http://www.l-m-c.org.uk/texts/russolo.html>

Don Buchla's Web Site – Inventor of electro-acoustic instruments and synthesizers, Berkley's own Don Buchla created the Marimba Lumina featured in this Spark story on Drescher - <http://www.buchla.com>

New World Records – Published liner notes for Opposites Attract by Paul Drescher -

<http://www.newworldrecords.org/linernotes/80411.pdf>

Oddmusic – A Web site dedicated to unique, ethnic, and experimental musical instruments and music. Worth a look/listen just to see what is out there -

<http://www.oddmusic.com/gallery>

Obsolete – A Web site chronicling the 120-year history of electronic music, including a good bibliography and links to electronic instrument manufacturers, musicians, and instruments throughout the history of electronic music.

[http://www.obsolete.com/120\\_years](http://www.obsolete.com/120_years)

Philip Glass Web Site – Including a biography, complete works listing, ongoing performances of his work and more - <http://www.philipglass.com>

Transbay Creative Music Calendar – Event listings for experimental, improvised, noise, electronic, free-jazz, avant-garde, modern composition, and other forms of contemporary sound in the San Francisco Bay Area – <http://www.transbaycalendar.org>

Wind World – Web Site for an organization dedicated to unusual and interesting invented musical instruments of all kinds, including their journal and back issues, plus resources and links -

<http://www.windworld.com>

## DISCOGRAPHY

### Paul Drescher's Discography

A Little Girl Dreams of Taking The Veil. 2000. -

Acclaimed studio recording of Erling Wold's chamber opera based on the Max Ernst collage novel.

Cage Machine. New Albion Records, 2004.

Ten years of Paul Drescher's innovative, industrial strength "chamber music with a clang." Released on the prestigious New Albion label, the CD celebrates Drescher's unique musical language and vision.

Casa Vecchia. Starklkand, 1995. - This 1995 CD is a collection of four of Paul Drescher's electro-acoustic and chamber works: Underground (tape), Other Fire (tape), Mirrors (for electric bass and live electronics) and the title cut, Casa Vecchia, a string quartet commissioned by the Kronos Quartet and recorded as a double quartet by Ensemble 9 from Vienna.

Dark Blue Circumstance. New Albion Records, 1993.

– A retrospective of chamber music composed by Paul Drescher between 1979 and 1992, containing Double Ikat, Dark Blue Circumstance, Channels Passing and Night Songs.

Immersion. Compilation of different artists. 2002.

Contains Steel, Drescher's tape composition for Surround Sound and other works. This was the first commercially released DVD Audio recording.

Opposites Attract, New World Records, 1991, 80411

Ravenshead. Minimax, 1998. - Composer Steve Mackey and Librettist's Rinde Eckert's one man tour-de-force opera commissioned by the Paul Drescher

Ensemble and performed by Rinde Eckert and the Ensemble's Electro-Acoustic Band

Slow Fire. Minimax, 1992. - A high quality studio recording of the first work in the Paul Dresher Ensemble's "American Trilogy."

### **Other suggested listening**

Laurie Anderson; Laurie Anderson: Life on a String. Nonesuch, 2001.

Laurie Anderson; Home of the Brave. Warner Bros. Records, 1986.

Luigi Russolo; Risveglio di una Citta, Futurism and Dada Reviewed, " sub rosa records.

Edgard Varèse; Poème Électronique, Music of Edgard Varèse, Sony Music

Karlheinz Stockhausen; Studie II, Stockhausen (3): Elektronique Music, Stockhausen Verlag; Kontakte

John Cage; Cartridge Music, John Cage: Music for Merce Cunningham. Mode Records

Phillip Glass; Uakti – Aguas da Amazonia. Point Music, 1999.

Philip Glass; The Essential Philip Glass. Sony Masterworks, 1993

Steve Reich; Music for Mallet Instruments, Voices and Organ - 1973  
Music for Pieces of Wood - 1973  
Music for 18 Musicians - 1974

### **VIDEO RESOURCES**

Ravenshead Video [VHS] Composer Steve Mackey and Librettist's Rinde Eckert's one man tour-de-force opera commissioned by the Paul Dresher Ensemble and performed by Rinde Eckert and the Ensemble's Electro-Acoustic Band. Premiered in Nov. 1998, it is based on the a true story of Donald Crowhurst, a man who in 1968 attempted to be the first to sail solo & non-stop around in the world. Rinde's writing and performance are nothing short of astonishing. Shot live at the premiere.

Slow Fire (original one-act version - 1985) [VHS] First performed as a one-act opera, this video of Slow Fire reveals the original version which was presented by the New York Philharmonic and Minnesota Opera. Shot and edited by Target Video, 35 minutes.

Slow Fire. (Final two act version, 1988) [VHS – 75 minutes] - A live performance taping from the Cowell Theater in San Francisco in June 1992. Composed by Dresher, written and performed by vocalist/actor extraordinaire Rinde Eckert and directed by Richard E.T. White, this work is considered a masterpiece of multi-disciplinary collaboration and has been performed over 200 times throughout the US and Europe.

Sound Stage. [VHS – 76 minutes] Excellent quality video of Dresher's 2001 music-theater work with a set made entirely of invented musical instruments. Performed by the renowned Minneapolis-based new music ensemble Zeitgeist and Paul Dresher.

Theremin: An Electronic Odyssey. Orion Classics. 1995. – A documentary on theremin inventor, Lev Theremin.

Was Are/Will Be Video (1985) [VHS - 18 minutes] - A professional video of Dresher & Eckert's very first collaborative work, from early 1985, it is a work that led directly to their seminal work Slow Fire.

### **BAY AREA RESOURCES**

Aquarius Records  
1055 Valencia Street  
San Francisco 94110.  
415.647.2272  
<http://www.aquariusrecords.org>

ACME Observatory @ The Jazz House  
3192 Adeline  
Berkeley, CA  
510.649.8744  
<http://sfsound.org/acme.html> & [acme@sfsound.org](mailto:acme@sfsound.org)  
<http://www.thejazzhouse.org>

Beanbender's  
2295 Shattuck Avenue (at Bancroft Way)  
Berkeley, CA  
415.621-1967

Center for Contemporary Music  
Mills College  
5000 MacArthur Blvd.  
Oakland, California 94613-1399  
510.430.2187  
[http://www.mills.edu/academics/undergraduate/music/center\\_contemporary\\_music.php](http://www.mills.edu/academics/undergraduate/music/center_contemporary_music.php)

*\* One of the country's foremost contemporary music programs, including regular public performances*

The Luggage Store  
1007 Market Street (near 6<sup>th</sup> Street)  
San Francisco, CA 94103  
415.255.5971  
The Store's Music Series features experimental and improvisational music programs –  
<http://www.luggagestoregallery.org>

Stork Club  
380 12<sup>th</sup> Street  
Oakland, CA 94607  
510.835.6305

Yerba Buena Center for the Arts  
701 Mission Street (at 3<sup>rd</sup> Street)  
San Francisco, CA 94103  
415.978.ARTS(2787)  
<http://www.yerbabuenaarts.org>

## SECTION III – VOCABULARY

### DISCIPLINE-BASED VOCABULARY AND CONCEPTS IN THE SPARK STORY

**A-Frame**

A building which has a roof that reaches the ground like the letter “A”

**Bow**

A rod that is strung with horse hairs tightly attached to its two raised ends and then used to play instruments in the viol family

**Collapsible**

That which can be collapsed, or folded compactly

**Commission**

In the arts, the act of being granted certain authority and the funds to create a new work

**Controllers**

On a Musical Instrument Digital Interface (MIDI)- a protocol designed for recording and playing back music on digital synthesizers that is supported by many makes of personal computer sound cards, a controller is a bar, pad or strip that one strikes or touches to send a signal to the brain of the instrument to control pitch, volume, timbre, panning, virtually anything it is programmed to do.

**Cutting-Edge**

Being contemporary or avant-garde

**Din**

An accumulation of simultaneous noises and sounds

**Emotional Depth**

The quality of having profound connections on an emotional level

**Erector Set**

A construction set

**Foot Pedals**

On musical instruments such as organs, pianos, vibraphones and some electronic instruments, foot pedals are used to control aspects of the production of the sound of the instrument, and are operated by the feet

**Harmonic Sense**

The quality of having good structure, progression and relation of the chords in a piece of music

**Iniquity**

Wickedness, sinfulness

**Innovation**

Something newly created and introduced

**Integrate**

To make whole by bringing all parts together, to unify

**Inventor**

Someone who creates or produces things from their own imagination

**Millennia**

The span of one thousand years

**Quadrachord**

An instrument invented by Paul Dresher with four strings stretched across a 14-foot long piece of wood

**Metronome**

A mechanism which sounds a constant pulse whose tempo can be changed according to the desired speed, which is used in music to keep time while practicing music

**Minimalism**

A genre of music that emerged in the 1960's, and featured a simplified approach to composition, focusing on the key characteristics of minimalist composition: the repetition of simple patterns, the making of subtle modulations in pitch and rhythmic patterning, and the phasing in and out different musical materials gradually over time.

**Music Technology**

The use of electronic instruments or technology in both composition and execution of musical works

**Musical Theatre**

A type of performance art which combines music with a theatrical work, though unlike opera in that not all the dialogue need be sung

**Pendulum**

An object suspended from a fixed support so that it swings freely back and forth under the influence of gravity

**Recycle**

To use again or to reprocess in order to use again

**Resonator**

A hollow chamber or cavity with dimensions chosen to allow internal resonant oscillation of electromagnetic or acoustical waves of specific frequencies

**Synthesizer**

A machine having a simple keyboard and using solid-state circuitry to duplicate the sounds of musical instruments

**Tenacious**

Persistent, holding firmly

## SECTION IV – ENGAGING WITH SPARK

### STANDARDS-BASED ACTIVITIES AND DISCUSSION POINTS

(Also see the SPARK story on Loren Chasse and sound art for more activity ideas at <http://www.kqed.org/spark/artists-orgs.>)

#### **Discussion on minimalism**

Select some of the listening samples from the discography from Paul Dresher and traditional minimalists such as Philip Glass. Facilitate a discussion on how mood and emotion are established through the music. Examine how repetition and phasing of musical elements create tension and also set an emotional tone to the music. What are their general reactions? Ask the students how the music makes them feel. Discuss its relationship to the minimalist movement in visual art. Examine the history behind minimalism, its development and perhaps where it is going.

#### **What would happen if...**

Paul Dresher says one of his inspirations for creating musical instruments is his fascination with sound, and the idea of creating complex sounds from very simple beginnings. All instruments start as experimentations asking the question of “what would happen if...” For instance, what would happen if we stretched these gut strings across a piece of wood and plucked them? What happens if we bow the strings? Over time, the violin and cello were evolved. Using this question as a basis for an in-class experiment, create new instruments based on materials you find in the classroom or in the school’s recycling bin. Have students consider different aspects of sound principles before creating the instrument. What is the concept of the music they want to create? Do you want the music to sound scary or happy? Angry? Frantic? Use terms like frequency, timbre, dynamics, intensity, and tension to establish the basis for the kind of sounds you want to achieve. Then go looking for the kinds of materials you think will create that sound. Keep in mind that new instruments are not intended to be replications of traditional instruments or copying their sounds. Rather, they are unique in their own capacities for sound production.

#### **Conduct your new ensemble**

Using the previous exercise as a starting point, create compositions in the classroom using the new instruments. Have students alternate being the composer and/or conductor – directing the other students who are playing their instruments. For advanced levels, and if the facilities exist at your school, try creating a composition that involves technology as well as the acoustic instruments. If possible, use synthesizers or other electronic instruments and technology, such as previously recorded environmental sounds or computer generated and sampled sounds.

#### **Research on electronic instruments**

Split the class into different groups and have each group take on a period of time to research in the history of electronic instruments, using the resource list as a starting point. Have each group present their findings in the form of an oral presentation with audio samples of the music they find. Include a detailed discussion of the acoustic and physical attributes of each of the instruments they discover, such as the theremin, tone wheels, heterodyning, vacuum tubes, the first synthesizers, MIDI, etc. Challenge students to present a visual presentation as well to help explain the physical action of the electro-magnetic fields or sound waves or other acoustic functions.

#### **SPARKLERS**

- What will music be like in 50 years? After viewing the Spark episode, what do students think the future of music holds? What was it like 50 years ago and how has it changed today?
- Watch the movie “The Triplets of Belleville” and notice how the triplets use unusual “instruments” to create interesting interlocking rhythmic patterns, such as a newspaper, a vacuum cleaner,

the spokes of a bicycle, etc. Be inspired to find sounds in your environment to make music!

- Composers write music for all kinds of circumstances – Paul Drescher has collaborated with dance choreographers such as Margaret Jenkins (see Spark episode #4 of this season) as well as composed works for musical theatre and film, and minimalists such as Philip Glass have composed scores for movies such as Koyaanisqatsi and Powaqqatsi. Consider some of the different avenues that are open to composers besides the traditional orchestral score.
- In movies, the musical score has a great impact on how we as the audience perceive the moment. In such movies like Koyaanisqatsi or Powaqqatsi, which have no dialogue but are only visual segments with musical score, the viewer is left with different ways of how to interpret what he/she is seeing. Consider the following questions:

How does this non-verbal way of presenting an artistic work impact the viewer?  
What is the point of view? Is there one?  
How is the point of view presented and augmented by the musical score?  
What would happen if you took away all the sound of a film and watched it silently? How does your perception or mood change?  
Are the images fact or fiction?  
Based on what you are seeing, what do students think the lives of those people are like?

### Thinking about performance art

Assemble a collection of different video samples of Paul Drescher’s performance art work from the resource section. Watch the Spark episode on Paul Drescher and freeze the frame on the segment in which we see giant pendulum on stage as part of the Sound Stage performance. Have students take notes on what they see and hear. Encourage them to analyze all aspects of the performance, including the set, the music, the costumes and the action of the performers.

Extend this exercise to a longer performance from one of the videos. Direct a discussion on performance art and its potential as a vehicle for expression. Examine not only the execution of the

piece but its content and message. What does the piece say to individual students? How are their interpretations similar or different? Was the composer’s intention clearly demonstrated? What was left to personal interpretation? What do they like or not like? Encourage them to use constructive criticism, such as:

The music in \_\_\_ part made me feel \_\_\_\_\_.  
I was a little confused by \_\_\_\_\_ part.  
What really caught my eye was \_\_\_\_\_.  
The use of silence was \_\_\_\_\_.

#### RELATED STANDARDS

##### SCIENCE

Grades 9-12, Physics

Waves

4d - Students know sound is a longitudinal wave whose speed depends on the properties of the medium in which it propagates.

Electric and Magnetic Phenomena

5d – Students know the properties of transistors and the role of transistors in electric circuits.

5f – Students know magnetic materials and electric currents (moving electric charges) are sources of magnetic fields, and are subject to forces arising from the magnetic fields of other sources.

5g – Students know how to determine the direction of a magnetic field produced by a current flowing in a straight wire or in a coil.

5h – Students know changing magnetic fields produce electric fields, thereby inducing currents in nearby conductors.

#### RELATED STANDARDS

##### MUSIC

Grade 2 – Artistic Perception, Aesthetic Valuing

Standard 1.0 - Listen to, Analyze, and Describe Music

1.3 Identify ascending/descending melody and even/uneven rhythm patterns in selected pieces of music.

Standard 4.0 - Derive Meaning

4.3 Identify how musical elements communicate ideas or moods.

Grade 6 – Aesthetic Valuing

4.2 Explain how various aesthetic qualities convey images, feeling or emotion

4.3 Identify aesthetic qualities in a specific musical work.

Grades 9-12, Advanced – Aesthetic Valuing

4.1 Compare and contrast how a composer’s intentions result in a work of music and how that music is used.

For more information about SPARK and its educational content, including the Visual & Performing Arts Standards, visit the Web site at <http://www.kqed.org/spark/education>.



For more information about the California Visual & Performing Arts Standards, visit the CA Dept. of Education at <http://www.cde.ca.gov/be/st/ss/index.asp>.