That beauty is in the eye of the beholder is literally true of these kaleidoscope patterns, for only one twelfth of each is real, a jumble of bits of plastic and glass. Eleven twelfths are reflections, blended by repetition into a symmetrical whole. These designs were photographed in a kaleidoscope built especially for P.S.M. To minimize the loss of light in successive reflections, special mirrors are used. They consist of plate glass on which vaporized aluminum has been deposited in a vacuum to form the reflecting surface. For these photos, the kaleidoscope was illuminated by two 2,000-watt spotlights shining through a sheet of opal glass. One-second exposures were made on Kodachrome film at lens openings of from f/8 to f/16

Our Color Camera Takes a Look

By HARRY WALTON

Photographs by WILLIAM MORRIS *and* ROBERT SMITH

VISITORS to London about 1816 were amazed to see people in the streets gazing skyward through pasteboard tubes. But these watchers were peering at no eclipse or comet. They were fascinated by a scientific novelty that had taken London by storm—the kaleidoscope, invented by Sir David Brewster. First regarded only as a toy, it was soon adopted by artists as an aid in originating new designs. Sir David named his invention by combining three Greek words: *kalos*, meaning beautiful; *eidos*, form; and *skopeo*, I see. Almost anyone who has looked through a kaleidoscope will agree that the name is appropriate.

Two mirrors on facing walls create the familiar illusion of an endless succession of walls. Multiple reflection also produces the pat-

POPULAR SCIENCE

Kaleidoscope

Project

CA State Standard 1: Artistic Perception

- Research the history of the Kaleidoscope on the internet
- Who invented it? Why?
- Write about the history of the Kaleidoscope in your own words.
- How does it relate to Photography?
- What Principle of design is used when creating a Kaleidoscope?
- Cite your sources

Research

Inventor: David Brewster

CA State Standard 3: Historical and Cultural Content

- David Brewster, a Scottish physicist, patented the kaleidoscope in 1817.In 1816, Scotsman Dr. David Brewster was the first to arrange mirrors and objects in a tube and call it a kaleidoscope. Not just a toy, the device also was intended for use by designers and artists, who might be inspired by the beautiful patterns they could create. Brewster patented his invention in 1817.

- Optics is the branch of physical science that deals with the properties and phenomena of both visible and invisible light and with vision.
- Optical device consisting of mirrors that reflect images of bits of coloured glass or other objects in a symmetrical geometric design through a viewer. The design may be changed endlessly by rotating the section containing the loose fragments. A simple kaleidoscope consists of two thin, wedge-shaped mirror strips touching along a common edge. The mirrors are enclosed in a tube with a viewing eyehole at one end. At the other end is a thin, flat box that can be rotated; it is made from two glass disks, the outer one ground to act as a diffusing screen. In this box are pieces of coloured glass, beads, etc. When the box is turned, the objects inside tumble into an arbitrary grouping, and when the diffusing screen is illuminated, the sixfold or eightfold multiplication creates a striking symmetrical pattern. The kaleidoscope was invented by Sir David Brewster c. 1816.

CA State Standard 5: Connections, Relationships, Applications

Optics

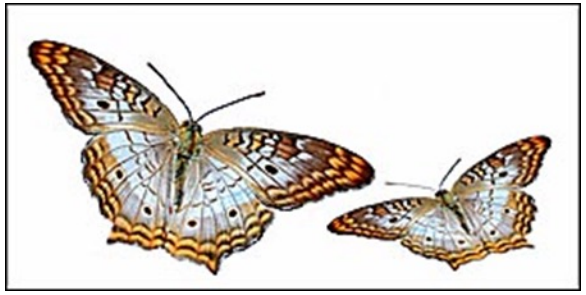
- *Balance* is the consideration of visual weight. It is way to compare the right and left side of a composition.
- The butterfly on the (right top) by itself is essentially *Symmetrical balance*. Both sides are similar in visual weight and almost mirrored. Because symmetrical balance often looks more stiff and formal, sometimes it is called formal balance.
- The butterfly on the (right bottom) represents *Asymmetrical balance* is more interesting. Above both sides are similar in visual weight but not mirrored. It is more casual, dynamic, and relaxed feeling so it is often called informal balance.
- Of course a butterfly, even though it is symmetrical, doesn't look stiff and formal because we think of fluttering butterflies as metaphors for freedom and spontaneity. It is a case of subject matter and symbolism overpowering formal design effects.

The Principle of Balance

- Radial balance is not very common in artist's compositions, but it is like a daisy or sunflower with everything arranged around a center. Rose windows of cathedrals use this design system.
- Of course a sunflower can have many meanings and feelings beyond its "radiant" feeling. Farmers might hate it as weed cutting into their corn production. On the other hand, many of us can't help thinking about Vincent Van Gogh's extraordinarily textured painted sunflowers. Once we have contemplated those thickly expressed colors and textures with their luscious painterly surface, every sunflower we see becomes an aesthetic experience filled with spiritual sensations.
- Bottom Right is a simple diagram of **radial** balance.

Radial Balance

- **Variety -** You create variety when elements are changed. Repeating a similar shape but changing the size can give variety and unity at the same time. Keeping the same size, but changing the color can also give variety and unity at the same time. In visual composition, there are many ways you can change something while simultaneously keeping it the same.
- **Depth** - effects of depth, space, projection toward the viewer add interest. Linear perspective in the real world makes things look smaller in the distance. Some artists try to avoid depth by making large things duller and small things brighter, and so on, to make the objects contradict realism. Many artists don't believe in realism even though they could do it if they wanted to. It seems too boring to them. Realism wouldn't be art for some artists.
- **Repetition** - Some ways to use Repetition of the Visual Elements are:
  - Size Variation can apply to shape, form, etc. Notice how size can affect how close or far something can appear to be from the viewer.
  - Here the same butterfly is shown twice. Which one appears closer? Note how size relationships create depth or space in a composition. Children in first grade can already recognize closer and farther based on size even though they wouldn't typically use this in their pictures unless they were motivated to do so.
  - **Repetition** can be used on all of the Visual Elements. If things are repeated without any change they can quickly get boring. However, repetition with variation can be both interesting and comfortably familiar. Repetition gives motion.
  - **Variation** can be used with all of the visual elements. See "Variety" above. You can do this with all the elements. Artists do this all the time.

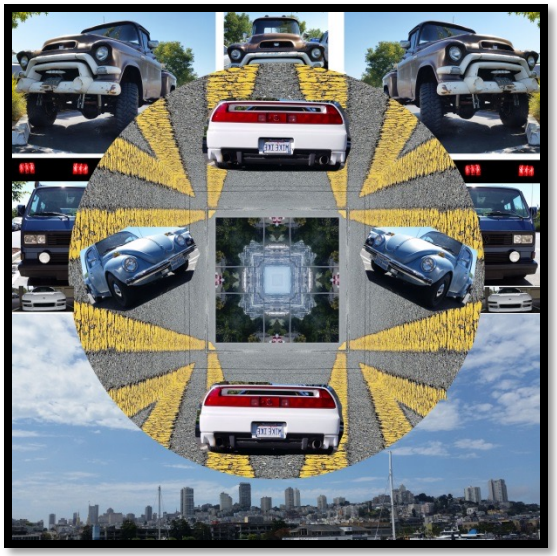


Variety, Spatial Depth and Repetition

CA State Standard 2: Creative Expression

- Take a photo
- Dissect the Photo
- Use the instructions in the outbox or find your own on the internet
- Create a Photographic Kaleidoscope
- Save in the Inbox with your LASTNAME!
- Write an Artist Statement

Project



CA State Standard 4: Aesthetic Valuing

- Describe: What is in your original photograph?
- Interpret: What is the meaning of your transformation? How does it differ from your original photograph?
- Analyze: What prominent elements of art are shown and how? What Principle of design is expressed in the image?
- **Self-Assessment** - Judge: Is it satisfactory? Is it excellent? What could make it better? What value does it have to others?

REFLECTION

Artist Statement

Resources

- Popular Science, October 1944, Through the Kaleidoscope, Harry Walton
- How to Create Kaleidoscope patterns from your Photos, Helen Bradley in the Out Box
- Making a Kaleidoscope in Photoshop by Angie D. http://www.myfinepix.com/article/83/1643 and in the Out Box

Rubric

- Rubric: Practice makes perfect!
- Submit: 2 kaleidoscopes
- One Artist statement using vocabulary terms.
- Photograph 4 items - Clarity of image, Meaning of Composition, Radial Balance
- Photo shop Skills: No lines between sections, cropping, and rotation
- Theme evident
- On time