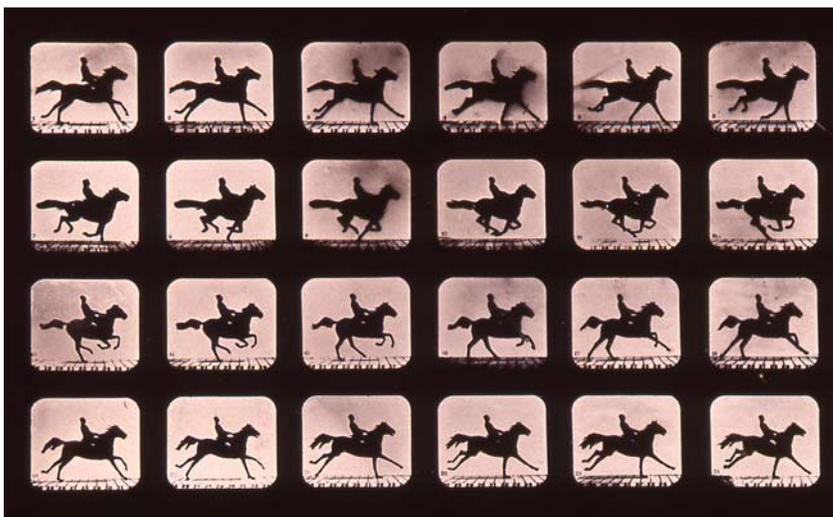


# Eadweard Muybridge, Harold Edgerton, and Beyond:

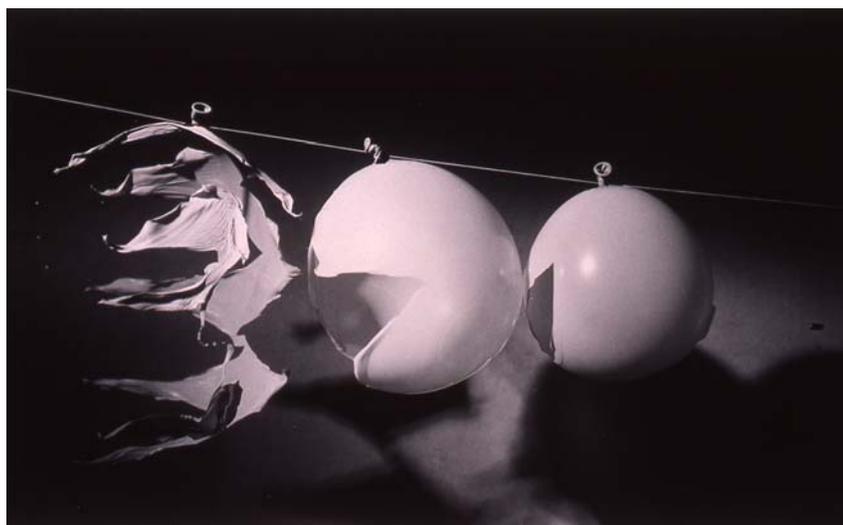
## *A Study of Motion and Time*

Eadweard Muybridge, *Plate 38. Horses, Running, Hattie H.*, 1881, from *The Attritudes of Animals in Motion*, albumen print, 6 1/4 in. x 8 13/16 in., partial gift of The Beinecke Foundation, Inc., Addison Gallery of American Art, Phillips Academy, Andover, MA



## Teacher Guide

### Fall 2008 Workshop Session 1: *Seeing Faster*



Harold Edgerton, *Bulter through balloon*, neg. 1959, print 1981, gelatin silver print, 18 7/8 in. x 11 3/8 in., museum purchase, Addison Gallery of American Art, Phillips Academy, Andover, MA

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Eadweard J. Muybridge, *Catonwood Bend, Valley of the Yosemite*, 1872, mammoth-plate albumen print, 16 13/16 in. x 21 1/8 in., museum purchase, Addison Gallery of American Art, Phillips Academy, Andover, MA

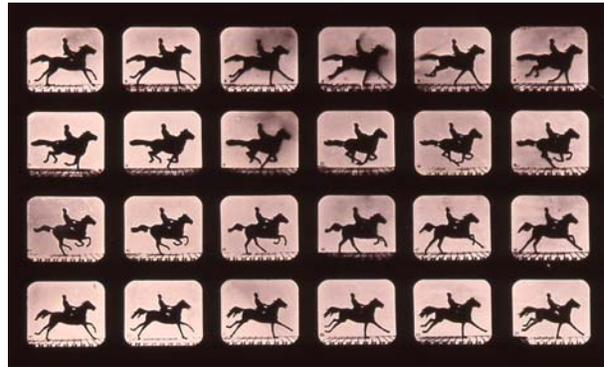


## Eadweard Muybridge (1830-1904)

Throughout his career, photographer Eadweard Muybridge focused his lens on change. From his photographs of the newly settled American West to his expeditions with the U.S. War and Treasury Department documenting the resources of the newly acquired Alaskan Territory, Muybridge developed a masterful way of picturing the grandeur of the evolving landscape.

Capturing change led to capturing motion. As the story goes, in 1872, Leland Stanford, the former governor of California, made a bet with a friend that when a horse gallops, all four hooves leave the ground at once. Up until this point, horses were depicted

visually in the “rocking horse” position. Stanford hired Eadweard Muybridge to test his theory. Muybridge set up twelve cameras along the racetrack at Stanford's horse farm. He attached a string to the shutter of each camera and ran the strings across the track. As the horse came down the track it snapped each string, setting off the shutters one by one. Thus, Muybridge confirmed that indeed all four of a horse's hooves do leave the ground. Not only did Stanford win his supposed bet, but perception of motion—and the arts—were changed forever.



Eadweard Muybridge, *Plate 38, Horses, Running, Hattie H.*, 1881, from *The Attitudes of Animals in Motion*, albumen print, 6 1/4 in. x 8 13/16 in., partial gift of The Beinecke Foundation, Inc., Addison Gallery of American Art, Phillips Academy, Andover, MA

Muybridge's investigation turned into a comprehensive exploration of motion. His legacy of 186 plates (each plate featuring one animal or human action) comprising the *Attitudes of Animals in Motion* series from 1881 and the 781 plates in the *Animal Locomotion* series from 1887 are still influencing science and art today.

Harold Edgerton, *Bullet and Apple*, from *Seeing the Unseen*, c. 1964, photograph, 14 in. x 11 in., gift of Stephen C. Sherrill (PA 1971), Addison Gallery of American Art, Phillips Academy, Andover, MA



## Harold Edgerton (1903-1990)

Much of Harold Edgerton's 63-year career at the Massachusetts Institute of Technology in Cambridge centered on a single idea – making the invisible visible. He devoted his career to finding ways to see what the naked eye cannot; and, like Eadweard Muybridge, his determination to be a problem-solver turned him into an inventor. He succeeded in photographing occurrences too bright or too dim, or that moved too quickly or too slowly, to be captured with photographic technology of the time. Using bright flashes of light similar to today's strobe light effect, he was able to extend the scientific tradition of Muybridge's work to capture images that allow us to analyze motion in imperceptibly small increments of time.

## And Beyond: How to Use This Packet

This packet contains curriculum connections based on themes of time and motion. Let us help you to use them to:

- Enhance lessons that you are already teaching in your classroom in the areas of science, math, language arts, history, social studies, and/or art.
- Plan a class visit to our Photography Study Studio to see selections from the Addison's photography collection
- Develop a photography & writing or other arts-based project for your class(es)

## Photography & Writing Project Themes and Curriculum Connections

### Exploring Time

- Why and how do we measure time?
- How can we tell by looking at a sequence of images how much time has passed between the scenes depicted?
- What changes would we notice if we photographed a tree over the course of a day? over the course of the year?

Choose a subject whose change over time you would like to document, such a plant, animal, or tree, a person. Photograph the subject over the course of time and write the changes that you observe as you go. As a conclusion, write what you have learned from close observation of your subject over time. Explorations can complement the study of the solar system, weather, the seasons, ecology, plant growth, animal and insect development, and more.



Eadweard J. Muybridge, *Plate 535, Movement of the Hand: Beating Time*, from *Animal Locomotion*, 1885, collotype on paper, 9 7/16 in. x 11 3/4 in., gift of the Edwin J. Bennecke Trust, Addison Gallery of American Art, Phillips Academy, Andover, MA

*How does this Muybridge image show the passing of time? How does an orchestra conductor mark the passing of time with his hands?*

### Exploring Your Community

- What can you learn about your community by photographing it over time?
- What changes would you see in one location at your school, in your neighborhood, or in your town/city center if you photographed it every day for a week? or every week for a month? or every month for a year?
- What might you notice if you photographed the same site at different times of the day?



Select a location to which you have a personal connection and can easily get to over the course of a day, week, month, or year. How would you position yourself in that place to make a series of photographs that would show its changes over time? From the photographs, write all of the changes that you notice throughout the sequence. Then write what you learned about that place that you did not know before you photographed it.

William Christenberry, *The Soul Wheel, Greensboro, Alabama, 1977*, incorporated color coupler print on paper, 3 5/16 in. x 4 7/8 in., museum purchase, Addison Gallery of American Art, Phillips Academy, MA

*William Christenberry has been returning to the same area where he grew up in Alabama every year for nearly forty years. Soul Wheel is one of nearly twenty photographs that he made of buildings on one site in Greensboro from 1967 to the present. He uses his camera—and also painting, drawing, and sculpture—to understand his strong connection to the places he photographs. How do Christenberry's photographs show changes over time? How do they show his connection to his community? How do they give us a sense of this area of the country?*

## Science Curriculum Connections

### How Does Art Produce Science? How Does Science Produce Art?

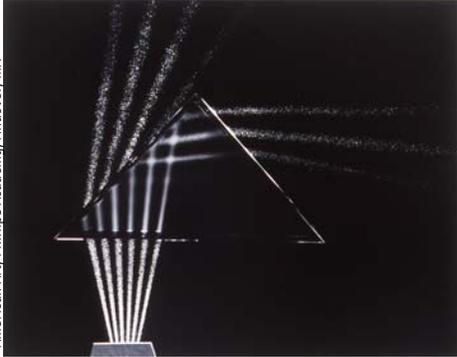
In order to create his motion studies, Eadweard Muybridge had to invent the proper camera setup to capture the sequence of actions. Harold Edgerton developed a flash system to photograph very small fractions of a second. Both invented the technology necessary to produce their art, and ultimately impacted the development of art and science.

- How did Muybridge's and Edgerton's technology influence their photography and vice versa?
- What are other ways in which science and art have mutually influenced each other?

Students can research innovative technologies that have influenced photography and/or art in general and present their findings.

*Did Berenice Abbott take this photo to see what happens when light refracts off glass (art producing science) or because she thought the scientific phenomenon would be visually interesting (science producing art)?*

Berenice Abbott, *Beams of Light Through Glass*, from *The Science Pictures*, 1982, gelatin silver print, 15 3/8 in. x 19 3/8 in., purchased as the gift of Vito S. Portera, Addison Gallery of American Art, Phillips Academy, Andover, MA



### Longitudinal Studies

- How is time measured in a longitudinal study?
- What types of charts and graphs are used to depict time?

How can we use photography in a longitudinal study? Choose a subject to observe over time by photographing it in regular intervals. What would happen if you superimposed these images through projection? What information does this method give you? What other methods can we use? Explorations can complement the study of plants growing, leaves changing, seasons changing, mold growing, eggs hatching, caterpillars turning into butterflies, and more.

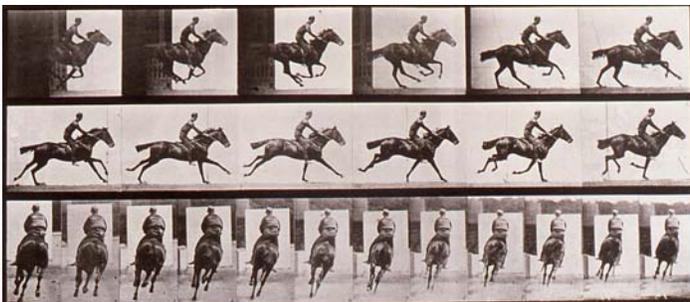
*How could we use photographs, such as Matthew Pillsbury's, to tell which exhibitions in a museum are visited most frequently throughout the day? What else can we learn from this image?*



Matthew Pillsbury, *Wyoming Diplodocus #2*, Natural History Museum, London, 2007, 2007, pigment ink print, 37 1/2 in. x 44 in., purchased as the gift of J. Mark Rudkin, Addison Gallery of American Art, Phillips Academy, Andover, MA

### Variables in Motion

Reenact a Muybridge *Motion Study* by having at least five students stand in a row, shoulder to shoulder, with cameras. Have one student walk past the row, and each of the photographers take a picture as the subject passes. (Remind the photographers to remain facing forwards and not move their bodies to follow the motion.) What can you learn from each picture on its own? from all five pictures as a series? Experiment with the number of photographers, a variety of moving subjects, the space between photographers, and the speed of the subject. What other variables can you test? Make a chart with your photo sequences and your observations about them.



Eadweard J. Muybridge, *Plate 633. Gallop; Saddle; Thoroughbred Bay Horse Bouquet*, from *Animal Locomotion*, 1885, collotype on paper, 7 1/4 in. x 16 7/16 in., gift of the Edwin J. Beinecke Trust, Addison Gallery of American Art, Phillips Academy, Andover, MA

What can you learn from each picture on its own? from all five pictures as a series? Experiment with the number of photographers, a variety of moving subjects, the space between photographers, and the speed of the subject. What other variables can you test? Make a chart with your photo sequences and your observations about them.

*Which viewpoint in this Muybridge Motion Study gives you the most information about a running horse? Which most effectively shows the speed of the horse? How does the photographer's shifting position give more information about the horse's movement?*

## History & Social Studies Connections

### Past + Present

Before his motion studies, Muybridge took advantage of the public thirst for images of the newly settled American West. He began by photographing San Francisco and views of Yosemite Valley and later, in 1886, documented government expeditions to explore the natural resources of recently acquired Alaskan Territory, and other industrial construction projects for government agencies.



*In 1877, Muybridge climbed with his cumbersome camera to the top of California Street in San Francisco to make a 360-degree panorama of the city. In 1990 Mark Klett re-photographed the same scene from nearly the same location.*



*What do Muybridge's and Klett's panoramas (three out of eleven Muybridge panels and out of twelve Klett panels shown here) tell us about the span of time that passed between 1878 and 1990? What can we learn about the earthquakes and fires and the urban development in San Francisco between the two dates? How do the two panoramas display the advances in both technology and photography between Muybridge's and Klett's time?*

Top: Eadward J. Muybridge, *Panorama of San Francisco, From California Street Hill* 1877, eleven albumen prints bound together, 13 1/8 in. x 9 3/8 in. x 1 1/4 in., museum purchase. Bottom: Mark Klett, *(panel 1), (panel 2) and (panel 3), Panorama of San Francisco from California Street Hill*, 1990, gelatin silver print, 20 in. x 16 in., purchased as the gift of the Edward S. Moore Foundation, Inc. Both: Addison Gallery of American Art, Phillips Academy, Andover, MA

Have students research local sites and find images of those sites from the past. Compare older images to students' memory of the sites now, and then visit the sites to make current observations. Take photographs of the sites for comparison. Students can prepare an essay, an exhibition, or a presentation considering the following questions:

- How did the historical image compare to the image in your memory?
- How did the image in your memory compare to the current site?
- How did the current site compare to the historical image?
- How has the location changed? Is it more rural?  
More industrial? More urban?

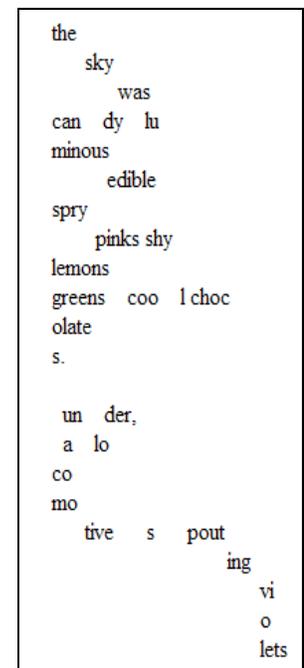
## Language Arts Connections

### Concrete & Visual Poetry

- What are words that imply motion?
- What words feel fast? slow?
- What words bounce?
- How can we show, rather than tell, with words?

Introduce students to concrete poetry, where the arrangement of words is as important in conveying the intended effect as the conventional elements of the poem. Look at works by e.e. cummings and other authors for inspiration. Then write your own concrete poetry making the motion words and ideas in the poem visual through the arrangement and style of the letters and words.

*How does this poem by e.e. cummings use words to show motion?*



e.e. cummings, "Tulips and Chimneys," 1966, Liveright Publishing Corporation

## Photography & Writing Project Process



Portrait Project Exhibition at the Glen Urquhart School inspired by the exhibition *Class Pictures: The Photographs of Dawoud Bey*

For the past twelve years, we have collaborated with educators to develop projects inspired by Addison exhibitions that give students the opportunity to explore and express their ideas about themselves and their community through words and photographs. Projects can be designed to suit the age level of your students, and we are glad to work with you to design a project to meet your curricular goals. Below is a general outline for a photography and writing project.

For ideas on project themes beyond those in this packet, please visit the education page of the Addison's website and go to "Photography & Writing Program."

### Possible Project Outline

#### 1. Brainstorming and photography planning

Based on the theme selected for the project, students brainstorm ideas about what they will photograph and why, thoughtfully considering how to set up their photographs in order to communicate their ideas.

#### 2. Making photographs

Students make photographs—either during the school day or at home—based on the ideas generated during the planning session.

#### 3. Writing from the photographs

Students review their photographs and select which image to use. Writing from their carefully observed photographs, students develop compelling stories or statements about their topics.

#### 4. Sharing student work

Student photos and writing together can be shared through: an exhibition in the school or community; a printed, photocopied, or one-of-a-kind book; or a special presentation to classmates, parents and/or the public. This important step in the project helps students take pride in their work and empowers them to share their ideas and values with a larger community.



Wood Hill Middle School students exhibit their "Andover Days" photography and writing project inspired by the *Ipswich Days* exhibition.

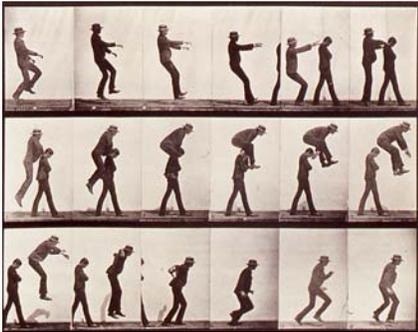
*Contact us anytime to discuss themes and ideas or for resources or assistance.*

## Resources

Addison Gallery of American Art's collection online: <http://accessaddison.andover.edu/>

Browse or search to find images of your favorite Addison artworks anytime—or check out our community portfolios for themes and ideas around which we can base a class visit to the Photography Study Studio.

The Addison Gallery can lend a DVD of animated sequences of Muybridge's *Motion Studies* or provide PowerPoint presentations with the images in this packet or others from the Addison's collection.



Eadweard J. Muybridge, *Plate 169. Jumping; over boy's back (leap-frog)*, from *Animal Locomotion*, 1885, collotype on paper, 9 5/8 in. x 12 1/8 in., gift of the Edwin J. Beinecke Trust, Addison Gallery of American Art, Phillips Academy, Andover, MA

## Muybridge

Sheldon, James L. and Jock Reynolds. *Motion and Document—Sequence and Time: Eadweard Muybridge and Contemporary American Photography*. Andover, MA: Addison Gallery of American Art, 1991.

<http://americanhistory.si.edu/muybridge/index.htm>

The website for the National Museum of American History/Smithsonian Institution's exhibition *Freeze Frame: Eadweard Muybridge's Photography of Motion*, which was on view from 2000–2001.

<http://www.archives.upenn.edu/histy/features/muybridge/muybridge.html>

The photography for Eadweard Muybridge's *Animal Locomotion* plates was created on the University of Pennsylvania campus. This essay provides background context for the University of Pennsylvania Archives' Eadweard Muybridge Collection, including a link to a primary source document, an 1886 article in Penn's student newspaper discussing his use of student models.

[http://commons.wikimedia.org/wiki/Image:Muybridge\\_race\\_horse\\_animated.gif](http://commons.wikimedia.org/wiki/Image:Muybridge_race_horse_animated.gif)

An animated sequence of one of Muybridge's *Motion Studies*. Although the Addison cannot guarantee the accuracy of the information provided by the Wikipedia, the animation sequence may be useful in the classroom to complement additional discussions.

## Edgerton

<http://web.mit.edu/Edgerton/www/Intro.html>

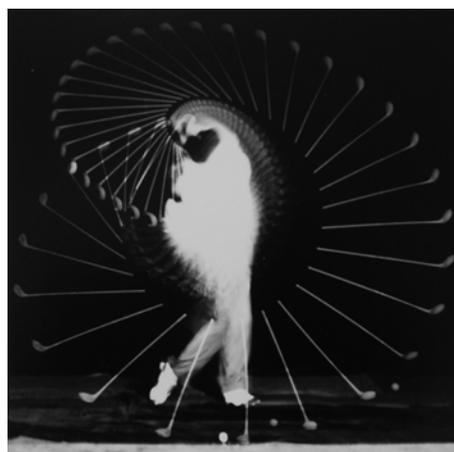
The Edgerton Center at MIT's website, which includes:

[http://web.mit.edu/vrtour/movies/n2\\_edgerton\\_mv.mov](http://web.mit.edu/vrtour/movies/n2_edgerton_mv.mov)

Video footage of Edgerton and his famous milk drop experiment.

<http://web.mit.edu/edgerton/www/hedgerton-nas-memoir.pdf>

An in-depth biography of Edgerton.



Harold Edgerton, *Golf Drive by Denmore Shure*, from *Seeing the Unseen*, 1938, photograph, 14 in. x 11 in., gift of Stephen C. Sherrill (PA 1971), Addison Gallery of American Art, Phillips Academy, Andover, MA

### **Note to Teachers:**

In pursuit of his mission to accurately illustrate all aspects of human movement, Eadweard Muybridge frequently used models who were nude, semi-nude, or draped in a gauzy fabric. This is in keeping with centuries-old artistic tradition and the scientific aspect of Muybridge's work. We can work with you to select the images with which you are most comfortable working with your students.