Penultimate Draft.
The article appears in:
Estetika 2022, vol. 1

Mirrors, Windows, and Paintings

Clotilde Calabi, Wolfgang Huemer and Marco Santambrogio

Abstract: What do we see in a mirror? There is an ongoing debate whether mirrors present us with images of objects or whether we see, through the mirror, the objects themselves. Roberto Casati has recently argued that there is a categorical difference between images and mirror-reflections. His argument depends on the observation that mirrors, but not paintings, are sensitive to changes in the observer's prospective. In our paper we scrutinize Casati's argument and present a modal argument that shows that it cannot establish this conclusion. We suggest that Casati's line of reasoning suffers from the fact that he does not take dynamic images, i.e., images that change over time, into account.

Keywords: Mirror images; Pictorial representation; Perspective; Dynamic images; Brunelleschi's experiment

Half-jokingly, Plato compared mirrors to accomplished painters. Leonardo da Vinci, on the other hand, was quite serious when he urged his fellow artists to take mirrors as masters and touchstones.[1] This was based on the assumption that the images paintings present to us are

[1] 'How the mirror is master of painters. When you want to see if your painting altogether conforms with the thing portrayed in nature, take a mirror, and make the live thing reflect in it, and compare the thing reflected with your painting, and consider well whether the subject of one and the other likeness conform to each other. Above all the mirror is to be taken as master, I mean the flat mirror, inasmuch as on its surface things have similarities with paintings in many parts; that is you see a painting done on a plane show things that seem in relief, and a mirror on a plane does the same; a painting is just a surface, a mirror is the very same; a painting is intangible, insofar as that which is round and distinct cannot be circled with hands, and mirrors do the same. Mirrors and paintings show the similarity of things surrounded by shadow and light, and one and the other appear well beyond their surface. And if you know that a mirror through features and shadows and lights makes things seem to stand out for you, and your having among your colours shadows and light more powerful that those of the mirror, of course, if you know how to compose them well together, your picture too will seem itself a natural thing, seen in a great mirror' (Leonardo da Vinci, *Trattato della Pittura* (Milano: Società Tipografica Classici Italiani, 1804), 165f, translated by R. Casati). See also Vivian Mizrahi 'Mirrors and Misleading Appearances.' *Australasian Journal of Philosophy* 97, 2 (2019): 354-367, where she points out that 'according to Leonardo's guidelines,

precisely of the same kind as what we can see in mirrors. The assumption became much of a common place for at least the subsequent two centuries and retains its appeal to this day. Zeno Vendler for one endorses both the spirit and the letter of Leonardo's claim.

> We see [mirror images], yet they are nothing in the physical world. The mirror image of my face appears behind the mirror, yet there is nothing there but bricks.[2]

The main competing theory concerning mirrors is that, in them, far from seeing images, we see the reflected objects themselves. Roberto Casati[3] has recently presented an argument based on commonplace observations to show that mirrors are quite unlike paintings, in so far as what we see in mirrors are not images. If the argument is at all convincing, Leonardo was decidedly off-target and so is Vendler, among many others. We shall argue that Casati's argument has some major flaws.

Let us retrace the steps of Casati's argument. First, he divides up theorists attempting to answer the question, What is it that we see in mirrors?, into two types: the Multipliers and the Unifiers. Multipliers contend that what is seen in mirrors are images of the objects situated on our side of the mirror, not the objects themselves. Thus, they multiply the entities that are there to be seen.[4] According to the Unifiers, on the other hand, what we see in mirrors are the reflected objects themselves. Such ontological austerity is to be applauded. However, there is a price to pay for it. Objects are seen in mirrors as being located in places different from where they really are — e.g., one sees oneself as behind the mirror, despite one's being in front of it — and as having properties different from those they really have — e.g., when Captain Hook, who has a hook on his left arm, looks at himself in the mirror, he

---

pictures and mirrors are similar because […] they create the illusion that there is a three-dimensional reality beyond their surface' (365f).

[2] Zeno Vendler, "The Ineffable Soul," in *The Mind-Body Problem: A Guide to the Current Debate*, ed. R. Warner and T. Szubka, (Oxford: Blackwell, 1994), 317–328: 322.

[3] Roberto Casati, "Mirrors, Illusions and Epistemic Innocence," in *Perceptual Illusions. Philosophical and Psychological Essays*, ed. C. Calabi (Basingstoke: Palgrave, 2012), 192–201.

[4] Among the Multipliers, Casati lists Ned Block, "Why do Mirrors Reverse Right/Left but not Up/Down," *The Journal of Philosophy* 71 (1974): 259-277. Mohan Matthen endorses that view in his *Seeing, Doing and Knowing: A Philosophical Theory of Sense Perception* (Oxford: Oxford University Press, 2005).

sees the hook on the right. This has to be accounted for somehow. Some, but by no means all, Unifiers are willing to concede that specular experiences are illusory. Their view is sometimes called 'specular illusionism'.[5] To the contrary, no illusion needs to be involved in specular experiences according to Multipliers. On their view, such experiences concern entities — i.e., images — other than the ordinary, material ones. They can be correctly seen as possessing spatial properties that are simply unlike those of ordinary objects (even though it is perfectly compatible to say that we see an image and undergo an illusion).[6] The loss of metaphysical sobriety inherent in positing extra entities beyond those existing on our side of the mirror is counterbalanced by eschewing specular illusionism. Having thus introduced images in their ontology, Multipliers can put them to good use. It is entirely natural for them to further contend that the images we perceive in mirrors belong to the same family as those we see when looking at figurative paintings, just as Leonardo claimed. This provides them with a clear template clarifying the metaphysical status of mirror images. At no extra cost, they can also account for what is seen in paintings showing non-existing objects, such as Bruegel's *Landscape with the fall of Icarus*. Whereas Icarus does not exist, it would be hard to deny that Icarus' image is there to be seen. Their view fully vindicates Leonardo's claim on paintings and mirrors quoted above.

Casati aims at having his cake and eating it too. He is a Unifier, thus helping himself to metaphysical sobriety, and also wants to avoid paying the price of specular illusionism. His argument consists of two parts. First, he attempts to show that no illusion is involved in, e.g., Captain Hook's seeing himself in a mirror with a hook on his right arm. Second, he argues that what appears to be the Multiplier's strongest asset — i.e., the similarity between mirrors and paintings as to what they show — is itself illusory. We shall only examine the second half of his argument.[7]

---

[5] Maarten Steenhagen, "False Reflections," *Philosophical Studies* 174/5 (2017), 1227–1242: 1227.

[6] We are grateful to an anonymous reviewer for drawing our attention to this point.

[7] A few words about the strategy of the first part of Casati's argument are in order here. Casati claims that an illusion occurs only if we conceive of our perception as epistemically innocent, that is, if we assume that, in principle, pure visual perception could be entirely divested of any admixture of belief and other cognitive attitudes. If, to the contrary, we are aware of what is going on in our encounters with mirrors, we see that our right hand appears to us in the mirror precisely where it ought to, and we feel no inclination to act as if what we see in the mirror were located behind it. Think of the

Let us once more state Leonardo's and the Multiplier's main claim:

LEONARDO'S CLAIM In mirrors we see images like those we see in paintings.

It is useful at this point to note that Leonardo's claim is perfectly compatible with a different analogy that was first used by Leon Battista Alberti and was immediately and enthusiastically endorsed by every other artist in Italian Renaissance. Famously, Alberti claimed that painters should consider the frame of the painting as an open window:

> Let me tell you what I do when I am painting. First of all, on the surface on which I am going to paint, I draw a rectangle of whatever size I want, which I regard as an open window through which the subject to be painted is seen; and I decide how large I wish the human figures in the painting to be.[8]

One can easily see that Leonardo's analogy is entirely compatible with Alberti's by considering two epoch making visual experiments by Filippo Brunelleschi. In the first experiment, following the newly discovered rules of linear perspective, he painted on a panel (now lost) a view of San Giovanni baptistery in Florence as seen from the cathedral. Then he made a hole in the panel and put a mirror in front of it. As Brunelleschi's biographer Antonio Manetti reports,

---

ease that permeates our experience of shaving while looking at our own face in the mirror. The belief that we are looking at a mirror penetrates the content of specular experiences. The upshot of Casati's account is that our experiences with mirrors is unlike the Mueller-Lyer experience, which is cognitively impenetrable, even though we *are* sometimes fooled by mirrors. According to his unifying account, the experience of looking at things in mirrors is much the same as that of looking at them through spectacles. Objections have been levelled to Casati's argument, the main one being that the illusion involved in locating an object on the other side of a mirror, much like the Mueller-Lyer one, does not go away by merely keeping in mind that one is facing a mirror. As Austen Clarke (1996: 490) puts it in his "Three Varieties of Visual Field," *Philosophical Psychology* 9/4 (1996): 477–495, 'Perhaps we aren't fooled, but our eyes are. Irresistibly they are in the grip of an image.' (490). It has to be mentioned that the idea that mirror appearances *per se* are illusory remains controversial. Steenhagen, "False Reflections," argues that mirrors do not convey any illusion of location. Mirrors merely allow us to see things by looking in directions other than those where they are. For instance, when I see my reflection, I see myself as occupying a location (my current location) that is not in the direction of my sight.

[8] Leon Battista Alberti, *On Painting*, trans. by C. Grayson, with an Introduction and notes by M. Kemp, (New York: Penguin Classics, 1435/1991): I, 19.

> The hole was as tiny as a lentil bean on the painted side and it widened conically like a woman's straw hat to about the circumference of a ducat or a bit more on the reverse side. He required that whoever wanted to look at it place his eye on the reverse side where the hole was large, and while bringing the hole up to his eye with one hand, to hold a flat mirror with the other hand in such a way that the painting would be reflected in it. […]. With the aforementioned elements […] the spectator felt he saw the actual scene when he looked at the painting. I have had it in my hands and seen it many times in my days, so I can testify to it.[9]

In a second and equally successful experiment, in order to compare the accuracy of his image (also lost) with the real object, Brunelleschi placed his drawing next to a mirror reflecting the building. The observers saw the striking similarity between the drawing and the mirror image. Those two experiments show that a painted image can engender the illusion of looking at 'the real thing' as seen both from a window (the hole) and also as reflected in a mirror, if the similarity exceeds a certain threshold. This proves that Alberti's analogy between paintings and the view through an open window is compatible with Leonardo's analogy between paintings and mirror images.[10]

Casati claims that, precisely because what can be seen through a window resembles what can be seen in a mirror, they are both unlike painted images. As many psychologists and philosophers have remarked, an all-important difference between mirrors and windows on the one hand and paintings on the other is that what we see in, or through, the former is sensitive to every movement of the observer, however small, whereas images shown by paintings do not substantially change as the observer moves relative to them.[11] Thus, mirrors

---

[9] Antonio Manetti, *The Life of Brunelleschi*, ed. H. Saalman, trans. by C. Enggas, (University Park: University of Pennsylvania Press, 1970), 44.

[10] According to Samuel Y. Edgerton, Brunelleschi's experiments marked an event which ultimately was to change the course of Western history (cf. *The Mirror, the Window & the Telescope: How Renaissance Linear Perspective Changed Our Vision of the Universe* (Ithaca, NY: Cornell University Press, 1975). See also Michael Kubovy, *The Psychology of Perspective and Renaissance Art* (Cambridge: Cambridge University Press, 1986), 27.

[11] Usually, as we move relative to windows and mirrors, objects become visible that were out of sight before. This is clearly not so with pictures, even though they do look different to us, to some extent, as we move. The latter kind of changes are not relevant to the issue at hand but are interesting in themselves. A surprising fact which is in need of some explanation

are like windows and unlike paintings in this respect. Note that the aforementioned contrast does not pertain to metaphysics. Metaphysically, mirror images side with painted images in so far as they are purely virtual objects, whereas through windows we see ordinary, material objects.[12] Rather, the contrast highlighted by Casati is phenomenological in kind as it concerns what our visual experiences present to us.[13]

Consider what happens when you trace on a window pane the profile of an object lying on the other side of the window itself:

> The smallest change in point of view causes a loss of alignment between the profile traced on the window and the visual profile of the thing to be represented. Indeed here lies the fundamental difference between images and windows. Windows do not function as images given that what is seen within a window changes according to adjustments of point of view, whereas what is seen by means of an image resists adjustment of point of view. But for this same reason mirrors do not function like images either, given that what is seen within a mirror changes in a way regulated by adjustments of point of view.[14]

---

is that, when we look at a picture from an oblique angle, we don't see the depicted scene as distorted even though the projection of a depicted object on our retina is very different from the way it is when we look at the picture head on. The perception of pictures from an oblique angle is a widely discussed topic in the psychology of picture perception. At least the following works are to be mentioned in this connection: Dhanraj Vishwanath, Ahna R Girshick and Martin S Banks, "Why Pictures Look Right When Viewed from the Wrong Place," *Nature Neuroscience* 8 (2005): 1401–1410; James E. Cutting, "Rigidity in Cinema Seen from the Front Row, Side Aisle," *Journal of Experimental Psychology: Human Perception and Performance* 13 (1987): 323–334; E. Bruce Goldstein, "Spatial layout, Orientation Relative to the Observer, and Perceived Projection in Pictures Viewed at an Angle." *Journal of Experimental Psychology Human Perceptual Performance* 13 (1987): 256–266; Thomas O. Halloran, "Picture Perception is Array Specific: Viewing Angle versus Apparent Orientation." *Perception and Psychophysics* 45 (1989): 467–482; Maurice Henri Pirenne, *Optics, Painting, and Photography* (Cambridge, Cambridge University Press, 1970); Michael Polanyi, "What is a Painting?", *British Journal of Aesthetics* 10 (1970): 225–236; Richard Wollheim, "Seeing-as, Seeing-in, and Pictorial Representation." In *Art and its Object*, 2nd ed. (Cambridge University Press, 1980), 205–226; Matthen *Seeing, Doing and Knowing: A Philosophical Theory of Sense Perception*, 315ff. We are indebted to Bence Nanay, "Threefoldness," *Philosophical Studies* 175 (2018): 163–182 on this point.

[12] Mohan Matthen makes much of that metaphysical similarity, See "Ephemeral Vision," in *Perceptual Ephemera*, ed. T. Crowther and C. Mac Cumhaill (Oxford: Oxford University Press, 2018), 312-336: 321ff.

[13] See Casati, "Mirrors, Illusions and Epistemic Innocence," 198f.

[14] Casati, "Mirrors, Illusions and Epistemic Innocence," 194.

Also:

> The fundamental difference between seeing in an image and seeing in a mirror was given by phenomenology: the robustness of what is seen in the image was contrasted with the transience of what is seen using a mirror. If I move from right to left relative to the picture of Uncle Sam, his threatening finger continues to point at me; but if I move to the left or right of an immobile Uncle Sam that I see through a mirror, I can escape his pointing gesture.[15]

In a nutshell, since what we see in a mirror or through a window pane is sensitive to the point of view whereas an image such as that drawn on a mirror, a pane, or a canvas, is not, what we see in a mirror or through a window is not an image. More in detail, Casati's argument, applied to mirrors, can be rephrased as consisting of the following steps.

1. Suppose we paint on a mirror the image of an object reflected by the mirror in such a way that the image appears to us — as we stand perfectly still in front of the mirror — exactly like the object reflected. Call the image we have painted on the mirror, **a**.
2. As we move relative to the mirror — i.e., as our point of view changes — what we see in the mirror changes, but image **a** on the mirror looks no different, so that the similarity between the mirror-reflection and the image is lost.
3. More abstractly, in circumstances C1, what we see in the mirror appears to be indistinguishable from image **a**. But, in circumstances C2, they are clearly distinguishable. So, they are not one and the same.
4. Therefore, what we see in the mirror is not identical to that image **a** — or to any other image, since the same experience can easily be repeated for any image whatsoever, no matter how perfectly resembling a given object in particular circumstances.

[15] Casati, "Mirrors, Illusions and Epistemic Innocence," 198f.

Before showing that the argument is flawed, let us point out that it bears a close resemblance to some arguments given by George Berkeley and Bertrand Russell, that have been exposed by other philosophers. After pointing out that a drop of blood appears uniformly red viewed with the naked eye, but will appear to consist of red particles suspended in a clear fluid when viewed through a microscope, Berkeley concludes, first, 'That either the appearance of objects to the naked eye or their appearance through the microscope is illusory' and, second and more strongly, that 'From all this, should it not seem to follow, that all colours are equally apparent, and that none of those which we perceive are really inherent in any outward object'.[16] After David Armstrong, this is known as the argument from microscopes.

Russell applied much the same argument to other visually perceived properties. For example, if we look at the texture of the surface of a table top with the naked eye we see the grain, 'but otherwise the table looks smooth and even.' If we look at it through a microscope, instead, 'we should see roughnesses and hills and valleys, and all sorts of differences that are imperceptible to the naked eye.' Then he goes on to ask which of these is the 'real' table. 'We are naturally tempted to say that what we see through the microscope is more real, but that in turn would be changed by a still more powerful microscope. If, then, we cannot trust what we see with the naked eye, why should we trust what we see through a microscope?'[17]

In order to see the similarity of Berkeley's and Russell's argument to Casati's one, consider the following: From the fact that in circumstances C1 – i.e., as seen with naked eye – the color of a drop of blood appears to be indistinguishable from red whereas in other circumstances, C2, the color of the same drop of blood appears to be mainly of no color at all, it is concluded that the drop of blood cannot be red. This closely matches step 3 above in our rephrasing of Casati's argument. Berkeley's further conclusion that all colors are

[16] George Berkeley, *First Dialogue between Hylas and Philonous in Opposition to Sceptics and Atheists in Principles of Human Knowledge and Three Dialogues*, edited with an Introduction and Notes by H. Robinson (Oxford: Oxford University Press, 1996); David Armstrong, "Colour Realism and the Argument from Microscopes," In *Contemporary Philosophy in Australia*, ed. R. Brown and C. D. Rollins (New York: Humanities Press, 1969), 301–323; David Hilbert, *Color and Color Perception. A Study in Anthropocentric Realism* (Stanford: CSLI Lecture Notes, 1987).
[17] Bertrand Russell, *The Problems of Philosophy* (Digireads.com Publishing, 1912/2018): 7.

equally apparent matches step 4. To stress the analogy between the two arguments further, let us remark that Berkeley concludes that colours are not real – while Casati concludes that nothing we see in a mirror is a real image.

Berkeley's argument cannot establish its intended conclusion. One can counter, for instance, that objects can possess many perceived and unperceived colours, or that there is an epistemologically privileged set of circumstances, i.e., the 'normal conditions', for issuing perceptual judgements, or that, without being illusory or mistaken, perceptual properties are always relative to a number of factors (and thus are relations, rather than properties). However, one can supplement Berkeley's argument with some additional premise, relying on apparently obvious facts pertaining to perception of color. One such additional premise, which Berkeley did not bother to mention, is that an object cannot consistently have both the color property of being red all over and that of being (mainly) transparent all over. But even if this premise was added, the argument would still not be sufficient to bring home the point — as pointed out by David Hilbert, who claims that the argument is irredeemably flawed.[18] But in any case, what interests us is that, for Casati's argument, no comparable premise is even in sight.

Be that as it may, to see that Casati's argument is not valid, a simple modal argument suffices. In actual history, in 1773, the Postmaster General was indistinguishable from Benjamin Franklin, simply because Benjamin Franklin *was* the Postmaster General. Surely someone other than Benjamin Franklin could have been the Postmaster General in the same year. Thus, the Postmaster General, in counterfactual circumstances, would be clearly distinguishable from Benjamin Franklin. This obviously has no tendency to show that the Postmaster General was not Benjamin Franklin in actual fact. Note that 'the Postmaster General' is a definite description, just like 'what is seen in a mirror'. On the other hand, 'Benjamin Franklin' and 'that image' are rigid designators (a proper name and a demonstrative, respectively). We can conclude that Casati's argument, purporting to show

[18] Hilbert, *Color and Color Perception.*

that what is seen in a mirror is no image, cannot be valid, as its form is the same as that of the modal argument above, which is clearly flawed.

It might be objected that we equivocate on the term 'indistinguishable': it is one thing to say that an image is indistinguishable from another, and quite another that Benjamin Franklin is indistinguishable from the Postmaster General. In the latter case, we mean that the two terms — 'Benjamin Franklin' and 'the Postmaster General' — are co-referential, i.e., that Benjamin Franklin is identical to the Postmaster General. In the former, we simply mean that two distinct images are very similar — yet not identical — to one another.

Of course, we agree that two images being perceptually indistinguishable is not the same thing as two objects being identical. However, the latter entails the former. In actual circumstances, Benjamin Franklin was the same individual as the Postmaster General. Being the same individual, *a fortiori* he was perceptually indistinguishable from it. It is generally agreed that any individual resembles itself. In any case, we do not even have to resort to the notion of resemblance, as Leibniz Law suffices: if A is identical to B, then A and B share all properties and hence are indistinguishable. If A and B are indistinguishable, then they are perceptually indistinguishable.

To recap, the following are all true:

1. Benjamin Franklin = Postmaster General in possible world w1,
2. Benjamin Franklin is indistinguishable from Postmaster General in possible world w1 [by Leibniz Law],
3. Benjamin Franklin is perceptually indistinguishable from Postmaster General in possible world w1, [logic of adverbs],
4. Benjamin Franklin ≠ Postmaster General in possible world w2,
5. Benjamin Franklin is distinguishable from Postmaster General in possible world w2 [by the (controversial) converse to Leibniz Law or, more simply, by the commonsensical fact that any two distinct persons can be distinguished from one another].

However, it is false that

> 6. Benjamin Franklin ≠ Postmaster General in possible world w1 [(6) is the negation of (1)].

This proves that Casati's argument is fallacious. From the fact that something (the color of a blood drop, resp. what is seen in a mirror) is indistinguishable in some circumstances C1 but not in other circumstances C2 from something else (the color red, resp. the image drawn on the mirror), it cannot be concluded that they are not the same thing in the former circumstances.

This is only part of the whole story. A further fallacy is involved in arguing that what is seen in a mirror cannot be any image at all (not just the one we have drawn) since the same reasoning can be repeated for what is seen in a mirror and any other image. We can easily grant that, as we move relative to the mirror, the object reflected loses its similarity to the image we have drawn. But at any given moment, in any other position, we could draw – if we were given enough time and dexterity – *another* image that would be indistinguishable from what we would then see in the mirror.

A parallel can further clarify the issue. After pointing out that, in some counterfactual circumstances, the first Postmaster General would not be Benjamin Franklin, one might want further to conclude that, therefore, the General Postmaster is distinct from any human being, since, for every human being, the same reasoning about Franklin could be duplicated, i.e., circumstances could be found in which the first General Postmaster would not be *that* human being. But this is clearly absurd.

Have we been unfair to Casati? Have we represented his argument inaccurately? One could perhaps read him differently, suggesting that Casati builds on a widely accepted observation, according to which the peculiarity of images consists in the fact that what you see in them is not sensitive to the position of the observer and does not, in consequence, change with the angle of observation. His argument would then proceed as follows: If something is an image,

then what you can see by means of it is perspective independent, i.e., is insensitive to changes in the observer's position. What one sees in a mirror, on the other hand, is sensitive to changes in the observer's position. From this, it immediately follows that what you see in a mirror is not an image, or is not seen by means of an image.[19]

It is debatable that the argument so reconstructed really is distinct from the one that we ascribed to Casati above. For, what does perspective independence amount to? An image is perspective independent in so far as it *would* look the same in counterfactual circumstances, i.e. if one stepped aside and looked at it from a different point of view. Step 2, in our rendering of Casati's argument above, exploits precisely this difference in counterfactual behaviour between images and what is seen in mirrors. Be that as it may, we surmise that it still is invalid. Let us note, first of all, that Pirenne's observation is itself in need of some clarification. For one thing, it holds only with qualifications. The appearances of some very large and uniform objects — such as the surface of the sea — and of some uniform ones of any size — such as spheres — do not really change as you move relative to them. In the opposite direction, some images (e.g., tilt cards or wiggle pictures — i.e., images on grooved surfaces produced by lenticular printing — and those on spherical surfaces) appear quite different depending on the viewpoint. Second, one has to be careful as to what one takes images to be. In no sense are the material objects — such as a painted canvas or a photo — on which the image lies, peculiar within the large realm of all material objects. If you appreciably move relative to them, their appearances change depending on the angle from which you look at them. Thus, Pirenne's observation only holds for images considered as (very roughly) what you see *on* flat surfaces such as canvases and photos.

Now, barring the exceptions noted above, could Pirenne's observation be used to give a direct argument settling what kind of entities are that are seen in mirrors? If it were possible, we would have some test along the following lines: if what is seen in a mirror is perspective independent then it is an image. Otherwise, i.e., if what you see in it depends on the angle

[19] We are grateful to an anonymous reviewer for suggesting this reading to us.

from which you look at it, it is some other kind of entity, possibly a material object as the Unifier claims.

We very much doubt that any such test can be given. Imagine a book with an illustrated cover reflected in a mirror. The book as a material object will appear quite different, depending on your viewpoint. The image on the cover, on the other hand, (or, what you see in it) is perspective independent. The test would therefore yield conflicting results. But of course an assumption implicit not just in Casati's work but in the whole literature on the issue, is that there is only one kind of entity that is to be seen in mirrors.

As a final remark, let us point out that Casati seems to be victim of a false analogy that results from a one-sided diet of examples. He only takes into consideration static images, such as paintings or photos. By modifying the example and taking into consideration dynamic images that are sensitive to the observer's position and the relevant aspects of her environment, we might get a better grip on the limits of his argument. Imagine someone watches a video that is displayed on a big screen in front of her. The video was shot by a cameraperson as she was walking through an apartment. The person who watches the video sees a dynamic pictorial representation of the apartment. The continual changes in the image are sensitive to the movements of the cameraperson and the resulting changes of the camera's perspective. Now, imagine a second scenario in which the same screen does not display a video, but a close-to-perfect *Virtual-Reality* projection of the same apartment that is sensitive to the observer's bodily movements and to changes in her perspective. If Casati's argument were correct, we should have to conclude that the video, but not the VR-projection, is an image; for the latter, but not the former, is sensitive to changes in the observer's perspective. This conclusion seems counter-intuitive, though, as both the VR-projection and the video are displayed on the same screen in a way that is sufficiently similar. Hence, if one is willing to grant that the video is a pictorial representation, one should also admit, *pace* Casati, that the VR-projection is a pictorial representation, as well, which, in turn, entails that sensitivity to the observer's perspective is not a symptom for a categorical difference between the two representations, video and VR-projection, respectively. One might still wonder whether the video is, in fact, a pictorial representation; one might argue

that it is transparent and allows the observer to directly perceive the apartment. We cannot settle this complex question here; our discussion merely aims to show that Casati's argument does not succeed in supporting the claim that there is a categorical difference between mirror reflections and images. This is not to say that Leonardo's Claim is fully established as correct. Even less is it sufficient to rule out that what we see in mirrors are the reflected objects themselves. Further arguments are needed.

References

Alberti, L. B. *On Painting*, trans. by C. Grayson, with an Introduction and notes by M. Kemp. New York: Penguin Classics, 1435/1991.

Armstrong D. 'Colour Realism and the Argument from Microscopes.' In *Contemporary Philosophy in Australia*, edited by R. Brown and C. D. Rollins, 301–323. Humanities Press, 1969.

Berkeley, G. *First Dialogue between Hylas and Philonous in Opposition to Sceptics and Atheists in Principles of Human Knowledge and Three Dialogues*, edited with an Introduction and Notes by H. Robinson. Oxford: Oxford University Press, 1996.

Block, N. 'Why do Mirrors Reverse Right/Left but not Up/Down.' *The Journal of Philosophy* 71 (1974): 259-277.

Clarke, A. 'Three Varieties of Visual Field.' *Philosophical Psychology* 9/4 (1996): 477–495.

Casati, R. 'Mirrors, Illusions and Epistemic Innocence.' in *Perceptual Illusions. Philosophical and Psychological Essays*, edited by C. Calabi, 192–201. Basingstoke: Palgrave, 2012.

Cutting, J. E. 'Rigidity in Cinema Seen from the Front Row, Side Aisle.' *Journal of Experimental Psychology: Human Perception and Performance* 13 (1987): 323–334.

da Vinci, L. *Trattato della Pittura.* Milano: Società Tipografica Classici Italiani, 1804.

Edgerton, S. *The Mirror, the Window & the Telescope: How Renaissance Linear Perspective Changed Our Vision of the Universe*. Ithaca, NY: Cornell University Press, 1975.

Goldstein, E.B. ‘Spatial layout, Orientation Relative to the Observer, and Perceived Projection in Pictures Viewed at an Angle.’ *Journal of Experimental Psychology Human Perceptual Performance* 13 (1987): 256–266.

Kubovy, M. *The Psychology of Perspective and Renaissance Art.* Cambridge: Cambridge University Press, 1986.

Halloran, T. O. ‘Picture Perception is Array Specific: Viewing Angle versus Apparent Orientation.’ *Perception and Psychophysics* 45 (1989): 467–482.

Hilbert, D. *Color and Color Perception. A Study in Anthropocentric Realism*, CSLI Lecture Notes, Stanford, 1987.

Manetti, A. T. *The Life of Brunelleschi*, edited by H. Saalman, trans. by C. Enggas. University Park: University of Pennsylvania Press, 1970.

Matthen, M. *Seeing, Doing and Knowing: A Philosophical Theory of Sense Perception*. Oxford: Oxford University Press, 2005.

Matthen, M. ‘Ephemeral Vision.’ in *Perceptual Ephemera*, edited by T. Crowther and C. Mac Cumhaill, 312-336. Oxford: Oxford University Press, 2018.

Mizrahi, V. ‘Mirrors and Misleading Appearances.’ *Australasian Journal of Philosophy* 97, 2 (2019): 354-367.

Nanay, B. ‘Threefoldness.’ *Philosophical Studies* 175 (2018): 163–182.

Pirenne, M. H. *Optics, Painting, and Photography*. Cambridge, Cambridge University Press, 1970.

Polanyi, M. ‘What is a Painting?’ *British Journal of Aesthetics* 10 (1970): 225–236.

Russell, B. *The Problems of Philosophy*, Digireads.com Publishing, 1912/2018.

Steenhhagen M. ‘False Reflections.’ *Philosophical Studies* 174/5 (2017): 1227–1242.

Wollheim, R. ‘Seeing-as, Seeing-in, and Pictorial Representation.’ In *Art and its Object*, 2nd ed., 205–226. Cambridge University Press, 1980.

Vendler, Z. ‘The Ineffable Soul.’ in *The Mind-Body Problem: A Guide to the Current Debate*, edited by R. Warner and T. Szubka, 317–328. Oxford: Blackwell, 1994.

Vishwanath, D., Girshick, A. R., and Banks, M. S. ‘Why Pictures Look Right When Viewed from the Wrong Place.’ *Nature Neuroscience* 8 (2005): 1401–1410.