Connecting Art, Science, and the CCSS

*Six Random Lines Excentric III 1992-1999*
by George Rickey (SBMA)

Next Generation Science Standards (NGSS):
Forces and Motion

The kinetic art of George Rickey demonstrates what happens when a creative mind experiments with cause and effect reactions, or (as defined by the NGSS) Forces and Interactions. In the case of Rickey’s art, cause and effect reactions are predictable in terms of underpinning geometric and engineering principles, but they also include the element of chance that is an inherent part of nature.

About the Artist and His Work:

Throughout his life, George Rickey was a constant traveler and a keen observer of nature. Reading his biography is like reading a map that shows the frequent intersections of art, science, math, and engineering. Rickey was constantly influenced by new ideas in the arts and sciences, and he ultimately developed new, unique creative kinetic art pieces that gave evidence to his fascination with movement. Rickey stated:

*The form is, in a way, irrelevant. It’s the relation between the forms that counts, not the form itself – when still, it’s dead in its geometry. As soon as it begins to move it begins to express itself.*

Born in South Bend, Indiana on June 6, 1907, his childhood was a constant immersion into a scientist’s laboratory, engineer’s workshop, or artist’s studio – all within the walls of his home. He was the son of an MIT-educated engineer, and his mother, Grace Rickey, graduated from Smith College. She instilled in George and his siblings a passion for reading, writing, and the arts. His maternal grandfather was a lawyer and then a judge for the New York State Supreme Court. His maternal grandmother taught drawing at a girls’ school in Schenectady, New York, for many years.

Walter Rickey, George’s father, worked as a mechanical engineer for the Singer Sewing Corporation. When George was five years old, his father moved the family (of six children) from the American Midwest to Helensburgh, a Scottish coastal town. On the way to Scotland, George spent a few months in Athol, Massachusetts, with his paternal grandfather, a clockmaker who later lived with the family at their home in Scotland. Fascinated by the mechanical parts of these intricate clocks, young George spent hours taking them apart and trying to put them back together.
During school holidays, George sailed his family’s 38-foot yacht through Scotland’s coastal waterways, mastering the mechanics of sailing as he gained an understanding of wind currents and the laws of motion (central concepts of Rickey’s sculptures). After attending boarding school, Rickey studied history at Oxford, drawing at the Ruskin School, and painting in Paris. His life was comprised of painting, teaching, studying, and writing, until the advent of World War II. Once the Army Air Corps discovered his mechanical abilities, they assigned Rickey to projects involving the effects of wind and gravity on ballistics. During this time, he produced mobiles of plastic, brass, copper, and/or painted steel elements, using a mechanical system called a catenary which had been used on and off since 1932 by Alexander Calder. Rickey wanted to create works where the mechanics of movement were hidden. In the early 1950’s, he developed his first universal joint that allowed his works, by then being made of stainless steel, to respond to the slightest movement of air, and to move in unpredictable ways.

His emphasis on the unknown makes directly experiencing his works essential to appreciating them. In The Morphology of Movement, Rickey wrote:

“Since a photograph records only one instant and one instance among variations and never the factor of chance, it provides a false record of kinetic sculpture, which can have no ‘correct’ posture at rest.”

Only through direct engagement with Rickey’s sculptures can the viewer appreciate the many layers of form that they contain: the form of the steel sculpture itself, the path traced by its elements, the negative space of the surrounding air and environment, and, most particular to his kinetic works, the endless potential of a motion impelled by the unpredictable powers of nature.*

Rickey said of his unique quest to uncover motion,

“I did not want merely to set a static art in motion, nor did I want to describe the dynamic world around me with a series of moving images. I wanted the whole range of movements themselves at my disposal, not to describe what I observed in the world around me, but to be themselves performing in a world of their own.”

Today, viewers who enter the world that George Rickey created continue to be inspired as they watch one of his sculptures endlessly perform its dance of movement.

*Adapted from Passages of Light and Time, George Rickey’s Light in Motion (Snite Museum of Art, University of Notre Dame)

Please see the following pages of this PDF file for connections to the CCSS and the NGSS, and lesson plan ideas from across the curriculum.
Lesson plans developed by Joni Chancer, SBMA Program and Performance Consultant
From the Standards: Connecting Art, Science, & Higher Order Thinking
Rickey’s Kinetic Art Sculptures and Next Generation Science Standards (NGSS) for Forces and Motion

Students who demonstrate understanding can:

Kindergarten:
K-PS2-1.
Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Grade 3:
3-PS2-1.
Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3-PS2-2.
Make observations of an object’s motion to provide evidence that that a pattern can be used to predict future motion.

Middle School and High School:
MS-PS2-2.
Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.

HS-PS2-1.
Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

From the Common Core State Standards (CCSS)
Listening & Speaking / Comprehension & Collaboration):

To build a foundation for college and career readiness, students must have ample opportunities to take part in a variety of rich, structured conversations—as part of a whole class, in small groups, and with a partner. Being productive members of these conversations requires that students contribute accurate, relevant information; respond to and develop what others have said; make comparisons and contrasts; and analyze and synthesize a multitude of ideas in various domains.

Students must demonstrate the ability to integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

Please see the next pages of this PDF file for lesson ideas.
Visual Thinking Strategies (VTS) Facilitated Discussion

Download the short video of the kinetic art sculpture by George Rickey (*Six Random Lines Excentric III 1992-1999, SBMA*) from the SBMA website. The sculpture is installed at the top of the steps leading to the front door of the Museum.

Play the video segment for the students. After viewing it for the first time, play it again after asking the students to consider: *What’s going on in this video? What do you observe?* Play (and pause) the video clip as students offer their comments, observations, speculations, and questions. If a student makes a statement such as: “It looks like the sculpture has moving arms,” follow the observation with the question: “What do you see that makes you say that?” Always ask students to offer evidential reasoning – to support their opinions with observed details (CCSS). After a student offers his/her observation and provides support for the idea, open up the discussion again by asking: “What more can we find?”

Visible Thinking (VT) Thinking Routine: See, Think, Wonder

As an alternative to the facilitated VTS discussion, invite the students to participate in the “See, Think, Wonder” Thinking Routine. As they watch the video clip of the moving sculpture, ask: *What do you see? What do you think about what you see? What do you wonder (what questions do you have)?* Students (in pairs, small groups, or in a whole group discussion) can share their responses verbally or in writing.

Visible Thinking (VT) Thinking Routine: Form and Function

Ask students to consider and discuss these questions: *What does the form (physical characteristics, design, materials) reveal about the essence of this sculpture? How does the sculpture work? How do the pieces interact? What invisible forces are at play in the work? What do you see that makes you say that?*

Visible Thinking (VT) Thinking Routine: Is It Art?

Ask students: *What makes an object a work of art?* This sculpture was purchased by the Santa Barbara Museum of Art, so it was considered to be more than a machine with moving parts. It is a highly valued, featured work of art at the Museum. After viewing the video of the moving sculpture, ask students: *What is YOUR opinion? Do YOU think this is more than just a moving machine? Is it a work of art? Why?* Students should support their opinions with specific details (CCSS).

Visible Thinking (VT) Thinking Routine: Become the Work of Art

After students have viewed the video several times, have them look at it again to figure out how it moves in response to the wind (a force that sets it in motion). Challenge them to create a similar kinetic sculpture with their bodies (several students can work together) – one that moves artfully in response to wind (a force) coming from various directions. Like a Rickey sculpture, students need to be aware of their own movements, and how their movements interact with the other parts of their group’s living sculpture.
Writing Connection 1: Informational Writing

After students have viewed the video several times, ask them look at it again and jot down the sequence of forces in motion that create movement in the sculpture. Challenge them to write a description of the forces and the movements clearly and concisely. The use of transition words will help a reader follow the sequential action.

Writing Connection 2: Poetry, Simile, & Metaphor

After students have viewed the video several times, ask them look at it again and think of all the things the moving sculpture reminds them of in terms of its forms and its movement. As a warm up, have them quickly generate a list of action verbs that match different movements they observe as the sculpture moves. What can they compare it to? Invite them to write poems about the moving sculpture. A possible beginning line could be: “Like a __________, the .... “ For example, “Like a tree in the wind, the branches sway ...” or “Like the legs of marching soldiers...”

Science, Engineering, and Art: An Integrated Art Project

The CCSS and the NGSS both highly value applied creativity. Students are asked to design and create solutions to puzzles and problems by incorporating and applying their learned understandings. After students have viewed the video several times, invite them to think about ways they could design and create a kinetic art piece inspired by George Rickey. Download the related art and science lesson from the SBMA website for lesson ideas, suggested materials, and instructions.

Supplemental Films and Resources:

There are several short videos of George Rickey kinetic art sculptures available for viewing on the YouTube website.

Additionally, teachers can order the video George Rickey WORKS (A visual exploration of George Rickey’s kinetic work), produced and directed by Paul Kreft.

http://www.georgerickeyworks.com/film.html

Non-Fiction Books for Primary and Middle Elementary Grades:

I Face the Wind by Vicki Cobb  The Wind Blew by Pat Hutchins

Feel the Wind by Arthur Dorros  Like a Windy Day by Frank Asch

Can You See the Wind? by Alan Fowler