

Rental Group 1

Aeolian Landscape



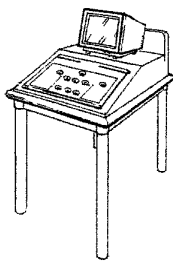
Aeolian Landscape is an exhibit in which a miniature wind-swept desert landscape is recreated by an electric fan and finely ground sand that mimics the process of wind picking up and depositing small particles. Geologists use the term "Aeolian" to refer to land formations that are caused by wind — sand dunes and snow are two common examples. The visitor can change the direction of the fan and notice how the shape of the miniature dunes influences the pattern of the wind, which in turn influences the shape of the dunes.

Angel Columns



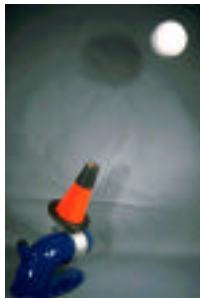
Angel Columns is a large-scale example of a figure/ground illusion. Several full-size three-dimensional architectural columns are mounted against a dark wall surface. By looking at the spaces between the columns rather than the columns themselves, it becomes apparent that the spaces actually form human figures. The exhibit is very entertaining, especially as visitors first begin to "see" the figures formed by the background.

Apparent Motion



This is a computer exhibit with a menu of seven different examples that visitors can select from to see some of the different perceptual and cognitive cues used to determine if something is moving and the direction it appears to move.

Balancing Ball/Bernoulli Blower



At Balancing Ball, a plastic beach ball floats mysteriously several feet above a large plastic cone. Upon closer inspection, the ball is found to be floating on a stream of air blowing out of the cone, generated by a large fan beneath it. If the ball is pulled slowly out of the stream of air, a force is felt in trying to pull the ball back into the air stream. If the cone is bent to the side, the ball can be suspended in space off to the side of the cone.

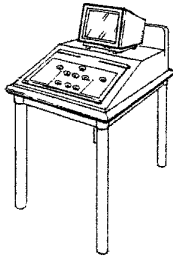
Catenary Arch



Catenary Arch is an arch assembled out of numbered blocks. The blocks are laid out on a horizontal board and then tilted into a vertical position. In spite of the fact that the blocks are relatively slender, they can stand due to their catenary shape. Visitors can compare the shape of the arch to the shape of a freely hanging chain and see that the shapes are the same. Graphics, drawings and photographs explain why the catenary is a good configuration for an arch. The mathematical formulae for the catenary are also presented.

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Changing Illusions



At Changing Illusions, you can experiment with four common visual illusions. Each set of illusions is displayed on a monitor, and you can use a set of buttons to try and make the various shapes displayed the same size. Another button allows you to check your answer against the actual answer.

Chaotic Pendulum



Chaotic Pendulum contains a deceptively simple set of pendulums in a steel and Plexiglas case. A central, T-shaped bar supports three bearing-mounted bars from its ends. The "T" is itself bearing mounted at the intersection of the upright and the cross arm. The visitor gives an initial twist to the pendulums with a protruding knob. Intuition says that the resulting motion of this system should be, if not simple, at least predictable. Intuition, however, does not work with this device since its motion is chaotic, extremely complicated and long-lived.

Circling Wave Umbrella



A spinning disc of fabric undulates in complex ways and organizes itself into a pattern of circling waves. The pattern of waves is influenced by the surrounding air currents as well as by visitors who can change the speed of rotation by adjusting a knob.

Cloud Rings



Cloud Rings uses a mist generator and a large rubber membrane with a hole in the middle to launch a ring of vapor up to the ceiling. The ring is generated by the friction between the hole's edge and the vapor flowing through the hole which form a swirling pattern known as a vortex.

Convection Currents



Convection Currents employs a water tank, heater, and light source to project images of convection currents. The visitor can control the heater and the projector. In effect, chaotic streams of warm and cool water sculpt lenses of ever-changing shapes. Water, like air, expands as it warms, which makes it less dense than cooler water. As the heated water threads its way through the cooler water, the friction of water rubbing on water and on the glass sides causes turbulence. Turbulence is chaotic behavior and the swirling patterns change unpredictably.

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Disappearing Act



Disappearing Act is a computer-based exhibit which shows various animal shapes and words moving back and forth against a multi-colored background. The shapes themselves are camouflaged, so that when the visitor makes the shapes stop moving, they become impossible to see. Disappearing Act has four different demonstrations of this effect of movement on camouflage.

Hyperbolic Slot



Hyperbolic Slot displays an aspect of mathematics which is positively arresting. A flat vertical plane made of plastic is mounted on a table top; there is a curve cut into the plastic sheet. Next to the plastic sheet stands a straight stick which is mounted on a vertical rod. The stick, even though it is straight, swings cleanly through the radically curved slot in the plastic. Graphics explain why this is so, and describe the nature of the curve.

Illusions Package



Illusions is a set of common visual illusions displayed in poster formats. The illusions are available individually or in combination. Horse and Cowboy is a puzzle which requires a new way of thinking to find a solution. Old Woman or Young Girl? and Faces or Vases shows how the brain changes the interpretation of the same information. Paris in the Spring and Count the F's demonstrates how familiarity causes us to overlook details.

Magic Wand



There's really no magic at work in the Magic Wand. A lens in a projector produces a real image in space. Waving the wand provides a surface on which the image can reflect, so that light can penetrate the eye. Persistence of vision--the eye's capacity to retain an image for a short period of time--lets visitors see the individual reflections from the stick as one whole picture. There are also other images in space found by waving the wand closer to or farther away from the projector, but only one image is actually in focus.

Mercator Your Face



This exhibit uses a video camera and a computer to capture the image of the visitor's face and convert it into several of the projections that are used by mapmakers. It's a fun way of using the principles of map making to see how an image with which one is intimately familiar -- one's own face -- is distorted by the mathematics of map projections.

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Non-Round Rollers



Rollers that are not round, but that are of constant width, are used like roller bearings underneath a flat plate. The visitor moves the plate horizontally along the table. The plate moves smoothly in a horizontal plane while the rollers appear to wobble.

Pendulum / Relative Motion



A pendulum swings above a table. The table itself is also a pendulum that swings at right angles to, and has the same period as the first pendulum. When both pendulums are set swinging at the same time, the observer sees the relative motions of the two pendulums in the frame of reference of the table. The relative motion can be linear, circular or elliptical, depending on the phases and amplitudes of the pendulums. The visitor starts the pendulums swinging and controls their relative phase. Pendulum/Relative Motion illustrate how two sinusoidal motions at right angles add together. It can be used to explain polarization of light which can be linear, elliptical or circular, and which can be considered as a combination of two components at right angles to one another. It is startling to hold a flat object next to the first pendulum and see that its motion is indeed back and forth in a straight line when it looks like it is moving in a circle.

Settling Column



Settling Column demonstrates that sand falling through water forms complex patterns. The visitor turns a tube of sand and blue liquid over to cause the sand to fall. The angle of the tube affects the patterns of flow. As the sand falls, it displaces water at the bottom of the tube causing the fluid to flow upwards. When this upwelling encounters more falling sand, much turbulence is created. The more vertically the tube is oriented, the greater the turbulence and the longer the sand takes to settle.

Shimmer



Shimmer is an optical illusion poster composed of black and white lines radiating out from a center point. As the poster is steadily observed, the array of black and white lines creates the impression of movement.

Silage Beach



Silage Beach, an artwork by Mowry Baden, provides an environment that fools one's sensory perceptions. Visitors step inside a cylindrical, rotating tent-like structure made up of vertical strips of white and orange vinyl, and sit down on a stool they find inside. The rotating tent offers no visual cues, and after a short time, visitors often feel that they themselves are rotating, rather than the tent. The tent-like structure is supported by a silage chute, emphasizing the artist's interest in found objects and providing a clue to the name of the work. The exhibit is based on extensive research done in the field of motion perception.

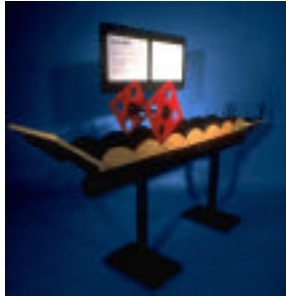
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Spinners



The visual system adapts to spinning motion in Spinners. When visitors first stare at a spinning spiral, it appears to move in and out. By continuing to stare for 15 or 20 seconds, one set of motion detectors in the eye becomes tired, and the motion of the spiral appears to stop. By looking away from the spiral at something stationary, the opposite set of motion detectors takes over and visitors will briefly see motion in the opposite direction. The visitor can also experiment with a pattern of rotating dots.

Square Wheels



In Square Wheel, an ten-inch square wheel rolls smoothly across a very bumpy surface. The bumps are carefully designed, flat catenary curves which exactly match the sides of the wheel in length. These curves also exactly compensate for the changing axle height of the square wheel as it rolls along. The axle of the wheel does not move up and down. Extensive graphics explain the exhibit.

Strange Attractor



A one-meter-long pendulum performs a strange chaotic dance. Visitors set the pendulum in motion, yet it does not behave like a simple pendulum because it is tipped with a strong magnet, and on the table beneath the pendulum are three strong magnets oriented to repel the magnetic pendulum. Visitors position the three magnets about on the table to produce different chaotic paths; they also choose the starting position and speed of the pendulum. The sensitive dependence of motion on initial conditions is a property of chaotic systems. The name Strange Attractor was given to this exhibit because due to arrangements of the three table magnets, the pendulum will come to rest at different locations depending on where and how the pendulum is started. These final states "attract" the pendulum. This behavior is similar to that of mathematical strange attractors. Not only does the swinging of the pendulum depend on the placement of all three

Streamlines



Streamlines is a miniature wind tunnel which museum visitors can use to visualize airflow patterns around a variety of objects. Brightly lit streamlines of air and water vapor flow from one end of a chamber to the other. Visitors open the clear chamber lid and place objects into the airflow. The mist swirls around the wing cross sections, cubes, spheres, and cityscapes revealing laminar and turbulent airflow patterns. Visitors can vary the airspeed of the streamlines to create different effects.

Strobe Fountain



At this exhibit, a small spray of water can be observed beneath a flashing strobe light which allows visitors to see a "frozen" S-shaped pattern. In normal light only a blur of water droplets is visible, but when the strobe is flashing, the visitor can see interesting stroboscopic effects.

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Talking in Circles (Faces, Vases)



Visitors spin what looks like a large goblet and suddenly two people appear and begin talking in the negative space around the sculpture.

Turbulent Orb



The Turbulent Orb is a large polycarbonate sphere full of special, colored, flow-visualization fluid. The sphere is mounted on top of a pedestal and can be spun in either direction and at different speeds. The fluid in the sphere shows swirls and waves of internal fluid motions produced by the actions of the visitors. The turbulence of the fluid in the sphere is reminiscent of the turbulent flows that occur in planetary atmospheres. This exhibit shows the complexities of fluid motion that can be produced by very simple circumstances.

Turntable



In Turntable, a portion of the table top rotates freely, like a giant record turntable. A supply of small metal disks, rings, and balls, 7-10 cm in diameter, is scattered around the stationary portion of the table top. Visitors try to keep the rings on their edge spinning on the disk. They discover that a ring spinning on edge may stay on the turntable for a while, orbiting the center. A disk laid flat will move in a straight line as soon as it slides off the turntable. Visitors, especially children, love the challenge of getting the disks and rings to stand on edge while moving around the Turntable.

Vanna (About Face)



Vanna (or "About Face") provides a startling example of the major role of memory and past experience in perception. Two photographs of a woman's face (Vanna White) are mounted on a turntable which is fixed to a wall. The turntables are weighted so that the photos are normally seen upside down, and they appear normal. However, when the visitor flips the pictures right side up, one photo looks grotesquely strange: the eyes and mouth in the photo have been cut out and inverted. The alteration of the photo is painfully obvious when viewed right side up, but much less noticeable when upside down. This is because eyes and mouth are the two areas where we focus our attention most strongly when we look at faces.