Darkness, as the power dualistically opposed to light [...] as a dazzling envelope of pure and absolute light. (36, emphasis added)
Hans Blumenberg, “Light as a Metaphor for Truth”

Throughout the world the shadow is considered an outgrowth of the object that casts it. (317)
Rudolf Arnheim, Art and Visual Perception

Pictured below is a lethal weapon that is actually an artefact on display (fig. 4.1) from the Imperial War Museum’s permanent collection under specialized illumination conditions, a lighting situation that is different from ambient daylight conditions. With only a cursory look, we as viewers see a missile and its larger shadow suspended in front of a wall on which the word “peace?” is printed, although appearing as if it is a cast shadow. The missile’s shadow in this image piques our attention and beckons contemplative consideration. Is it the boldness of the unsheathed weapon suspended above our heads, or rather the question mark after the word “peace” that fascinates? For me, it is the enlarged shadow on the wall that is the most intriguing element of this group. The artefact, or rather its illumination, raises the question of how shadows may influence our perception. In particular, the more specific question arises how museums, their exhibition designers, and artists use shadow. The question of shadow perception and its meaning has been theorized in historical treatises, art and architectural theories, and in many artworks themselves, more so than light. Throughout the millennia, the rhetorical trope of shadow has often been used metaphorically. That is, it was used to convey messages, tell stories and teach lessons. In what follows, through the analysis of specific authors and artworks, I will demonstrate different ways in which shadows influence our perception.
In this chapter, I first consider various sorts of shadow through the lens of noteworthy Renaissance and Enlightenment historical treatises, essays and artworks. I discuss these works primarily through the adroit framework of two authors: Victor Stoichita and Michael Baxandall. Secondly, I investigate the use of shadow in modern and contemporary artworks, as well as in museum displays. In this second section I consider a selected group of museum exhibits and artworks where shadow plays a prominent role. Through close analysis of various shadow-centred media, I contend that the use of shadow as tool does indeed affect viewers of contemporary museum environments, by influencing our perception of spaces and images.
Observing Shadows

I understand the notion of visual perception as it connects to the effects of light in relation to shadow.¹ For example, when I look at a work of art like a full-round marble sculpture such as Michelangelo Buonarroti’s (1475-1564) *David* (1501-04) (fig. 4.2), I acquire information in the form of visual stimuli from looking at the sculpture, and then processing that visual information, which tells me that the sculpture has three dimensions and, hence, occupies space. When I focus my vision on the contours, protrusions and recesses, I understand that the statue is not just an unremarkable smooth object, but that it has form and relief, made explicit by shadow.

Figure 4.2. Michelangelo Buonarroti. *David*, 1501-04.

¹ In art and the cognitive sciences, perception is defined as the process of acquiring and interpreting sensory information, which presupposes the selection and organization of the information received. The *Oxford English Dictionary* defines perception as “receiving, collecting, action of taking possession, apprehension with the mind or senses.”
Shadow plays an important role in influencing the cerebral process of visual perception. Under normal ambient lighting conditions, darker areas of the sculpture are perceived as being closer to the core of the sculpture or further away from the light source, in contradistinction to the lighter areas which are understood as being closer to the surface or closer to the source of illumination. Unfortunately, during everyday encounters shadows are not usually cognitively engaged and human perception of shadow is often repressed. It requires us to make a special effort to focus our attention, which is assisted by favourable illumination conditions. In his article “The Perspective of Shadows: The History of the Theory of Shadow Projection”, Thomas Da Costa Kaufmann explains that:

Because the eye adjusts to the brightest light in the field of vision by dilating or contracting the pupil, in very bright daylight it may contract the pupil to a level where enough light is let in to see, but not enough to produce a perceivable contrast of light in what is observed, to notice the difference between light and shadow. Even where shadows may be perceived, differences in perception of brightness constancy mean that there is no uniform attitude that an observer will take to a cast shadow. One may look at shadows, into them, or through them. (259)

Although Kaufman is writing specifically about cast shadow, no uniform observer attitude can be distinguished with other sorts of shadow either. Because of this lack of a generalized attitude toward shadows, a viewer may adopt their own attitude. In other words, a viewer may choose to consciously ignore shadow or engage with it fully and contemplate its uses, causes and consequences.

Shadows have occupied the thoughts and minds of humanity since they became cognitive beings. Beginning sometime during the Greek Republican epoch, shadows began to be used as rhetorical devises in literature to aid in telling a story, expressing a philosophical opinion or teaching a lesson. One particular trope in literature engages with the notion that losing your shadow can, in a sense, mean losing yourself, such as in the story of Peter Schlemihl. Many authors have taken the time to apply their interest and intellect to the observation of shadow. The depiction, description and articulation of shadow in exhibitions and artworks are the motivations of this chapter that will develop throughout, beginning here with Plato (c. 428-347 BCE).

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2 For an explanation of the story from a visual perspective see Stoichita, “The story of Peter Schlemihl as seen through some of the illustrations” (172-186).
During the fourth century BCE Plato was engaged in writing what would become the acknowledged beginning of Western philosophy. This “began with the turn away from the world of the senses to a suprasensual domain” (Silverman 1), from the “realm of becoming to the realm of what is” (Plato qtd. in Silverman 1), a realm with shadow as a leitmotif. One of the rhetorical devises Plato employs is a cast shadow, a specific sort of shadow, and one that is produced in his famous case of the parable of the cave prisoners. Cast shadow “is the shadow that is caused on the ground or elsewhere by the depicted object […]” writes Filippo Baldinucci (1624-97) in the first dictionary of artistic terms in 1681. “Cast shadow also gives clues to the shape, direction, relative distance from the eye, and position of the source of light” (Kaufmann 49). In book seven of The Republic (514a-520a), Plato puts shadows on display and creates a perceptual sense of limited space through the deployment of these cast shadows.

Kaja Silverman’s account of the well-known story is useful for my understanding of the function of shadow in Plato’s text:

In this most famous of all philosophical allegories, a prisoner who has been imprisoned in a dark cave since childhood, and who spends his time looking at shadows cast on the wall in front of him by a complicated projection system, is released from his chains and delivered into the sunlight outside. (1) 4

In World Spectators, she critiques Plato’s association of light with good and shadow with bad. As Silverman engages the shadow inside the cave, Hans Blumenberg addresses the natural light outside the darkness of the Platonic envelope. In his essay, “Light as a Metaphor for Truth: At the Preliminary Stage of Philosophical Concept Formation”, Blumenberg credits Plato for being the first to demonstrate, by means of metaphors of light, that the splitting of the dualistic concept of light and darkness “can be termed the naturalness of the connection between Being and truth” (32, emphasis in text).

Writing about the “naturalness” of light, Blumenberg argues that:

In the Platonic allegory of the cave, it is said of the Idea of the Good – which figures there as the sun that puts everything in the light of Being – that […] it is not itself a being, but rather something that stands out, in virtue of its dignity and strength, above beings. (33)

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3 Filippo Baldinucci, Vocabolario Toscano dell’Arte del Disegno, nel quale si explicano i propri termini e usi, non solo della Pittura, Scultura, & Architettura, ma ancora di altre Arti a quelle subordinate, e che abbiano per fondamento il Disegno. "Tuscan vocabulary of the art of design, in which are explained the particular words and expressions, not only of Painting, Sculpture and Architecture, but also of the other arts subordinate to them and which we possess fundamentally in Design", Florence 1681 (quoted in Gombrich 6).

4 Silverman refers here to one prisoner. However, Plato does indeed refer to multiple prisoners, which is the way the parable has been depicted throughout the history of art.
In a section entitled “Excursus: The Cave”, Blumenberg elaborates in a meditation the so-called world of the cave “as a sphere in which Being and truth were lacking”, through a discussion of Cicero (106BCE-43BCE), René Descartes (1596-1650) and Nicholas of Cusa (1401-64) (37). This lack of truth and splitting of the dualism has perceptual implications.

Plato’s allegory marked the beginning of the Western philosophical tradition, but my interest here is to bring attention to the cast shadows in order to show that the prisoners’ perception of their enclosure is heavily influenced by shadow. In fact, their entire worldview was constructed with shadows – the absence of light and “truth”. Firelight, illuminating puppets carried along the path behind the prisoners, creates shadows whose images are projected on the wall of the cave opposite the prisoners. The shadows represent an evanescent, false depiction of reality and they allow the prisoners to identify a boundary of their enclosed space, which is actually a receiving surface for the shadows.

Figure 4.3. Jan Saenredam, after Cornelis Corneliszoon van Haarlem. *The Cave of Plato*. Engraving, 1604. London British Museum.

This allegory has been a recurrent theme in pictorial depictions. A 1604 engraving by the Dutch printmaker and engraver Jan Saenredam (1565-1607), after
Cornelis Corneliszoon’s (1562-1638) mystical recreation of the cave allegory, which has not survived, clearly depicts many aspects of the parable and places Light at the centre of the image (fig. 4.3). At the top right corner of the engraving, shadows of personifications appear, replacing the wood and stone object shadows of Plato’s text. In a formal rather than a thematic way, the arched wall of the cave enhances the perception of space in the engraving through the use of shadow. In Shadows: The Depiction of Cast Shadows in Western Art, Ernst Gombrich considers this engraving as an “elaborate Christianised interpretation” of Plato’s famous passage (18).

Three hundred years after Plato, Pliny the Elder (23-79) discusses the origins of both painting and sculpture in book XXXV of his magnum opus Naturalis Historia, of which the first ten books were published in the year 77, two years before his death as a result of Mount Vesuvius’ eruption. Although the time and place of its origin is disputed, Pliny states that, “all agree that it began with tracing an outline around a man’s shadow” (Pliny quoted in Stoichita 11). The tracing of a man’s shadow also creates space, a two-dimensional space delineated by the outline or silhouette of the sitter that was to become the space of painting. In figure 4.4 the Plinian tale is depicted by Eduard Daege (1805-83) in his painting The Invention of Painting (1832). Here, a sharp-edged encircling cast shadow is projected onto a garden wall on which I see an encapsulating shadowy space. Simply by tracing the outline of the sitter’s shadow, the female figure has created a perceivable two-dimensional space.

Some pages further in the same book of the Naturalis Historia Pliny discusses the origin of sculpture. He writes:

It was through the service of that same earth that modelling portraits from clay was first invented by Butades, a potter of Sicyon, at Corinth. He did this owing to his daughter, who was in love with a young man; and she, when he was going abroad, drew in the outline on the wall the shadow of his face thrown by the lamp. Her father pressed clay on this and made a relief, which he hardened […]. (Pliny qtd. in Stoichita 11)

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5 All quotations in Stoichita of Pliny’s Natural History are taken from the Loeb Classical Library version by H. Rackman (Cambridge, MA and London, 1952).
Figure 4.4. Eduard Daege. *The Invention of Painting*. 1832. Oil on canvas. National Gallery, Berlin.
The shadow of the same young man stands at the origination of depicted depth, the three-dimensional depth of a sculptural object occupying space. Hence, we may say that according to these myths at least, a shadow stood at the origin of both sculpture and painting, or drawing. Is there a relation between this notion of shadow and the traditional interpretation of mimesis as imitation? The notion that art has to imitate life runs counter to Plato’s notion that art is an inferior imitation of an ideal world, as conveyed in the idea that the shadow lacks truth. The technique and the subject matter depicted in the Daege painting show clearly that the inscribed shadow is only an imitation because the interior is simply black and not a realistic flesh-like depiction of the head of her lover. Paradoxically, the shadow is simultaneously an inferior generic imitation and a finely-outlined realistic depiction of an actual person. In the painting, shadow thus straddles the artistic divide between realistic and stylized depictions.

During the medieval centuries the depiction of shadows in painting almost completely vanished. At the dawn of the Renaissance shadow once again became a topic of study in connection with the invention of linear perspective. Based on evidence in a letter of 1413, Filippo Brunelleschi (1377-1446) is credited with this invention. In the Science of Art, Martin Kemp explains that linear perspective “is a system for recording the configuration of light rays on a plane as they proceed from an object to the eye in a pyramidal pattern” (342). This type of drawing or painting produces – on a two-dimensional surface (the picture plane) – the illusion of a three-dimensional scene. Fourteenth-century artists in Italy had indeed developed a variety of stratagems for evoking space and depicting solid forms, but it was not until the early-fifteenth century that the system became based on systematic techniques subject to rules. It is at this point in the development of art where the depiction of shadow, particularly cast shadow, became supremely important for the creation of illusionistic space.

Leon Battista Alberti’s (1404-72) De Pictura (1435), “the first classic Renaissance statement of the principles of perspective […]” mentions little about cast shadows (Kaufmann 261). What it does mention is the importance of the light of heavenly bodies, which provided much of the impetus for the coming theoretical investigations of cast shadows. Alberti writes, in speaking of the “reception of lights”:

Some are of stars, such as the sun and the moon and the morning-star, others of lamps and fire. There is a great difference between them, for the light of stars makes shadows exactly the same size as bodies, while the shadows from

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6 This is not the best interpretation of mimesis. See Bal (1982) who interprets it as representation.
fire are larger than the bodies. A shadow is made when rays of light are intercepted. (52)

Kaufmann suggests that shadows were investigated apart from perspective and that their study belonged to the intellectual tradition of astronomy. The study of heavenly bodies and the examination of shadow find their amalgamation in one of the most celebrated writers of the Renaissance, Leonardo da Vinci (1452-1519).

Renaissance Shadow

During the last decades of the fifteenth century, the perception of shadow was occupying a great Renaissance mind; Leonardo was engaged in working out his views on vision, light and shadow as it pertained to the art of painting and the scientific investigation of the natural sciences. He was called uneducated by many of his contemporaries because of his lack of fluency in Latin, the language popular in scientific circles at that time. Born in Tuscany, Leonardo moved with his family to Florence in the 1460s where he was apprenticed to the artist Andrea del Verrocchio (c.1435-88). In 1472 Leonardo was allowed to enter the painters’ guild during which time he carried out a number of commissions. After he migrated to Milan around 1483, he completed a number of artistic, architectural, and engineering projects for the Sforza court (Lindberg 155). “Shadow is the privation of light”, proclaims Leonardo in the Codex Atlanticus (c. 1478-1518), the largest collection of Leonardo’s manuscript sheets containing various texts, as well as autographed illustrations of his empirical experiments involving light and shadow.7 But according to Michael Baxandall in Shadows and Enlightenment it was during the period 1490-93 that Leonardo’s work on shadow and light came to a crescendo.8 By analyzing Leonardo’s annotated and (re)arranged empirical work on shadow, I hope to give insight into the ways different sorts of shadow influence our perception.9

7 In its present arrangement, after the restoration work carried out in the 1960s, the codex consists of 1119 sheets. It contains studies related to the entire range of Leonardo’s interest in science and technology, together with architectural projects, town planning, biographical records and personal notes.

8 This author, among others, suggests reading the appendix of Baxandall’s Shadows and Enlightenment dedicated to Leonardo first, before reading the individual chapters of this seminal work. The other important recent work on the subject of shadow is Victor I. Stoichita’s A Short history of the Shadow. It should be noted here that these two volumes were being prepared at approximately the same time, and therefore each author had very limited knowledge of the other’s research.

9 Editors Martin Kemp and Margret Walker’s Leonardo on Painting is the first English-language book to thematically organize much of Leonardo’s known work. In many cases Leonardo gives no headings or subdivisions to his works. Kemp and Walker have created them for their English translation of his work, which are identified here by setting their improvised titles within quotation marks.
In addition to the *Codex Atlanticus*, the *Codex Urbinas Latinus* and the manuscript known as the *Ashburnham II* codex also feature text and illustrations regarding shadow. In the *Codex Atlanticus* Leonardo makes seven propositions beginning with a preamble, which can be considered as a treatise on shadow. It is important to quote him *in extenso* because of the poetical character of the writing and to facilitate an understanding of a Renaissance mindset regarding shadow. What I consider the preamble of Leonardo’s “introduction to shadow” concerns figurative shadow in Renaissance perspective painting. He describes shadow as:

[…] the privation of light. Shadows appear to me to be supremely necessary in perspective, since without them opaque and solid bodies will be ill defined. Those features that are located within their boundaries – and their boundaries themselves – will be ill defined if they do not end against a background of a colour different from that of the body. (97)

Perspective provides the viewer with an illusion of distance and Leonardo claims that the boundaries and features of figures in perspective paintings will be “ill defined” if they are not set off from the background through the use of shadow.

One way in which shadow influences perception is through the propagation of perspectival space. Perspective painting is the art of drawing objects on a planar surface so as to give the same impression of relative position, size, or distance, as the actual objects do when viewed from a particular point of sight. Kemp defines perspective in “Appendix 1”: “At its simplest, linear perspective is a system for recording the configuration of light rays on a plane as they proceed from an object to the eye in a pyramidal pattern” (342). The point being that the technique of perspective painting creates the illusion of space, based on geometrical proportional manipulation. When figurative shadows are included in the composition, the manipulative effect is increased dramatically.

Leonardo’s first proposition pertains to *attached shadow*, where shadows created by opaque solids remain attached to the object.

And on this account I propound my first proposition on shadows: I state in this manner that every opaque body will be encircled and its surfaces clothed in shadows and lights, and on this basis I will found my first book. (97)

In his first proposition, Leonardo puts forth the suggestion that shadows and lights envelop opaque bodies. Completed in the late-1470s, this drapery study (fig. 4.5) for a
seated figure illustrates Leonardo’s first proposition pictorially as well as metaphorically. In the figure below shadow gives the illusion of depth in the folds of the drapery. Shadow as tool is being applied to the picture plane to conjure up the impression of recession. That is to say, the inner parts of the folds recede away from the light. Pictorially, the surface of the drapery is “encircled” and “clothed” by light and shadow (97).

Figure 4.5. Leonardo da Vinci. *Drapery study for a seated figure*. Late-1470s. Brush and grey tempera, highlighted with white on grey prepared linen. Musée du Louvre.
The drapery clothes or shrouds the body, which is in its turn supporting the drapery. In each of the folds of the drapery there is a privation of light where shadows assist in the creation of perceived space.

In his second proposition Leonardo is concerned with *self-shadow* and *shading*:

In addition to this, these shadows are in themselves of varying degrees of darkness because they represent the loss of varying quantities of luminous rays, and these I term original shadows, because, being the first shadows, they clothe the bodies to which they are attached [...]. (97)

He names the shadows that fall directly upon the body “original shadow”. In *Shadows and Enlightenment* Michael Baxandall equates Leonardo’s term “original shadow” with the current vernacular term “self shadow” (152). Baxandall codifies Leonardo’s concept of original shadow:

The main point about the original self-shadow is that it is not just the self-occluded surface of an object but is original or originating in the sense of being the source of derived shadow rather as an “original light” is the source of rays of light: original shadow emits shadowing rays. Apart from its shadow-emitting property, there are two other peculiar characteristics about original shadow. Intrinsically it has the same value all over, unlike derived shadow and shading, which vary in intensity from here to there. And it clings to the object: move a sphere in light and the self-shadow may move on the surface of the object but will always be there. (152; emphasis added)

An illustration of a conveniently heavy-featured man after Leonardo from the lost *Libro A* drawn around 1508, depicting light falling on a face, clearly illustrates Leonardo’s conception of original shadow (fig. 4.6). Original, or self-shadow can be observed on the upper lip which is occluded from the light source by the nose, and again on the neck, where the shadow is caused by the protruding chin. Self-shadow affects the way the human visual system organizes sensory information by creating a perceptual sense of depth, making objects, or facial features, appear further away. The perception of self-shadow also gives visual clues as to the location of a light source. In figure 4.6 the radiant lines emanating from the drawn light source (A) denote the position of the source.
At the beginning of the second proposition Leonardo discusses the concept of shading, or the “varying degrees of darkness”, as he calls it, and provides a diagram (97). In this diagram Leonardo depicts light entering from a window above that falls upon a suspended sphere. He postulates that: “Every light which falls on opaque bodies between equal angles produces the first degree of brightness and that will be darker which receives it by less equal angles […]” (111).

In Leonardo’s third proposition he is concerned not with shadow on a surface, but with the shadowy volume of an atmospheric field:

From these original shadows there arise shadowy rays which are transmitted throughout the air, and these are of a quality corresponding to the variety of the original shadows from which they are derived. And on this account I will call
these shadows derived shadows, because they have their origins in other shadows [...]. (97)

These shadows are derived from another shadow, in other words, a shadow of a shadow. Leonardo considers them “derived” because they come into existence because of another kind of shadow. Baxandall notes that:

Derived shadow attenuates in intensity as it distances itself from its origin: this is seen as the expression of a general natural principal whereby things weaken as they leave their sources, rather than a result of the progressive intervention of reflected light [...]. (153)

Figure 4.7. Leonardo da Vinci. c. 1492. Depiction of derived shadow based on Ashburnham II, folio 22 recto. Bibliothèque Nationale de France.

In figure 4.7, extracted from the Ashburnham II codex, we see a drawing by Leonardo depicting a beam of light seen colliding with a sphere. The beam of light with the same diameter as the sphere originates from the left, arrives at the surface of the sphere, creates the discernable “original shadow” on the occluded side of the sphere, and then emits the “shadowy rays” Leonardo writes about.

In his fourth postulate Leonardo is concerned with cast shadow, although he does not name it as such:

Again, these derived shadows, where they strike other things, make varied effects in accordance with the places at which they make their impact; this topic comprises the fourth book. (97)

Cast shadow is something we tend to think of as being cast or projected onto another surface like our own shadow seen on the ground. However, it can manifest itself on the same body. Again, it is Baxandall who notes:

We are less likely to think of the shadow on the far side of a concave like the Leonardo man’s neck as cast, partly because it is phenomenally almost continuous with the other sort of shadow under his chin. Indeed, we might think of the whole shadowed concave from chin to neck as attached shadow, for
the good reason that it is on the object, not thrown, (or detached) onto some other surface. (4; emphasis in text)

Attached shadows are cast also and the two terms cannot be used interchangeably. Therefore, applying the separate terms appropriately is a prudent course of action to follow. Although Leonardo clearly intended to write entire books on these subjects, it appears that he did not.\textsuperscript{13}

Leonardo’s work on shadow is relevant to my study of shadow in museums because of his interest in the way the privation of light affects human perception. I speculate that the sorts of shadows such as Leonardo defines them – cast, attached, original or self-shadow – affects to a great degree our perception of works of art and other intentionally exhibited objects such as the ALARM missile.

During the Renaissance period, the concept of shadow had been studied empirically and travelled from scientific investigations in the natural sciences to artistic studies and to alchemic studies. One such study involved a mystical memory system devised by Giordano Bruno (1548-1600), a member of the Dominican Order in 1582. In his book \textit{Shadows} he discusses “shadows of ideas”, which are to be the basis for Bruno’s Hermetic memory system.\textsuperscript{14} “In fact the star images are the ‘shadows of ideas’, shadows of reality which are nearer to reality than the physical shadows in the lower world” (Yates 216). This resembles Plato’s notion of the shadow and moves away from the mimesis-idea of shadow. Clearly, Bruno is writing about shadow in a metaphorical sense. He was burned at the stake as a heretic and is seen by some as the first martyr to the cause of free thought, a viewpoint that holds that beliefs should be formed on the basis of science and logical principles.\textsuperscript{15} During this period, the interest in the physical phenomena of shadow often manifested itself in negative metaphoric expressions of shadow. Shadow was symbolically associated during the Renaissance period with ignorance and bad tidings. However, the physical phenomena of shadow would occupy scientific minds well into the age of Enlightenment.

\textbf{Enlightenment Shadow}

Physical shadows and the perception of them become important issues from the outset of the Enlightenment period. In 1689 John Locke (1632-1704) framed succinctly the issue of how humans “achieve a perception of the three-dimensional world from the two-dimensional array of stimulations on the retina” in the form of a

\begin{footnotesize}
\begin{enumerate}
\item Kemp notes in \textit{Leonardo on Painting} that “although it is not possible to classify the surviving notes according to this scheme, the general sense of Leonardo’s arrangement has been followed” (285 n259).
\item For more on this aspect of Bruno see \textit{The Pope and the Heretic} (2006) by Michael White.
\end{enumerate}
\end{footnotesize}
question: “On what basis do we perceive that what the eye receives as a specifically shadowed circle is really a solid sphere?” (Baxandall 17). Experience, was his answer. In An Essay Concerning Human Understanding (1690) Locke claimed that what our eyes receive as a specifically shaded circle is perceived as a solid sphere because we have learned from empirical experience. Experience with shadowed circles in conjunction with spheres touched and identified as solids, “leads us to judge shadowed circles to be caused by solid spheres” (18).

Making an informed guess and an inference about the cause facilitates perception. However, we cannot rely solely on our visual perception; tactile perception is also required to smooth the progress of comprehension. Baxandall remarks that Locke’s newly formed empiricist formation of perception was radical, and he further dramatized the issue by making an addition to the second edition of his book. This was a passage where Locke reported a letter from the now famous William Molyneux (1656–98), which has come to be known as Molyneux’s Problem, or Molyneux’s Question, and even Molyneux’s Query. Whatever its name, it seemed to encapsulate Locke’s notion of experiential perception. The abridged passage is as follows:

Suppose a Man born blind, and now adult, and taught by his touch to distinguish between a Cube, and a Sphere of the same metal, and nighly of the same bigness, so as to tell when he felt one and other, which is the Cube, which the Sphere. Suppose then the Cube and Sphere placed on a Table, and the Blind man to be made to see. Quaere, Whether by his sight, before he touch’d them, he could now distinguish, and tell, which is the Globe, which the Cube? […] (2nd edition, 1694, II. ix. 8. Locke and Molyneux quoted in Baxandall 19, emphasis in text)

This case, as Baxandall points out, emblematizes the “power of the shadow”, which causes a shaded circle, through visual and tactile experience, to be perceived as a sphere (20). After experiencing the tactile and visual qualities of the bodies, the newly sighted man will now perceive shaded circles as three-dimensional spheres. Locke argues that before the blind man who was made to see could distinguish between the sphere and cube, he would first need to touch them in order to gain the tactile experience needed to differentiate between the two Plutonic solids. In other words, he would have to feel the circle that appears shaded, in order to perceive it as a multi dimensional sphere.
Figure 4.8. Roger de Piles. 1708. *Flat circles variously shadowed. Cours de peinture par principes*” (Baxandall 16, fig. 7).

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In a particularly gripping way Locke framed the issue of how we achieve a perception of the three-dimensional world from the two-dimensional array of stimulations on the retina of the human eye. Learned experience through vision in conjunction with touch enables us to differentiate between two-dimensional planar surfaces and three-dimensional objects. Figure 4.8, an engraving by Roger de Piles (1635-1709) from 1708, illustrates the concept of specifically shaded circles which allows us to perceive them as spheres because we know through experience that circles shaded in such a manner are three-dimensional spheres in the physical world in which we live. I wish to highlight here that the shaded spheres – drawn on a flat surface – emphasize the issue of pictorial depth and are not perceived as being two-dimensional, but fully round and sphere-like.

Molyneux’s Problem was not to be definitively answered in such short order; the Problem was freshened, thickened and enriched throughout the eighteenth century by many luminaries of the age of Enlightenment. The one technique that is crucial to the depiction of shadow and the illusion of relief on a two-dimensional surface is chiaroscuro. *Chiaroscuro* is the Italian term used to refer to the distribution of light and dark tones with which artists imitate light and shadow. And by extension, it also refers to variations of shade and light falling on sculpture and architecture, as a result of illumination.

To me, two painters in particular exemplify this tradition: Michelangelo da Caravaggio (1571-1610) and Joseph Wright of Derby (1734-1797). Caravaggio’s expertise was a radical Baroque naturalism that combined close physical observation with a dramatically theatrical use of chiaroscuro, exemplified by his *Christ at the Column* (c. 1607) (fig. 4.9). In this work, Caravaggio uses light to direct attention to the pivotal aspects of the composition. Alternatively, shadow and darkness enable him to use light dramatically by creating a steep contrast gradient between the foreground and background.
Chiaroscuro had been practiced for many years, but it was Caravaggio who made the technique exceptional, by darkening the shadows and transfixing the painted subject in a blinding shaft of light.\textsuperscript{16} Wright on the other hand is associated with the age of scientific enlightenment and industrial revolution with such paintings as \textit{An Experiment on a Bird in the Air Pump} (1768) and \textit{A Philosopher giving that Lecture on the Orrery} (1766) (fig. 4.10). Both artists could produce successful paintings that included areas that ranged from blindingly bright subjects to the blackest recesses of pictorial depth.

De Piles’ engraving illustrates both senses in which chiaroscuro was used during the eighteenth century. The first is “the working of light and shade in the world” and the second is “the artistic arrangement of light and shade in pictures”

\textsuperscript{16} For an examination of Caravaggio’s work that is informed by cultural analysis in relation to contemporary artworks see Bal 1999b. See also Itay Sapir’s \textit{Early Baroque Tenebrist Painting: An Epistemological Interpretation}. Unpublished PhD dissertation, ASCA, 2007.
In de Piles’ engraving (figs. 1, 2 & 4 in his image; my fig. 4.8) circles are shaded to represent spheres illuminated by an unseen but perceivable light source, originating beyond the frame coming from the top right. In figure 2 of the engraving, a single sphere is depicted illustrating various degrees of shading. On the occluded side of the sphere self-shadow is depicted, as well as projected shadow appearing on the surface on which the sphere rests. The other sense in which chiaroscuro was used during this period is seen in figure 3 of de Piles’ engraving. This figure depicts a bunch of grapes still on the vine composed of the same shaded circles, but it also illustrates the artistic arrangement of light and shade over the surface of the entire picture plane.

This one page depicts the three-value scale of lights, half tones and shadow that was prevalent during the eighteenth century. But it was in Méthode pour apprendre le dessin, the 1755 illustrated handbook on painting by Charles-Antoine Jombert (1712-84), where an important summary on shadow appeared in conjunction with corresponding technical illustrations. This handbook was a revised publication based
on the anonymously published *Nouvelle Méthode pour apprendre à dessiner sans maître*, attributed to Jombert. In a footnote attributed to Jombert's close friend, Charles-Nicolas Cochin (1715-90), the eighteenth-century's obsession with shadow was clearly articulated. Baxandall derives from this note his own questions:

The eighteenth-century issues emerging from Jombert-Cochin's footnote can be generalized as follows: What can be said about the outline form of shadows? And how rigorously can it be said? How do light's complex ways of operating, particularly reflection and refraction, bear on the character of shadow? What determines the different intensities of different shadows in the same array? What about different kinds of lighting, focused and diffused? What happens to object colours within shadow? And why do shadows sometimes themselves appear coloured? (79-80)

Because the answers to Baxandall's questions will aid my investigation of the operations of light and shadow, I will endeavour to answer them one by one. This will assist in creating a rhetorical toolbox with which I can analyze my cases.

“What can be said about the outline form of shadows? And how rigorously can it be said?” The edges of shadows are not definitive. As Baxandall has it, there are “multicoloured fringes associated with shadow edges” (82). In fact, there are successively fainter and narrower streaks of white light at the edges of shadows. “How do light’s complex ways of operating, particularly reflection and refraction, bear on the character of shadow?” In *Physico-Mathesis de Lumine, Coloribus, et Iride* (1665), Francesco-Maria Grimaldi (1618-63), experimenting with the behaviour of light, claimed that light has four operational modes of movement, all of which bear on the character of shadow. *Direct light* consists of light waves that are unimpeded in their directional flow. However, Enlightenment observers had either a particle conception or fluid conception of light; the wave theory was still to be promulgated. Grimaldi understands *refraction* as the apparent bending of light when it “passes from one sort of physical medium to another” (80). In addition, he observes that light is propagated by *reflection*, where the phenomenon of light is thrown back, or reflected after striking a solid surface. And the last operational mode of light movement he distinguishes is *diffraction*. This is the breaking up of a beam of light into a series of light and dark bands (in the case of monochromatic light), or into coloured spectra (in the case of white or other composite light). The occurrence is due to the interference of the rays when deflected from their original straight course. The last two, reflection and diffraction, have the most remarkable implications for shadow, for Baxandall’s and for my own analysis of shadow operations. Reflection has pertinent implications because it can determine shadow intensity and at the same time plays a variously great role in
the colour of shadows. Impassioned shadow watcher J.H.S. (Privé) Formey (1711-97),
the author of the article “Ombre” (Shadows) in Dennis Diderot’s (1713-84) Encyclopédie writes:

Unvarying laws as ancient as the world itself make the light of one body spring back on to another body, and from this successively on to a third, and then continuously on others, like as many cascades; though always with progressive reductions in strength, from one stage of falling to another. (qtd. in Baxandall 81)

An analogy can be drawn between the bounce of light beams from surface to surface and the bounce of a ball that has successive reductions in energy after each bounce. Reflections of light also diminish after each successive bounce.

The operational mode of reflected light movement could also be applied to answer the third question: “What determines the different intensities of different shadows in the same array?” When light is reflected from surface to surface it reduces the intensities of different shadows. This particular question is taken up by the engraver Charles-Nicolas Cochin (1715-90) with the publication of his Dissertation sur l’effet de la Lumière dans les Ombres (1757), a written text taken from a lecture he gave in 1753 at the Académie Royale de Peinture et de Sculpture in Paris.

The fourth question: “What about different kinds of lighting, focused and diffused?” hinges on the different types of sources of light, which in turn impacts the edges of shadows. Focused, sharp-edged beams of light produce sharper-edged shadows, but even they have perceptible white streaks of light at their edges. Let me remind the reader here that the sources of artificial light during this period were restricted to light emitted by a flame from tallow, wax or oil, which generally produces diffused edges. However, through the use of various optical devises such as prisms and ground glasses, experimenters could produce light with varying degrees of edge sharpness, and by extension, shadow edge sharpness also varied.

Through an analysis of shadow from antiquity to the Enlightenment, I have brought into focus various aspects of shadow formation that often escape our notice. The aim of which was to equip myself with an analytical toolbox with which I can investigate shadow. I have also foregrounded the ambiguities and complexities of shadow in relation to human perception and the creation of space in an endeavour to lay bare shadow phenomena and set the theoretical groundwork for the cases that follow. In the next section I will discuss the shadow as tool in association with twentieth- and twenty-first-century artworks and museum displays.
**Shadow Frames**

In this section I analyse so-called framing shadows, that is to say, shadows that are displayed and which frame an exhibited object. The first of several examples discussed below is the shadow that is created by the display of a military missile (fig. 4.1). The second is a shadow that appears in artist Constantin Brancusi’s (1876-1957) photograph of his sculpture *Prometheus* (1911). Next, I return to the work of Janssens. The last example is the shadow created by a deceivingly precise abstract metal sculpture entitled *Jet* by Larry Kagan (1946-). Common to all the examples is the unifying thread of exhibition. The shadows appear as part of the artwork rather than a mere effect of the placement of the objects. In the previous chapter, I suggested that ultraviolet light functioned in both ways; not only does it make unseen aspects of artworks visible, but it is also a necessary constituent of the artwork. In chapter two, I argued that the shadowy parts of the *Dangerous Liaisons* exhibition receive less attention. In contradistinction, in this chapter, shadow takes centre stage, so to speak, and I demonstrate that it too has a specific function. These shadows, in different contexts, are placed to be seen and in turn frame the objects on display. As such, they produce meaning through their rhetorical effect. I analyse the operation of shadows deployed within an exhibitionary context.

Frames are basic structures that restrain our cognitive faculties and affect our perception. They limit visual representations of reality and can be physical or temporal in nature. Familiar museological frames include the frame around a painting or the fortified edges of a transparent vitrine containing precious artefacts. These types of frames define physical and visual borders; they define the viewer’s vision in relation to the artefact on display. I would like to suggest that light frames objects by highlighting or obscuring their features while creating a perceived contrast between object and background. Light is a typical form of framing as well. Familiar types of light-frames are theatrical followspots that frame a stage performer, and military searchlights that frame enemy aircrafts in the sky. Similarly, light frames in a museological environment include the effect produced by shuttered luminaries to shape or texturize the beam, as well as any specialized lighting situation that actively conditions our perception of an exhibit or whole exhibition. All displays are, in some way or another, encased in light.

Therefore, I would like to advance the idea that light and shadow can be used as a rhetorical frame. When light frames are directed onto objects, a shadow frame often results. The shadow frame and the light frame are akin to one another in a

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17 For more on the military use of spotlights see Kittler’s, “A Short History of the Spotlight”.  
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complementary way, that is, they can be seen as two sides of a single coin. I contend that the theoretical searchlight of framing enables us to hear what is “metaphorically” spoken by the shadow as tool, in Bal’s sense of the term. As a verb and as a concept “framing” can be understood as an act that “produces an event” (2002: 135). In Travelling Concepts, Bal constructs three arguments for the use of the concept of framing, which involve context, event making and time or duration. Frames help us to interpret meanings, but create them as well. In addition, they never stand by themselves; they are constructed by an encounter between the viewer and the exhibited object, and as such framing is a process of selective control over our perception. It also defines how an element of rhetoric is “packaged” so to speak. In the introduction to his book Framing the Sign, Jonathan Culler explains that “framing is something we do [...]”, it is an act, something which is enacted (ix). Correspondingly, Bal suggests that “[t]he act of framing [...] produces an event [...] in the present, the here and now; and the agent of framing is framed in turn” (2002: 135). Bal thus suggests that the frame is an organizing structure with which to focus upon a certain aspect or meaning of an artefact or exhibition. Whereas most framing is highly visible (picture frames, theatre stage and curtains, display cabinets), light as a framing device often goes unnoticed and it can be difficult to tell whether light is part of the artwork, part of its framing or an accidental environmental factor.

The event of viewing an artefact within a specifically lit environment in a museum takes place in the present; museum viewers experience this event from certain culturally determined frames of reference. The verb form “framing” predicates objects in time, space and aspect (Bal 137), that is to say, it situates the artefact in the physical world, yet setting it apart. This new perspective on framing is at the forefront of contemporary cultural analysis as well as of communication and media studies. Artist Larry Kagan considers a frame to be “a visual stage; it can be seen either as a window out into deep space or as a finite universe that does not extend beyond the frame’s border” (162). We consciously and subconsciously frame in order to see an object or artefact more clearly and in a so-called different light.

I adopt the concept of framing in this section in order to investigate how shadow as tool influences our perception of pictorial and exhibitionary spaces. Concepts travel from one artistic or academic field to another – often changing, morphing or acquiring additional baggage along their journey. The analytical concept of framing is one of these continually morphing concepts that move through disciplinary fields such as literary studies, art, art history, and now here to a

18 “Framing” (Bal 2002: 133-173).
museological investigation. I am going to let this concept travel a little further into museum studies in my analysis of shadow. Frames are brought to bear on, or “frame up” cultural objects in order to bring them into focus and meaning. Regarding the act of framing, Bal argues that: “historical […] experience infuses subjects in the present with the temporal density that ‘history’ provides” (153). This explanation is useful to illustrate the active nature of framing artworks and artefacts in the present using shadow.

The artefact illustrated in figure 4.1 is an Air-Launched Anti-Radar (ALARM) Missile measuring 4.24 meters in length, 23 centimetres in diameter, has a wingspan of 73 centimetres, and weighs 268 kilograms. This particular one (Imperial War Museum Inventory # MUN 4604) is a fully weighted, non-operational munition intended only for exhibition purposes. Its nose cone is red, its wings are black and the body is painted white. When fully operational, this missile destroys radar defences, thereby providing support to attack aircraft while penetrating hostile air defences. The missile is suspended above the heads of the viewers, its nose is pointed to the left, and it is placed close to where viewers of the museum enter the main gallery. However, it is the shadow on the adjacent wall that is the element of the composition under analysis here.

As an effect of the illumination, the lighting generates a readily detectable cast shadow on the wall that, I contend, should be considered as a frame for the missile as artefact. In addition, what Leonardo calls original shadow in his second proposition is evident and blankets the missile. The cast shadow is easily detectable because of the contrast between the perceived brightness of the white wall and the dark space created by the privation of light caused by the missile. I consider the shadow a framing element, firstly, because it creates a backdrop against which to view the missile. Spatially speaking, the missile is “in front of” its shadow, which perceptually thrusts the missile into the foreground of the exhibit. My analysis considers the shadow as a (framing) tool, first in a physical sense and then in a metaphorical sense.

Physically, there is a space between the receiving wall on which the shadow resides and the hanging missile. This distance, in conjunction with the placement of the luminaires, accounts for the greater size of the shadow. A two-dimensional space is created and delineated by the relatively sharp-edged shadow cast on the receiving wall. This makes the shadow an easily recognizable outcropping of the missile because of its shape, its proximity to the artefact and the fact that it appears in the same visual

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Exhibition purposes are not limited to only museum exhibitions, but also include political functions and military parades.
array. Perceptually speaking, we unquestioningly admit that the missile “causes” the shadow. The directionality of the source of light in relation to the viewer can be practically observed by the size and position of the attached- and cast-shadows and also by the shading or “various degrees of darkness” (Leonardo 97), as I mentioned above.

As a result, two sorts of space are created by this framing shadow. The first is a pictorial space where the silhouette of the missile is projected onto a surface. It is, in fact, a realistic projection with little distortion and a moderately sharp edge. Uniform intensity of darkness across the shadow is apparent. These characteristics aid our perception of the cohesive whole image of the shadow, instead of a cacophony of individual geometric shapes of which the shadow is constituted. The second sort of space created by the shadow is a kind of metaphorical space that the missile inhabits. The printed word “peace?” that appears to be a cast shadow indicates or produces this metaphorical reading by asking a question with the use of a single punctuation mark, a mark that punctuates the metaphor where the descriptive word (peace) is transferred to the object (shadow and missile). Moreover, the appearance suggests that the missile itself asks this question rhetorically, since the word “Peace?” appears as a shadow of the missile even if this is not actually the case.

Another message conveyed by the framing shadow is the notion of flight. In combat, missiles fly through the air in search of their target. In this exhibit, we may say that the missile metaphorically flies through the carefully orchestrated perceptual space of the museum environment with the aid of its shadow frame. This installation technique accentuates and conveys to the viewer the impression of flight.

The missile and its shadow are not the same size. The shadow is greater because of the alignment of the artefact in relation to the light source and the receiving surface. Larger than the missile, the silhouette can be read as “over-shadowing” the missile itself. Because shadow is associated with death, and the shadow is larger than the missile, I speculate that the curators of the exhibit seek to convey that weapons such as the ALARM missile do not facilitate peace, but rather its opposite. In traditional metaphors of light, peace is equated with light and darkness with war. In this artwork, however, it is as though the shadow reveals the “truth” of the object, running counter to the traditional metaphor and to Plato’s influential view on the shadow.

As I mentioned in the introduction to this study, metaphors of light and shadow abound throughout history, and this particular shadow is a prime example for discussion of these metaphors – illustrating how they may be interpreted. The semiotic concepts of connotation and denotation are useful here to aid my analysis of
the missile exhibit. The concepts are commonly associated with John Stuart Mill (1806-73), however many others including John Fiske (1842-1901), Roland Barthes (1915-1980) and Stuart Hall (1932-), have written extensively on the subject. Hall considers the connotative and denotative aspects of signs in his essay “Encoding/Decoding” where he distinguishes the terms used in linguistic theory and visual discourse:

The term “denotation” is widely equated with the literal meaning of a sign [...]. “Connotation” on the other hand is employed [...] to refer to less fixed and therefore more conventionalized and changeable associative meanings [...]. In actual discourse most signs will combine both the denotative and the connotative aspects. (170-71; emphasis in text)

Denotation involves a strict description of the sign, while connotation involves a culturally associated meaning or ideology. In his essay “The Rhetoric of the Image”, Barthes submits “the image to a spectral analysis of the messages it may contain” (32), while explaining “that the literal image is denoted and the symbolic image is connoted (37, emphasis in text).

My image of the missile also contains messages. What are the messages contained in figure 4.1? The image of the missile denotes an airborne cylindrical military weapon. In addition, the missile connotes war, death and destruction. The shadow denotes an obstruction to the flow of visible electro-magnetic radiation; a “privation of light”, writes Leonardo. Like the missile, the shadow connotes death. But also the so-called other, or alterity. In other words, to exchange one’s own perspective with that of an “other”; an idea put forward by philosopher Emmanuel Lévinas (1906-95). The concept of “the other” has been deployed by contemporary anthropologists such as Johannes Fabian (1937-) and Michael Taussig (1940-) in particular. This doppelgänger image of the missile (the shadow) is what I understand Barthes could have in mind when he refers to “the scene ‘en abyme’” (33).

This redoubling capacity of the missile and its shadow together has now created its own connoted (associative, symbolic) messages. The missile is no longer seen only as one weapon of war – a singular instrument – but it now symbolically connotes a representation of all weapons of war. The larger cast shadow connotes the great loss of life caused by these potent weapons. Is this a violent weapon, an enforcer of peace or an innocent artefact? The shadowy-word “peace?” triggers our perception and beckons us to contemplate the question, do weapons lead to peace? Through the spatial juxtaposition of artefact and shadow, a transformation in meaning occurs to connote commemoration, the act of keeping the memory of individuals (combatants
and non-combatants) alive. In other words the shadow becomes a memorial trace. The object achieves this by affecting the viewers’ perception.

I have shown that the ALARM missile is visualized, perceived and interpreted variously under different luminous conditions within the same exhibition space with the aid of the shadow as tool. Because the shadow is placed prominently – to be seen – it adds spatial and narrative depth to the story being told by the curators, or in fact, by the shadow itself. In what ways does this so-called depth contribute to the ways shadows are read by the viewer?

In figure 4.11 a marble sculpture entitled Prometheus (1911) is depicted resting on a plinth by sculptor Constantin Brancusi. A single sharp-edged cast shadow appears on the plinth supporting the sculpture. Self-shadow, in accordance with Leonardo’s second proposition, clings to the bottom of the sculpture where it meets the plinth. A shading gradient is also visible which diminishingly extends from the boundary of the self-shadow on the bottom upwards until the light source extinguishes the shading shadow. Brancusi has apparently placed a single light source directly above the sculpture, lighting both the sculpture and the plinth in a particular way.

We know this because the relatively compact single light source produces a sharply defined cast shadow directly below the stone head creating “an a-spatial presence” that immaterially frames the sculpture (Stoichita 193). In his article “The Development of Light Art”, Peter Weibel suggests that “Light generates virtual volumes without bodies and matter” (100). I would like to suggest that shadow also generates virtual volumes. The cast shadow beneath Prometheus’ head appears as a concave void out of which Prometheus rises. Brancusi’s sculptural head is seen floating above a black abyss and hovering just above the square plinth. Alternatively, the framing cast shadow can be interpreted as an element of separation, separating the sculpture from its supporting plinth.
Stoichita illustrates his discussion of Brancusi’s use of discursive photography with two illustrations of photographs taken by Brancusi. Shadows figure prominently in photographs of both *The Beginning of the World* (c. 1920) and *Prometheus* (1911). These shadows define the spatial relationship between a sculpture and its location, or the space it occupies. Because Brancusi would only accept photographs of his work taken by himself, as Stoichita points out, we can extrapolate that Brancusi considered shadow an integral part of his creations. His sculpture is underscored by a “black bodiless stain” (194), which frames his artwork and creates a perception of space in the mind of the viewer.

Brancusi does not render a full-body sculpture as one might expect, but simply fashions a minimalist low-relief head. I speculate that there are several reasons why Brancusi chose to depict Prometheus by representing only his head, which is to a certain extent, appropriate for this particular Greek myth. In Greek mythology, Prometheus is most familiar for stealing Fire from the hearth of Mount Olympus and giving it to mankind, ushering in an age of Enlightenment. The stealthy act of stealing the fire is a cerebral process, one occurring within the confines of the head. The shadow as tool frames the sculpture in such a way as to accentuate the dark forces associated with the act of thievery.
Another part of the myth appearing in Ovid’s *Metamorphoses* credits Prometheus with curing the headache of Zeus. In this part of the story Zeus was stricken by a horrendous headache that no healer of the Olympic realm could cure. Prometheus declared that he could cure the Lord of the Gods and proceeded to strike the ruler with a rock, splitting his head open. From out of the gash emerged the goddess Athena and Zeus’ headache disappeared. It can be argued that Athena is therefore an outgrowth of the head of Zeus. In this sense, the shadow is a memorial trace of both Olympians.

Rudolf Arnheim (1904-2007) considers shadow a development of the object: “Throughout the world the shadow is considered an outgrowth of the object that casts it” (317). The shadow on Brancusi’s plinth is just such an outgrowth. In addition, the objects on the plinth are an allusion to the presence of Athena and Zeus within the context of Ovid’s literary work. Because there are two forms on the plinth, the sculpture and shadow, a connection can be drawn between Brancusi’s photo-sculptural interpretation and the story. I wish to make one last connection between the literary work and the sculptural work. When Prometheus was invited to return to Mount Olympus after assisting in the glorification of Zeus’ son Heracles, he was still obliged to carry the rock to which he was mythically chained. Brancusi’s sculpture, as exhibited and documented in the photograph, is emblematic of just such a rock because of the general shape of the sculpture and its similarity to a ball-and-chain used historically for incarceration purposes.

High and low contrast areas are discernable on Leonardo’s drapery study (fig. 4.5) and Daege’s *Invention of Painting* (fig. 4.4), as well as in Brancusi’s image. The background and foreground of the photograph are almost completely black, in contradistinction to the illuminated features of the sculptural head and plinth. The difference between the unlit surfaces of the plinth and the background of the image is almost indiscernible, that is to say that the contrast is considered to be low and tends to blur our perception of individual objects in space. However, the contrast is considered high in other parts of the image. High contrast situations tend to increase our ability to discern individual objects. For example, the contrast between the top of the sculpture and the background is markedly high. I can easily discern the boundaries of the sculpture because of the contrast between it and the background.

This also holds true for the boundaries of the plinth where high contrasts can be observed between its lit and unlit surfaces. But by far the highest contrast in the image exists between the cast shadow and the plinth. This contrast is key to the power of the shadow because by providing the high contrast it allows the shadow to emerge into the world, focus our attention, and frame the artwork. The shadow as tool has
affected visual perception to such a degree that it creates a visual line of demarcation, in a real sense between the sculptural object and its base, and in a metaphorical sense between Prometheus and the shadowy world of myth. The shadow in Brancusi’s photograph has helped underscore this contrast between real physical space and imaginary mythological space. In this case, the outline of a shadow can differentiate objects from the space they occupy and affect the perception of viewers. In this example, as in the case of the missile, there is a strong relationship between the shape of the sculpture and that of its shadow. In the final example this is not so, and I will show shortly how lines consisting of shadow can create the perception of an immaterial pictorial entity. But first, I would like to return the work of Janssens in order to investigate ways in which artworks can frame the viewer with darkness and shadow.

In *Représentation d’un corps rond* (2001) (fig. 4.12), Janssens has created a lightwork that not only “thrusts out” and “separates” the body of the viewer from others, in Foucault terms, but she does so with shadow and obscuration. In this piece viewers are confronted by an intense rotating light source which creates a silhouette effect against which viewers see each other as shadowy voids cut out of the light. A Cyberlight, fitted with a patterned gobo template creates a hollow, cone shaped beam of light in front of which viewers see a dark representation of themselves and others, by an effect of Leonardo’s “privation of light”. This effect also frames the viewer with a halo-like emanation where the body is placed at the centre of the piece while paradoxically de-centring the viewer by overloading the visual organ of the eye with the blinding intensity of this exotic light source. It is precisely this blinding effect which allows the eye to find the dark body or shadow caster that produces Leonardo’s derived shadow in space, which appears like an outline of a bodily-shaped form.
Another work by Janssens which centres the body of the viewer in its outward gaze is *Le corps noir* (1994) (fig. 4.13). An edition of this discrete piece, which I
Cultures of Light

had the pleasure of experiencing in a residential setting, produces on first look, an inverted “soap-bubble” reflection of the viewer. Upon closer inspection it became apparent that the image is framed by the outer limits of the black concavity. In this work, reflected light in the form of an inverted mirror image emerges from the centre of this concave highly polished Perspex bowl. The work is concave, but the image produced appears convex. While standing in front of the piece, the body of the viewer is framed by a dark ring where light is reflected in such a way that it creates a dark frame around the image with a razor-sharp edge.

![Figure 4.13. Ann Veronica Janssens. Le corps noir. 1994.](image)

With a more active engagement of the piece I found that it held a secret which only revealed itself by placing your hand inside, that is within the space created by the form. When you place your inwardsly turned hand into the sculpture as in a scooping motion, it appears to slip behind the image. The hand of the viewer appears to go behind a material surface which is only light. This is a human-scaled modest sculpture in appearance, however, it is powerful in it affect. With this piece Janssens proposes to make light more tangible, as if it could slip right through your fingers like reflective liquid mercury. The viewer becomes fascinated with the materiality of his or her own image which is framed by darkness. In both of these pieces Janssens invokes the word “corps”, the French word for body. She wants us to know that the body is on her mind. I maintain that, to have an embodied experience with these pieces, is one
aim of her work. The other, related aim is to lodge that experience in contact with the materiality of light and shadow.

Larry Kagan’s use of shadow in his oeuvre is not only remarkable for the shadows that are displayed, but also for their ingeniously hidden shadows, that is shadows overlain by other shadows so that they appear as one. Kagan creates sculptures where shadow is the focal point of the work. At a recent Paris exhibition devoted entirely to shadow entitled *Ombres et lumière. Rêves d’ombre* at the Centre Pompidou, Kagan exhibited a shadow sculpture similar in composition to *Jet (2000)* (fig. 4.14), currently in the artist’s own collection. *Jet* was “built before the Iraq war when the no fly zones were in the news” but when war was on the minds of the American people.²⁰ The piece is politically infused because of the imposition of no-fly zones at the time; they are controversial acts, made obligatory during periods of conflict. Assembled from wire, light, shadow and wall, this sculpture measures 40” x 40” x 12” (steel and shadow combined) and is created by the interaction of material steel and light.

![Figure 4.14. Larry Kagan. Jet. 2000. Light source, metal wire and shadow. 40” x 40” x 12” (steel and shadow combined). Artist’s collection. Image courtesy of the artist.](image)

Kagan employs previously used large-gage rusty bailing wire of the sort utilized to wrap huge metal beams transported by ships during oceanic voyages. In a 2003 interview he admits that he prefers to “reuse stuff rather than use new stuff” (MacDonald 3). When he receives the wire it is already bent and curved, which might offer ideas about form. His sculpture, in fact, has two foci: the shadow on the wall and the wire casting it. Is the wire actually casting the shadow? The steel sculpture, which has no determined shape, is in fact casting the clearly shaped image and this is undoubtedly the relation Kagan is playing on. It seems impossible that there is a one-to-one relation between the wire sculpture and the shadow but, nonetheless, it is the case. The steel wire and the wall surface are not only related, as in Brancusi’s Prometheus, but here the shadow is integral to the work, as is the light source, for without it there would be neither shadow, delineation of space nor pictorial image. Again, in this case the light source is of paramount importance for the visual success of this artwork, which Kagan has termed “object/shadow sculpture” (Ackerman 2). It is the apparent discordance between the object and the shadow that makes this such a fascinating artwork.

In his article “Object/Shadows: Notes on a Developing Art Form”, Kagan defines the term as: “a condition wherein a solid component of the sculpture casts a specific shadow that completes the artwork” which is the case here. He comments that “Object/Shadows need both solid [component] and the shadow in order to exist” (158, emphasis in text). The wire object and its shadow are complementary in such a way that they artistically complete each other’s deficiencies. The recognizable form of the shadow leaves nothing wanting in the abstractness of the wire form. Also, the wire is vertically oriented and the shadow oriented horizontally, thus lending a pleasing balance to the completed work.

There are three elements necessary for Kagan’s Shadow/Objects. The first element is the wire that he forms to create a seemingly abstract shape. Kagan uses his background in construction engineering to bend the wire in such a way as to produce an identifiable image of a stylized object of everyday life that when illuminated from a precise location creates a cast shadow. Kagan’s shadow edges are both sharp and well defined in some places, but blurry and ill defined in other places of his artworks. He employs the wire in order to cast particular shadows, while at the same time hiding others. That is, he uses the wire to hide shadows in shadows. Kagan’s use of shadows is distinctly different from that of Brancusi because Kagan’s shadows actually produce an image, whereas Brancusi’s shadow is more like a supportive secondary plinth, which is not acutely necessary.
The second crucial element necessary for the successful completion of one of Kagan's sculptures is a light source. More precisely, he utilizes a point source luminaire where the filament of the lamp is tightly arranged. This opposed to a diffused source such as, in the extreme, daylight, where the atmosphere reflects light uniformly and produces what Leonardo called universal light. North-facing exposures were much favoured by painters because of the even distribution of reflected light, but in Kagan's case it would render the effect of his sculptures almost invisible. His work necessitates a point light source in order to produce the relatively sharp shadow captured in figure 4.12.

A receiving surface for the shadow is the third essential element for Kagan's shadow work. The surface should be light in hue in order to provide a sufficient contrast for the shadow to appear visible to the eye. Another property that is important for the receiving surface is its level of reflectivity. It should be a matte surface that diffuses light evenly. As Baxandall explains, these types of surfaces are known as Lambertian surfaces. “Lambertian surfaces, such as chalk or indeed the moon, reflect diffusely in such a way that they seem equally bright from any angle […]” (Baxandall 6, emphasis in text). The term Lambertian is coined from the works of the eighteenth-century student of light Johann Henrich Lambert (1728-77) and the perfectly diffusing surface is described by Lambert's law. This law states that the reflected or transmitted luminous intensity in any direction from an element of a perfectly diffusing surface varies as the cosine of the angle between that direction and the normal vector of the surface. As a consequence, the luminance of that surface is the same regardless of the viewing angle.21

It is the apparent discordance between the sculptural steel object and the shadow that makes Jet such a fascinating object. Shadows are not straightforward or uncomplicated. In Plato's cave allegory, as in Kagan's pieces, the connection between being and truth is disrupted, but in a different way. With Kagan's Jet, we as viewers see the abstract wire but find it hard to believe that it actually casts the shadow because of the apparent discrepancy in shape. Thus, we see the truth but refuse to accept it. Plato's prisoners, who are not privy to seeing the apparatus or shadow-caster, which is only a puppet, believe that the shadows on the wall are a realistic, truthful depiction of the world. Only when they go outside do they discover that they were mistaken.

There are important differences between the artworks I have discussed here. In the case of the ALARM missile the shadow is not part of the displayed object, but part of its exhibition. In the case of Brancusi's Prometheus, the shadow is not part of

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the object, but part of the photograph of the object. This could be seen as an object in its own right. In Janssens’ case shadow and darkness frame the viewer. In the case of Jet the shadow is integral to the object. This goes against our usual perception of the shadow as supplement, but at the same time invokes the notion that losing your shadow can mean losing yourself, as I mentioned earlier. What the objects taken together show is that although the different types of shadows seem straightforward, they are in fact quite physically complex and demand mindful observation, which is also the point of the theories I considered in the first sections of this chapter.

On the basis of these analyses, I find that shadow-as-tool affects our perception of space and the meaning of objects by facilitating transformations in meaning. The artefacts never stand alone when shadows are present and observed. Shadow is imbued with the ability to alter our perception, dependent on the display technique employed. In the case of the ALARM missile, for example, the cast shadow is employed as a backdrop to the exhibited artefact, continuously beckoning our gaze to move between the two. And during this process of oscillation, I am coaxed to contemplate many meanings from a single exhibit.

In Brancusi’s Prometheus, the cast shadow on the plinth creates a metaphorical link between artwork and its display technique. With this image of an exhibit I am cajoled into making a decision as to whether the sculpture is resting atop a solid surface, rising out of it, or sinking into a black abyss. I am torn between the choices and maybe that is exactly the point.

For Jet, Kagan has used shadow to make a political statement depicted pictorially by means of shadow. Paradoxically, I would speculate that the piece is, at the same time, a statement for and against the no-fly zones. By depicting the aircraft in such a stylized or even idealized manner, which connotes speed and movement as opposed to denoting a plane, it can be argued that the piece supports the notion that no-fly zones assist in the peace process. However, the piece can also be seen to condemn the dictatorial act. Because Kagan depicts the aircraft designed for combat with a shadow, the viewer can easily be persuaded to envision the memorial trace left by people who were killed in the conflict. He has transformed the abstract sculpture into something organized, politically charged and readily recognizable. Kagan’s aircraft has two missiles, thus bringing me full-circle and back to the ALARM missile duplicated by its shadow and supplemented by the insistent question, Peace? In the end, shadow as tool in all these cases defines and redefines the spatial and temporal relationships between the artefact and its viewer and shadow thus turns out to be at least as important a framing device as light.