Shading the Sphere

Depicting light and shadow are essential to creating the illusion of three-dimensional space when drawing subjects such as spheres, ovoids, and the human figure.

by Jon deMartín

Correctly depicting how light falls on forms is essential to a realistic drawing. The previous article in this series covered how to model values and gradations on the cylinder, which curves in one direction. Combining two cylinders—one on a horizontal axis and one on a vertical axis—gives us double curvature. (See Illustration 1.) This article discusses how to draw value on the two basic geometric solids that curve in two directions: the sphere and the ovoid. (See Illustration 2.)

Spheres and ovoids underlie many natural forms, including subjects crucial to a draftsman, such as the human head. The surfaces of most objects found in nature are complex, irregular, and so unpredictable that they can easily overwhelm us. However, when artists understand the inherent characteristics of these geometric solids, they are in a better position to perceive and draw natural forms effectively.

How Light Affects Value on a Sphere

The sphere is the purest example of a double-curved geometric solid. It is perfectly round, and no matter where you hold it in space its shape never changes. Every part of a sphere is equally curved, and all points of its surface are equidistant from its center. Only a flat plane such as a side of a cube, can be shaded an even value. Curving and rounding forms always produce the effect of graduated values. The sphere is the most powerful example of this, so we’ll use it as the foundational example for modeling the surfaces of double-curved forms.

It’s useful to know why gradations appear the way they do. When looking at a curved form, how many gradations can we see? Most artists can tell you they see two, the shadow and the highlight. Not only are these the most visible gradations but they are also the most important to identify. As Illustration 3 shows, the dividing line between light and shade on a sphere is perpendicular to the direction the light comes from.

The edge of the shadow indicates the exact point where the light ends (or where the light source can no longer reach). All shadows are the result of something blocking the light.

As Illustration 4 shows, a highlight occurs at the spot on an object at which the angle of the light source (which is incident light, hitting the surface of the object directly) is equal to the angle of reflectance (at which the light reflects to the eye). In other words, the highlight is the most direct path from the light source to the object and then to the viewer. It’s the brightest of all the lights. Depending on the form’s surface, the highlight may

Illustration 1

Illustration 2

Illustration 3

Illustration 4
Edge of Shadow
Side View (Theoretical)

As seen from Viewer
Modeling Factors on Sphere

Light Source (Incident Light)

Angle of Incidence

Angle of Reflection

Viewer (Reflected Light)

Light
Middle Light
Dark Light
Light Halftone
Dark Halftone

Highlight

Light Light
Middle Light
Dark Light
Light Halftone
Dark Halftone

Illustration 6

Illustration 8
be more or less pronounced than on other surfaces. For instance, the highlight on the glossy surface of a billiard ball will reflect more light than a highlight on the matte surface of a tennis ball.

Illustration 5 shows all the gradations that are necessary to give form its three-dimensional illusion. These gradations are called modeling factors. The modeling factors are the planes that represent themselves to the illumination at different angles. As a result, they produce different values. Each of these facets is a plane that has a name, and if an artist shades each plane with the correct value and in the correct sequence, the resulting shape will have three-dimensional form. If the gradations jump or skip, the illusion of form is lost. This takes practice—lots of practice—which is why it's best to start with a simple sphere before tackling more complicated objects.

In order from lightest to darkest, the modeling factors are the highlight, light light, middle light, dark light, light halftone, dark halftone, and shadow. The side view of the left sphere in Illustration 5 shows the relationship between the sphere’s surfaces, the light source, and modeling factors. The right sphere shows the same modeling factors but from the point of view of the viewer.

Illustration 9a, The Ovoid Girl (Front View) by Jon deMartin, 2009, black and white chalk on toned paper, 24 x 18. Collection the artist.

After the sculpture The Ovoid Girl by Eliot Goldfinger.

Illustration 9b, The Ovoid Girl (Side View) by Jon deMartin, 2009, black chalk on white paper, 24 x 18. Collection the artist.

After the sculpture The Ovoid Girl by Eliot Goldfinger.

Modeling Values on a Sphere

The surfaces that face the light (highlight, light light, and middle light) reflect light, and as a result, they darken. (See Illustration 6.) In order to model form effectively, it must first be drawn by placing the shadow and the halftones that surround it. The highlight, light halftone, and dark halftone—known collectively as the halftones—are the most significant modeling factors to creating the illusion of round form in a drawing. Illustration 7a shows a sphere modeled with just the halftones and the shadow. As you can see, the illusion of form is quite apparent, even without the middle light, light light, and highlight. Illustration 7b shows the sphere modeled with all the modeling factors. The inclusion of all the gradations results in a more realized illusion of form, and the highlight is now apparent. (In this example, the highlight is the white of the paper.) When modeling any form, the shadow is the first value to indicate. The less variation in value you draw in the shadow, the better start you’ll have in modeling the rest of the forms.

Modeling Values on an Ovoid

The ovoid is a geometric solid that resembles an egg. It’s similar to the sphere in that every part of the surface is curved, but unlike the sphere its curves are not equal everywhere, and the angle at which you hold an ovoid changes the shape that you see. It is longer in one direction than the other, and the larger end is rounder, and the smaller end is pointed.

The ovoid is an irregular form, so shadows and modeling factors behave differently than on a sphere. (See Illustrations 9a and 9b.) However, by knowing how light reacts to a sphere, the artist can take the same principles and apply
them to the ovoid (or to any other form). The ovoid is also the first step in drawing a naturalistic object; it’s a useful shape because of its relationship to the human form, being similar to the head, ribcage, and other parts of the body.

Illustrations 10a and 10b show front and side views of an ovoid figure, and these drawings show that the characteristics of double-curved surfaces apply to ovoids as well as to spheres. Every form has its brightest part. Whether wide, flat, deep, narrow, long, or short, each surface still turns in two different directions.

The brightest parts of an ovoid (or a sphere) show a more concentrated amount of light than the brightest part of a cylinder does, because the cylinder’s surface only bends one way. The surface of a cylinder runs straight along its axis, whereas the forms of *The Ovoid Girl* are convex and continually gradate.

The head is a perfect form to end this discussion with because it’s a shape that closely resembles an ovoid. The head is a complex naturalistic subject, but reducing it to its most basic shapes makes the task of drawing it more approachable. Light falls on the head the same way as on an ovoid. It has a shadow, highlight, and all the modeling factors in between.

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LEFT

*Julie*

by Jon deMartin, 2007, black and white chalk on toned paper, 20 x 18.

Collection the artist.

OPPOSITE PAGE

*Self-Portrait*

by Jon deMartin, 2010, black and white chalk on toned paper, 17 x 14.

Collection the artist.