

## Chapter 86

# The Venus Effect

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## Abstract and Keywords

When an image shows an individual and a mirror, observers tend to describe the scene by saying that the individual is looking at his or her own reflection in the mirror, even when the layout makes this impossible. The name comes from the many examples of paintings of Venus with a mirror, but the effect is not specific to pictures or to women. In addition to difficulties understanding what is visible in a mirror from different viewpoints, observers also struggle to appreciate information such as size of images on transparent surfaces, either mirror or windows. These illusions and difficulties stem from the nature of a visual system tuned to distal information and from the need to discard accidental information from changing perspectives.

*Keywords:* Venus, perspective, viewpoint, visual system, distal information

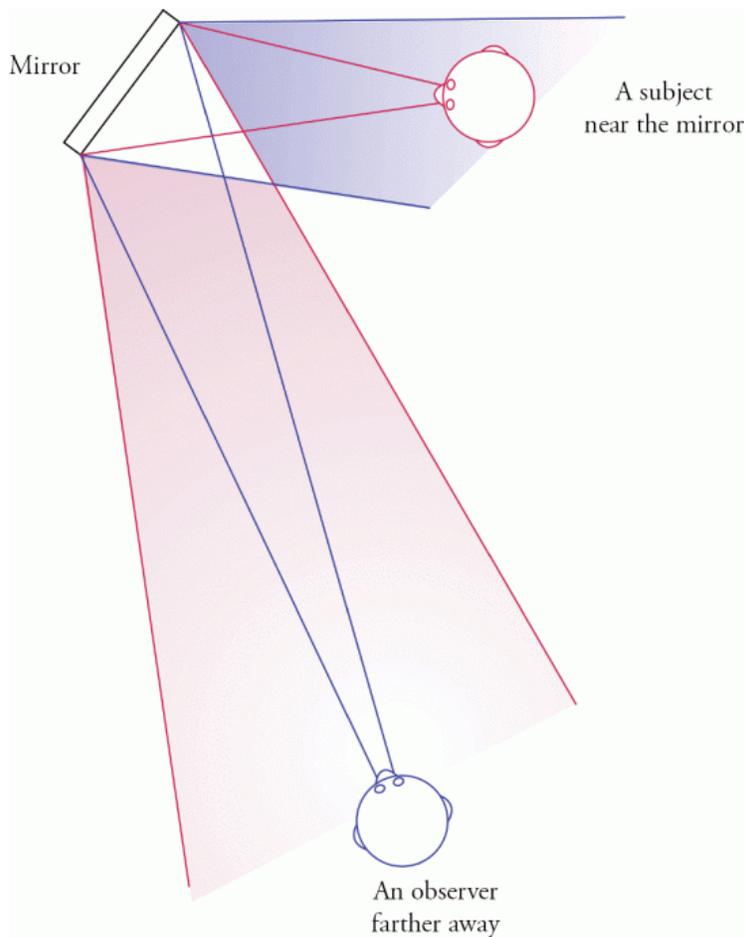
DOI:10.1093/acprof:oso/9780199794607.003.0086

## Definition

The Venus effect arises in situations where an observer sees a scene in which another person (called a subject in this chapter), is present together with a mirror and the observer can see both the subject and the subject's image reflected in the mirror. When describing this scene, there is a strong tendency for the observer to say that the subject is looking at his or her own image in the mirror. Therefore the subject in the scene is judged to be able to see a reflection of his or her own face, even when this is not possible given the layout of the scene, as shown in Figure V.86-1 (Bertamini, Latto, & Spooner, 2003).

The definition in Bertamini et al. (2003) referred to how pictures are perceived. It specifically described the situation in which a subject and a mirror are not placed along the observer's line of sight (e.g., a Venus admiring herself in a small mirror). The authors suggested that observers are influenced by the fact that the reflection of the subject in the mirror is visible to them. This is a type of egocentric bias, in the sense that observers assume that everyone—including the subject—has access to the same information from the mirror as they do. Figure V.86-1 shows a typical layout with a subject and a small mirror. Note that the face is visible to the observer only if the observer moves behind the subject with respect to the mirror. This is because in order to share a similar view of what is reflected in a mirror it is necessary to share a similar line of sight.

Conversely, consider what happens when a subject, a mirror, and an observer form a triangle, as in Figure V.86-1. It is possible to orient the mirror so that the observer sees a reflection of the subject's face in it. This creates a basic symmetry because the subject will now see a reflection of the observer's face in the mirror. Therefore, based on experience, observers should feel "observed" by the subject when the subject's face is visible to them in a small mirror. Surprisingly, this does not seem to happen. Very few people, for example, would say that Veronese's Venus in Figure V.86-2 is using the mirror to look out of the picture, or toward the observer.



*Figure V.86-1.* This diagram shows a layout in which an observer (in blue) or a camera can see the face of a subject (in red) in the small mirror while standing in a different position. The blue shaded area is what is visible as reflected in the mirror for the observer, and the red shaded area is what is visible as reflected in the mirror for the subject. Note that the subject can see the observer's face but is not able to see his or her own face. (Image created by MB.)

## Toilet of Venus

The name of the Venus effect derives from the numerous paintings in which a Venus is shown at her toilette. The subject is present in Greek and Roman art but is probably more famous in the paintings of the Italian Renaissance. An early and famous example is by Titian (1488–1576), now at the Hermitage (Poglayen-Neuwall, 1934). The theme is that of beauty, and Venus is often shown together with jewelry, flowers, and a small mirror. Because both Venus and the mirror are important items in the composition, they are usually placed so that they are easily visible, roughly at the same distance from the viewer and side by side. Moreover, the face

of Venus is almost always reflected (p.610) in the mirror. In an analysis (Bertamini et al., 2003) of the paintings reproduced in the catalogue for Jonathan Miller's exhibition "On Reflection" at the National Gallery in London (Miller, 1998) we found 14 in which a person was visible at the same time as his or her own reflection in a small mirror. These were images likely to generate the Venus effect. The type of reflection, however, varied considerably, from a full face (Hans von Aachen, *Couple with Mirror*, c. 1596, Vienna, Kunsthistorisches Museum) to a profile facing in the same direction as Venus (Simon Vouet, *Allegory of Prudence*, c. 1645, Montpellier, Musée Fabre) to an opposite profile (Vasari, *Toilet of Venus*, 1558, Stuttgart, Staatgalerie). Despite all these variations, most viewers read the scene in a similar way, generally as a Venus intent on admiring herself in the mirror. The Venus effect thus allows artists great flexibility in how they represent a reflection without destroying the illusion of self-regard.

It is remarkable how much has been written about these famous works of art without any discussion of this basic issue of perception. Leaving aside the intentions of the artists, observers should be familiar enough with mirrors to understand that Venus is not looking at herself, given that the observer can see her face from a very different viewpoint. The phenomenon is not confined to the special case of Venus. One of the earliest examples of this kind of picture is *La dame à la licorne* (end of 15th century, Musée de Cluny, Musée du Moyen-Âge, Paris, France). The tapestry is complete with its six pieces. Five of them illustrate each of the five senses, and in the piece about "Sight," there is a unicorn with a woman holding a small mirror (Fig. V.86-2). To know whether this image generates a Venus effect, we must know how people interpret this scene. Fortunately, all we need to do is read the description of the Musée de Cluny (*The Lady and the Unicorn*, "Sight," n.d.): "in a familiar manner, the unicorn has placed its front paws on the Lady's knees and looks at its reflection in a mirror she holds." The Wikipedia entry on the tapestries also reports that "the unicorn ... gazes at his reflection in the mirror" (*The Lady and the Unicorn*, 2011).

In Figure V.86-2 we provide an example from a Venus by Veronese. The pragmatic use of the mirror permitted to the artist by the Venus effect is highlighted by the description provided by the museum: "the inclusion of the mirror presents the opportunity to portray the goddess both full-face and in profile" (Joslyn Art Museum, n.d.). This shows how freely mirrors can be used without any clear reference to what Venus can and cannot see.



Tapestry



Painting



Film



Real Life

Figure V.86-2. Tapestry: *La dame à la licorne* (end of 15th century). Detail. Musée de Cluny, Paris. Painting: Veronese (1528–1588), *Venus at Her Toilette*, c. 1582. Joslyn Museum, Omaha. Film: *Snow White and the Three Clowns* (1961), Twentieth Century Fox. Real life: A mannequin in a study (Bertamini et al., 2010). (Images used under academic fair use, and photograph taken by MB.)

## Pictures, Films, and Real Life

The definition given at the beginning of this chapter, and also in Bertamini et al. (2003), describes a phenomenon that occurs in the perception of pictures. This is not, however, an effect confined to visual art. Indeed, a few observations from our own daily life illustrate that something similar also happens in situations where the person and the mirror are physically present. To test this, Bertamini, Lawson, Jones, and Winters (2010) placed a mannequin in a room and allowed people to look into the room from a side door. (A photograph of the observer's view is shown in Figure V.86-2.) The effect was just as strong under these conditions, with 73% of observers reporting that the mannequin was looking at herself in the mirror, a similar proportion to that found when viewing a painting of Venus at her toilette (Bertamini et al., 2003).

The situation where the Venus effect is most common is in film and television programs. As in the paintings of the toilet of Venus, it is often the case that an actor is looking at a mirror. Even when the viewer (i.e., the camera) is clearly not behind the actor and the viewer sees the actor's face in the mirror, the impression is not that of the actor looking toward the viewer or toward the camera. As with paintings, this phenomenon is convenient because a director can arrange actors and mirrors in many ways, and frame the face of the actor for the camera, without worrying about viewers being puzzled by an actor unable to see his or her own reflection. It should be noted that as the mirror gets larger, it becomes possible for both the actor and the camera to see the actor's face (see again Fig. V.86-1 and imagine a larger mirror surface, thus extending the space visible in the reflection). Nevertheless, the layout is often chosen to frame the image of the actor to appear in the center of the mirror for the camera, rather than for the actor (see the framing of the image in *Snow White*, Figure V.86-2 or the final scene of *Raging Bull* in which Robert De Niro is talking to himself in front of a large mirror).

Another important question is whether the presence of the visible reflection of the subject's face is necessary for the Venus effect. That is, do viewers say that the subject sees what they see? This would be an example of egocentrism. (p.611) However, evidence from Bertamini et al. (2010) suggests that the answer is no. As long as a subject is seen near a mirror and is looking toward it, observers tend to claim that the subject can see him or herself in the mirror even though the reflection from the mirror does not show any face.

## **Mirrors as Familiar Objects**

Many simple things in life are appreciated only when they are no longer around. It is difficult, though, to imagine a world without mirrors. Their existence is a significant part of our life, and it is almost impossible in an industrialized society to spend a single day without seeing some reflection in a mirror and see our own image reflected.

A New York artist, Anita Sto (2012), has recently performed an experiment in which she avoided seeing herself in a mirror or even in a photograph for an entire year (November 11, 2010 to November 11, 2011). In the process, she discovered how difficult this task is and how much of a difference mirrors make to her life. We make this point about the ubiquity of mirrors because from such vast experience people might be expected to have acquired accurate implicit and explicit knowledge about how mirrors work: for instance the fact that we can see our own reflection only when we are in front of a mirror and not when we are standing to its left or right. Yet several studies have shown that this is precisely the kind of knowledge most people do not have. For example, when asked where they need to move to in order to be able to see themselves, many people expect to be able to see themselves without being in front of the mirror (Bertamini, 2010; Bertamini et al., 2003). We call this a “from-the-side” error.

Experience does not eliminate the problem, and in a way experience may make people overreliant on the general idea that mirrors show what is within a cone in front of them, as shown by the fact that the from-the-side error does not exist in primary schoolchildren (Bertamini & Wynne, 2009).

## **Artists’ Exploitation of the Venus Effect**

The Venus effect differs from many of the other illusions described in this book. Most of these persist even when their nature is explained to the observer. On the other hand, once the Venus effect is brought to people’s attention, it becomes relatively easy to spot examples where the subject is unable to see him or herself in the mirror. People can learn to reason about the effect. However, this most likely involves an overt analysis of the image, rather in the way representational artists learn techniques to enable them to work out how to project a three-dimensional scene onto a flat surface in order to paint it. Despite this training, the artist continues to *perceive* the world as we do, with distant objects scaled up to reflect their actual size, partially occluded objects seen as complete, and so forth. In the same way, our perceptual systems never fully come to grips with how mirrors work, however much we know about the optics of reflection. This is why artists of all kinds can play with the reproduction of mirrors and their

reflections, sometimes using impossible reflections, without the image immediately looking wrong. Even in extreme examples, like Magritte's painting *La Reproduction interdite* (Figure V.86-3), it takes us a moment to identify, if indeed we do at all, the several things wrong with the image.



*Figure V.86-3. Magritte (1937), La reproduction interdite. Museum Boijmans Van Beuningen, Rotterdam, The Netherlands. As well as the anomalous reflection of the subject's back, the reflection should be rotated slightly, not seen square on. In this and many other artistic examples (e.g., Manet's *Le Bar aux Folies-Bergère*), the freedom with which the artist has created the reflection is not obvious until pointed out. (Image used under academic fair use.)*

The presence of mistakes in the reproduction of mirror reflections is interesting, but it can give the wrong impression in relation to the Venus effect. The Venus effect does not imply anything wrong with the picture and, as discussed, takes place even with photographs, film, and real people in front of real mirrors. The Venus effect is a misunderstanding of what another person is able to see in a mirror. In this sense it can exist independently of what the painter, director, or photographer intended to represent.

## **Knowledge About Viewpoint**

The experimental study of the understanding of perspective in children originated with Piaget. In his "three mountains" task, a child was asked what a doll could see of a landscape. The task requires an appreciation that what is visible to different people varies with their viewpoint (Piaget & Inhelder, 1967). Until the age of four, children struggle to distinguish

between their own view and that of the doll (egocentrism). Later research has shown that children's perspective-taking ability is affected by a variety of situational variables and that by the age of five most children will understand that an object appears different to observers who view it from different sides (Flavell, Flavell, Green, & Wilcox, 1981). On the other hand, some egocentric biases do also exist in adults (Epley, Morewedge, & Keysar, 2004). The Venus effect is an extreme example of a problem with reasoning about perspective. Our cognitive processes do not seem to include the facility to incorporate fully the way mirrors work, and so, like Piaget's infants, we fall back on our intuitions. These tell us that mirrors reveal a large spatial area, which is a copy of what is located in front of the mirror itself, within a cone that extends both left and right (Bertamini et al., 2010; Bertamini, 2014).

Relying on our memory of objects and their layout, we cannot easily answer questions about viewpoint (what is visible from where) because the viewpoint is nothing more than an accidental aspect of the visual experience. To understand what we mean by "accidental," consider for example that the wheel of a bicycle is an ellipse from almost all viewpoints. For the visual system, that is a distraction (an accident) of no consequence, and the wheel is always perceived and remembered as circular. These processes are known as constancy mechanisms (size constancy, shape constancy, and so on).

## **The Projection on a Mirror**

We have described how people find it difficult to judge what is made visible by means of a mirror to themselves or other people. This is a problem with viewpoint-dependent information. But a mirror is also an object on the wall. Could people learn what is "painted" on that object? In other words, could people treat mirrors as pictures and, in doing so, learn about what is shown in the picture? The answer is people find it extremely difficult to look at a mirror as if (p.612) it were a picture. The best example is when observers are asked about the size of the image projected on a mirror.

Gombrich (1960) suggested a demonstration that everyone can do in their own homes. Look at a fogged-up mirror in your bathroom and clear just enough space to see your own face. You will be surprised by how small this area is. It is in fact half of the height of your face (a quarter of the area). When told this, most people find it hard to accept that the image of their own face on the glass surface is only half the height of their face. In addition, they find it even harder to accept that this is true whatever their distance from the mirror (Bertamini & Parks, 2005). Thus the problem of

trying to judge size of projections persists even when the image is right in front of our eyes (Bertamini Lawson, R., & Liu, 2008; Lawson, Bertamini, & Liu, 2007). Readers are urged to test this at home using a felt-tip pen and closing one eye (the presence of two eyes is a minor complication), rather than taking our word for it.

## Naive Physics

Systematic differences between people's intuitive understanding of the physical world and what they should have learned from experience have been well documented. This area of research is known as "naive physics" (Proffitt, 1999). For example, people have intuitions about how objects move and fall, and they expect an object moving along a curved path to continue along such a path when released (McCloskey, 1983). The Venus effect can be seen as another example of an incorrect intuition about how the world works. The mistakes people make have multiple sources. In part they may originate from problems with reasoning, but they may also arise as a consequence of characteristics of perception. As mentioned earlier, the visual system has evolved to extract information about solid objects and discard accidental information such as changes in viewpoint. This factor helps to explain why it is hard to judge the properties of the projected image on a mirror. It is also worth remembering that although mirrors are very familiar to us today, they were not present in the environment in which we evolved.

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