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# Visual cast: *Cinéma en relief* and the nude figure in *Given*

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## Survey

Sitting in front of a computer monitor and wearing LCD glasses I am moving a cursor with the help of a special mouse, which, in addition to normal planar movement, controls diving in stereoscopic depth. What I am looking at is the scene behind the doors of Marcel Duchamp's enigmatic assemblage *Étant donnés: 1° la chute d'eau, 2° le gaz d'éclairage gaz d'éclairage* (*Given: 1. The Waterfall, 2. The Illuminating Gas*) (1946–66).[1] The aim is to establish the coordinates of the three-dimensional form of the nude figure by purely visual means. The sensation of moving the cursor is of an optical finger 'touching' every element; navigating in three dimensions I can place it confidently in different locations within the virtual model with certainty. Each touch leaves a mark, a point in space in the form of a red cross (Figure 12.1). However, defining the exact point of intersection needs practice, because the tactile resistance of a physical material object is absent. Touching the virtual model is like touching smoke or a shaft of light. The resulting three-dimensional field of points describes its spatial form but is devoid of pictorial information. Like floating gas particles in the shape of the nude figure, the measured points are an unveiled, undressed geometry of vision.

I performed this experiment at the Department of Civil, Environmental & Geomatic Engineering, University College London, in 2002, as part of my research on Duchamp's *Given*.[2] Drawing on Duchamp's term 'blossoming', which describes the Bride's desire in the *Large Glass*, but also his fascination with non-Euclidean geometries and the fourth dimension, my analysis of *Given* identifies stereoscopy as its central and intentional theme, not only influencing its intellectual content but also guiding its manufacturing process. In *Marcel Duchamp and the Architecture of Desire*, I propose that the nude figure in *Given* is a visual rather than a physical cast and present a detailed description of the process that Duchamp may have followed.[3] Expanding my previous research, this chapter aims to challenge the dominant narrative regarding Duchamp's methods for constructing the nude figure in *Given*, by tracing the origin of this proposition to his earlier stereoscopic experiments.

**Figure 12.1** Penelope Haralambidou, Coordinates of the three-dimensional form of the nude figure in *Étant donnés*, 2002. Image courtesy of Penelope Haralambidou.

## Relief

Duchamp describes in detail the arrangement of all elements constituting *Given*, in his *Manual of Instructions for the assembly of Étant donnés*, containing a series of handwritten 'operations,' diagrams and annotations on photographs of the assemblage.[4] However, there is no mention of the process of constructing the nude in this manual, which appears in the arrangement already complete. The nude figure was the first piece of the assemblage that Duchamp finalized much earlier, through an arduous process with many difficulties and mishaps.[5] Duchamp left no explicit written record of this process, but direct references to its construction exist in his letters to his secret lover Maria Martins, who was not only aware of its existence, but also allegedly the model. Further clues for its construction survive in a wide range of objects left behind in his studio, which are examined in Melissa S. Meighan's excellent analysis 'A Technical Discussion of the Figure in Marcel Duchamp's *Étant donnés*.'[6]

Since the discovery of Duchamp's letters, the consensus for the origin of the form of the nude figure is that it derives from directly casting Martins's body. For instance, Michael Taylor suggests that 'Duchamp's burgeoning relationship with Martins persuaded him to use her body to make plaster casts and drawings' for making the nude figure – which Taylor calls a 'mannequin' – 'employing the techniques he had learned from Ettore Salvatore' an Italian-born sculptor.[7]

Although there is clear evidence that at least the left hand has been cast from a human body, further proof of a body-casting process is limited.[8] I have contested the construction of the nude figure from physical casts of a female body, as I see two main problems with this proposition. The first is the peculiar physical form of the nude figure itself and the second exists in Duchamp's descriptions of the process in his letters to Martins.[9]

The nude figure appears often in the photographs Duchamp included in his *Manual of Instructions* for assembling *Given,* where he offers precise guidance for positioning it.[10] Further published images from different angles appear in Denise Brown Hare's and Paul Matisse's photographic recording of *Given* in Duchamp's studio before the transfer of the assemblage to the Philadelphia Museum of Art and the photographs of A. J. Wyatt, the museum photographer, soon after the assemblage was installed in 1970.[11] In all photographic representations, the three-dimensional figure does not seem to conform to the shape of a physical body and appears strangely flattened. Furthermore, it is evident that the figure is not rounded, but purely frontal with no back side. The low suppressed contours of the form rise from a notional plane cutting through the figure as if the relief is extruded from a horizontal surface.

When perceived from *Given*'s peepholes the figure gives the impression of a much fuller body, as if it has been skewed to appear 'correct' from just one angle – the viewing position defined by the door. This suggests some kind of optical distortion or illusionistic representation of depth, as if the nude figure is a hybrid between an image and a three-dimensional form. Based on all these observations I would suggest that it would be best described as a low relief (*bas relief*), rather than a mannequin or a sculpture.[12]

Further tangible proof of the discrepancy between its shape and a human body has recently materialized in the work of conceptual Turkish-American artist Serkan Özkaya's *We Will Wait* (2017). According to Julian Haladyn, Özkaya's 'monumental re-creation' of *Given* presents 'a powerful enactment of Duchampian accelerationism,' which treats the assemblage as 'a constellation of readymades, objects and ideas that should be repeated and repeatable.'[13] Unlike other previous reproductions of Duchamp's work, which aim to create an exact replica, Özkaya's piece has a different intention. His goal was to demonstrate the projective, image-making abilities of the enclosed space of *Given,* which he believes casts a self-portrait of Duchamp in light.[14] I have also proposed Duchamp's last enigmatic piece as a 'camera obscura in reverse', a double projector recreating the view behind the door in three dimensions.[15]

Özkaya collaborated with illustrator and digital sculptor Fernán Nápoles to create a digital 3D model of the nude figure (Figure 12.2).[16] They used no direct photogrammetry methods, but accurately digitally modelled the form following visual cues from published photographs and the measurement information in Meighan's analysis, which was their most valuable source. The resulting three-dimensional 3D model was SLA printed (stereolithography) in six full-scale fragments that Özkaya attached together. He sanded, coated and applied paint directly on the surface gained by the 3D printed form, to create a facsimile version of the nude figure. In an online conversation, Özkaya demonstrated the distorted figure on the screen and stressed how 'weird' and unnatural the resulting piece looks.[17] He mentioned its small size,


**Figure 12.2** Serkan Özkaya and Fernán Nápoles, digital 3D model of nude for *We Will Wait*, 2016. Image courtesy of the artist.

overall low relief, and very thin and elongated wrist. In his view, this alien form is far removed from casting a human body.[18] Özkaya's experience is corroborated by Francis M. Naumann, who also concluded that it is virtually impossible to assume this posture when he attempted to photograph a female model in the same position as the nude figure appears in *Given*.[19]

The second inconsistency with the physical casting proposition appears in Duchamp's correspondence with Martins. In several of his letters, he describes the creation of a 'plastilene,' an oil-based clay 'prototype,' hinting at a modelling process rather than direct casting (Figure 12.3):

> 12 October 1948
> Tomorrow and the following days I will be putting my skin under the nails and will make a test, which will be more or less definite, before starting on the full-scale plastilene.
>
> 31 May 1949
> But our woman is finished and goes to the molder's the day after tomorrow. I intend to work on the plaster cast a great deal because I can't see anything more to do with the plastilene.
> I am neither satisfied nor dissatisfied: I can't add or remove anything; it is what it is.
>
> 6 June 1949
> The day of the mold has come – I am taking our woman to the Italian [Ettore Salvatore] and I hope to have my plaster cast at the end of this week.[20]

If the process involved physical casting from Martins' body, Duchamp would simply need to attach the casts to compose the nude figure. Instead, he appears to spend eight months perfecting the prototype plastilene model. Only when the plastilene was ready, Duchamp mentions taking it to Salvatore to create a negative mold from which he

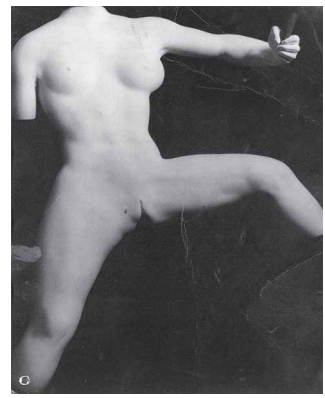

**Figure 12.3** Marcel Duchamp, Plaster Study for the figure in Étant donnés: 1° la chute d'eau, 2° le gaz d'éclairage, 1949. Gelatine silver print. © Association Marcel Duchamp / ADAGP, Paris and DACS, London 2023.

obtained a positive plaster cast. A photograph of this plaster cast study Duchamp sent to Martins in 1949 shows a beguiling white form from above, which as Meighan has shown in her analysis closely matches the shape and size of the final distorted nude figure in vellum.[21]

Both the distorted low-relief nude figure in *Given* and Duchamp's description of his methods contradict the widespread assumption that he created it from a direct physical cast of Martins's body. So, what was guiding his laborious plastilene modelling? I have suggested that Duchamp could be working from a visual cast: an anaglyph exemplar deriving from a stereo-photographic capture of a nude female body, possibly Martins, that he could access and measure optically.[22] In this chapter, I explore further the potential origin of the idea in his earlier stereoscopic experiment involving another important female figure.

## Cinéma en relief

In *Man Ray: Directeur du Mauvais Movies*, Jean-Michel Bouhours and Patrick de Haas describe Man Ray's cinematographic activities in New York in the early 1920s.[23] Bouhours and de Haas describe in detail two failed filmmaking attempts instigated by and in collaboration with Duchamp, of which few traces remain. The first was a recording of the shaving of the pubic hair of the New York Dada artist Baroness Elsa von Freytag-Loringhoven in 1920. Also in 1920, the second attempt was to produce a film in relief, a 3D, stereoscopic/anaglyphic film, or *cinéma en relief* in French, by linking two movie cameras. Allegedly, both films were accidentally destroyed during production leaving behind only a few surviving frames and a confused historical record of who was involved, what exactly was filmed and when the filming took place. This confusion is most likely a result of both artists misremembering and potentially misdating the events in interviews and in their writing.[24]

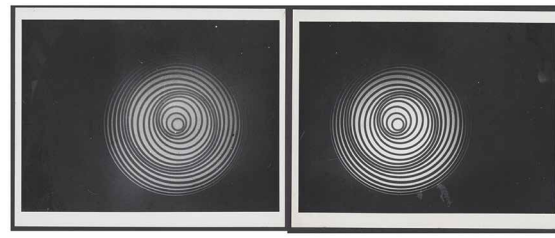

**Figure 12.4** Marcel Duchamp, Frames from projected stereoscopic film, 1920. © Succession Marcel Duchamp / ADAGP, Paris and DACS, London / © Man Ray Trust / ADAGP, Paris and DACS, London 2023.

Man Ray has consistently dated the attempt to create a stereoscopic film in 1920, when he and Duchamp were both in New York. In his autobiography *Man Ray: Self Portrait* he offers a detailed account:

> Then Duchamp came to me with projects; he had conceived an idea for making three-dimensional movies. Ms Drier had presented him with a movie camera, and he obtained another cheap one – the idea was to join them with gears and the common axis so that a double stereoscopic film could be made of the globe with a spiral painted on it.[25]

The recording was successful, but the film was destroyed during development. Only two matching strips were salvaged out of the resulting 'tangled seaweed' (Figure 12.4). Contrary to Man Ray's deep disappointment that led him to later characterise himself as a director of '*mauvais* movies', Duchamp was 'imperturbable.' On examination through an old stereopticon, two salvaged matching frames gave the effect of relief, so Duchamp was content that the experiment was verified.[26]

## Globe with a spiral

The central cause for an uncertainty arising behind the dating of the stereoscopic filming attempt is the identity of its subject matter. Man Ray describes a 'globe with a spiral painted on it', which confusingly matches the central element in a work by Duchamp, completed when both men were back in Paris five years later: *Rotary Demisphere (Precision Optics)* (1925) (Figure 12.5). This has led many commentators to dispute Man Ray's account and the dating of the salvaged stereoscopic film fragments. For instance, Jean Clair asserts: 'The comparison of frames from the film with the pattern of the *Rotary Demisphere* establishes them as identical in every respect, making the date of 1920 cited for the film in the Philadelphia catalogue erroneous; it is necessarily later than that at which the machine itself was made.'[27]

The complex construction of the work *Rotary Demisphere* was financed by Jacques Doucet, a fashionable Paris haberdasher and patron of avant-garde art, and the process is recorded in detail in the surviving correspondence between patron and artist starting at the beginning of 1924. Arturo Schwarz describes *Rotary Demisphere,* or 'hemisphere' as Duchamp calls it in a letter to Doucet:

**Figure 12.5** Marcel Duchamp, spiral globe, the central element of Rotary Demisphere (Precision Optics), 1925, attached on bicycle frame before its final assembly, *c.*1923. © Association Marcel Duchamp / ADAGP, Paris and DACS, London 2023.

> the demisphere is attached to a flat disk covered with black velvet, which in turn is mounted on a metal stand. The whole is protected by a plexiglass dome, with a copper collar on which is engraved a pun. The demisphere and the collar rotate together when activated by a small electric motor mounted at the foot of the stand. When set in motion, the black eccentric circles appear to advance and recede, producing a hypnotic illusion of space and depth.[28]

Prior to the completion of the work, Duchamp depicted a spiral-like pattern, similar to the one adorning the globe, in a drawing. Schwarz dates the creation of this 'first draft' of the *Rotary Demisphere* in early 1924.[29] The drawing is a two-dimensional circular diagram of eccentric circles giving the impression of a spiral and bares a close resemblance with Duchamp's later spinning disks recorded in his film *Anémic cinéma* (1926).[30] A reproduction of the drawing was included in the July 1924 issue of Picabia's journal *391* and featured on the front cover of the spring 1925 issue of the New York magazine *The Little Review*.[31]

If preceding the completion of the *Rotary Demisphere,* is it possible that this drawing was created, while the two men were in New York? Indeed, Lars Blunck in his thorough research on Duchamp's optical machines has established that an early version of a disc adorned with a similar, but not exact, pattern was in existence prior to 1921.[32] Perhaps what was recorded in the stereoscopic film fragments was an earlier disc and not the globe, and only a direct stereoscopic viewing of the frames could provide a definitive answer.

To ascertain the identity of the portrayed object, I decided to create a stereo pair from an image of the surviving film fragments as found in publications by Jean Clair and Schwarz.[33] The image shows two fragments of 35 mm film containing a frame and

a half each, which is not a stereo pair, as the two fragments are not aligned; the right image appears not only upside down but also reversed (back to front) in relation to the left. Although the low quality of the image was disappointing, by digitally adjusting the fragments to the correct corresponding positions, it was possible to merge the two images stereoscopically. This stereoscopic viewing undoubtedly confirmed the subject matter as a convex half-sphere, rather than a flat disc. Furthermore, it is clear that this is a fragment of a stereo film of a moving object as the two truncated frames below show the globe rotating anti-clockwise.

Looking for better quality images, I discovered digital versions of the photographic prints of the fragments in the online Duchamp Research Portal.[34] At the back of each photographic print the date is clearly stated as 1920, in pencil, most likely in Man Ray's hand: 'Frames from projected stereoscopic film; (left, green; right, red), 1920; $3^{3/4} \times 7^{1/4}$" including holder; Collection Man Ray; (This is left frame); MMA 8791a'.

Using the positioning instructions (top, left or right) found behind each print, I was able to create a higher resolution and better detail stereo pair for free fusion. Free fusion requires images to be crossed: the right image is placed on the left and the left image on the right. In this stereo pair arrangement, the image is sharper, casting no doubt that the object that has been stereoscopically captured is a convex dome painted with a pattern of eccentric circles that create an illusion of a spiral. The half sphere is bare, not covered by the plexiglass dome and the engraved copper ring that Duchamp added when assembling the final version of the *Rotary Demisphere* in 1925. Furthermore, a faint curved outline, which was not discernible in the earlier version of the stereo pair, suggests the presence of an outer black disc, on which the globe is attached.

The close inspection of the globe with a spiral depicted in this stereo arrangement led to an important breakthrough discovery regarding the 1924 drawing, which Schwarz considers the 'first draft' of the *Rotary Demisphere*. After superimposing the left-hand side frame of the stereoscopic film reversed onto the drawing it became clear that their patterns are identical. The distribution of eccentric circular rings on the ink drawing matches exactly the spatial distortions of the pattern on the three-dimensional sphere and their orientation within the rectangular frame is the same. This suggests that the drawing derives from this stereoscopic film fragment of the globe and is not an original draft predating it. The drawing was most likely executed by projecting the negative of the left film fragment directly on the black background paper and tracing the pattern with white ink. Both the construction and the filming of the rotating globe with the spiral, therefore, necessarily predate this 1924 drawing, and must have happened before the completion of the *Rotary Demisphere*.

Going back to Man Ray's extended detailed account, he describes that on the day they accidentally destroyed the film, he was taking care of the Irish wife of the mechanic who helped them put the two cameras together, while Duchamp visited his New York chess club. As we have seen he also mentions that one of the cameras they used was offered to Duchamp by American artist and patron of the arts Katherine S. Drier. In the same year, Man Ray, Duchamp and Dreier set up the Société Anonyme. As it was a period of close collaboration between the three artists, it makes sense for her to offer the camera then, rather than five years later when Duchamp and Man Ray had moved to Paris. Photographic proof of the

mechanic's gearing of the camera to create the stereoscopic coupling exists in a 1920 photograph of Man Ray's studio where the apparatus is visible.[35] Both artists only refer to a single attempt at a stereoscopic experiment and these facts indisputably locate it in New York in 1920.

On the other hand, there is also no doubt that Duchamp completed the *Rotary Demisphere* for Doucet in Paris in 1925. In their regular correspondence, he describes a complex process of acquiring the base from a supplier of medical equipment, engraving the copper ring and adding black velvet to the disc on which the globe with a spiral is attached.[36] So how can this conundrum be explained?

In one of his 'afternoon interviews' with Calvin Tomkins, Duchamp dates his preoccupation with motion and the construction of his rotary machines to 1920.[37] He mentions how the rotary glass plates gave him the idea of 'smaller things turning': 'I'd noticed that when two circles with different centers are on top of one another and are turning on a third center … one of the circles will go up and the other will go down.'[38] Duchamp seems to be describing the spiral-like eccentric circle pattern on the globe as one of the 'smaller things turning'.

In a photograph of the globe with a spiral 'under construction', most likely taken in Paris after 1923, the black disc on which the globe is attached appears aged, cracked and damaged.[39] Furthermore, it is clearly not attached to the triangular base of the *Rotary Demisphere*, but to a bicycle frame. This photographic proof supports the idea that the spiral globe might have had a long previous past life before the surrounding black disc was covered with velvet to hide the damage in order to become the central element of the apparatus that Doucet financed. The fact that Duchamp assembled the final piece in Paris does not preclude the possibility of constructing the simple central element, the eccentric circle spiral-like pattern painted globe, much earlier in 1920, when he was in New York. Therefore, my proposed solution to the mystery of the dating of the stereoscopic film is that the spiral globe with its round black collar was first constructed and filmed with two conjoined cameras rotating on a bicycle frame in New York in 1920. Most likely, Duchamp transferred the globe on one of his frequent trips back to Paris, where it became the *Rotary Demisphere*, five years later.

## Body as sculpture

In his biography of Marcel Duchamp, Calvin Tomkins also dates the attempt to make a stereoscopic film to 1920, during the time the two artists were in New York, but suggests a different subject matter:

> His old interest in depicting motion, which had resurfaced with *Rotary Glass Plates*, made him curious about cinema techniques. Katherine Drier bought him one of the first handheld movie cameras, and he and Man Ray tried using it to make a three-dimensional film. Their subject matter was the Baroness von Freytag-Loringhoven shaving her pubic hair.[40]

Elsa von Freytag-Loringhoven was a German visual artist and poet, part of the New York Dada scene, who used her body as a sculpture in Dadaist performance art and activism. Tomkins refers to a film known as *Baroness Elsa von Freytag-Loringhoven shaving her pubic hair*, which is sometimes also dated to 1921 and appears in contradictory accounts about whose idea it was, how many people were present and their responsibilities in terms of filming or shaving.[41]

In her biography of the Baroness, Irene Gammel describes this film experiment as a testament to 'the courage of her high-risk art' and a collaboration between the three artists: 'In a three-way film collaboration, Man Ray and Duchamp worked two cameras, simultaneously filming the Baroness as she modeled in the nude. Behind the first camera was Duchamp; behind the second, rented camera, a mechanic.'[42] According to Gammel, the resulting film was also damaged during development and she quotes Man Ray's detailed account of the destruction of the stereoscopic film of the globe with a spiral.

For Gammel, the Baroness, and not the cameramen, is in charge of her 'aggressive display of female sexuality', subverting the conventional syntax of the female nude in sexually pleasing and teasing poses. She quotes the Baroness: 'With me posing as art – aggressive – virile extraordinary – invigorating – ante-stereotyped – no wonder blockheads by nature degeneration dislike it – feel peeved – it underscores unreceptiveness like jazz does. But there are numbers of bright heads that have grasped [the] fact to their utmost pleasure – advantage – admiration of me.'[43] An alleged record of a frame and a half of the film survives in a 8 June 1921 letter from Man Ray to Tristan Tzara (Figure 12.6).[44] Gammel describes the Baroness's pose in this frame as a 'redrawing' of her own nude image in 'cubist forms':

> Her left arm extends to create a diagonal body line with the right leg extension, strategically placing the vagina in the body line's center, the vaginal triangle itself repeated through geometric arm and head positionings. The hands, generally in the foreground of nude paintings or photography (either for autoerotic purposes or for veiling purposes), are absent in this pose – just as feminine shame is absent.[45]

It is not clear whether Tomkins and Gammel's assertion that the film was stereoscopic is based on evidence or whether they are confusing it with the accounts relating to the film showing the globe with spiral spinning.[46] However, Man Ray also makes a reference to this additional contemporary filming occasion without revealing the identity of the model: 'While helping [Duchamp] with his research, I had shot a sequence of myself as a barber shaving the pubic hairs of a nude model, a sequence which was also ruined in the process of developing and never saw the light.'[47] Man Ray's hint at a connection, the proximity of the dating, the same location in New York and the shared failed destiny of the films suggest that these two instances of filming the globe with a spiral and the shaving of the Baroness are perhaps two separate scenes of the same length of stereoscopic film that was destroyed.[48]

Blunck rightly contests the idea that the fragment in the letter to Tzara is from a motion film, as the Baroness's pose in each frame is not sequential. Furthermore, the vertical orientation of the frames suggests the use of photographic rather than motion picture camera.[49] However, the image is proof that the event took place and

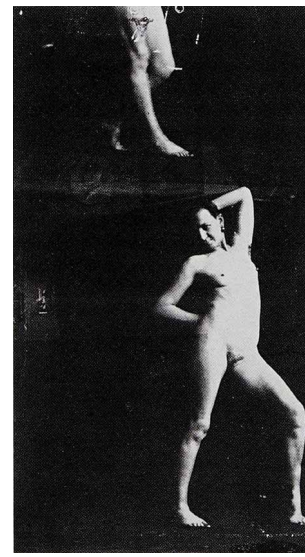

**Figure 12.6** Man Ray, Still from a film of Baroness Elsa von Freytag-Loringhoven shaving her pubic hair, 1920, (reversed). Included in a letter from Man Ray to Tristan Tzara, 1921. © Man Ray 2015 Trust / DACS, London 2023.

if Gammel is correct about the presence of two cameras, Man Ray could be using a normal photographic camera, while Duchamp or a mechanic could be filming with the double, geared stereoscopic movie camera. If indeed footage of the Baroness's body sculpture performance shaving her pubic hair was captured stereoscopically, it would be with an aim to cast her nude figure in optical relief.

## Anaglyph Projection

A further lack of clarity surrounds the physical properties of Duchamp's and Man Ray's experimental film, which is sometimes described as coloured anaglyphic and others as just stereoscopic. The anaglyph is a viewing technique that involves presenting the images of the stereoscopic pair superimposed in chromatically opposite colours – typically red and green/cyan. Stereoscopic depth is achieved by wearing gelatin red and green/cyan glasses, which render invisible the corresponding colour, thus allowing each eye to see just one of the two images.[50] The term anaglyph derives from the Greek *ανάγλυφο* 'low relief', from the verb *ανα-* 'up' and *γλύφειν* 'carve out'. In Modern Greek, the term is still used for 'relief' in art and is also in geology to describe elevations and depressions of the earth's surface.

In 1973, Man Ray and Arturo Schwarz created an edition of ten copies of the stereoscopic film fragments from the 'original negatives'.[51] Mounted between two glass plates the facsimile fragments were supplied together with a stereopticon viewer kept in a velvet-lined chestnut-wood box. The inscription reads: 'Marcel Duchamp in cooperation with Man Ray: Frames from projected stereoscopic film, 1920'.[52] The film fragments in this edition are tinged green and red, which according to Man Ray faithfully replicate the colouration of the originals.[53] As

Clair notes, Man Ray's and Schwarz arrangement of the red and green coloured film fragments in a slide for a stereoscope is misguided, because anaglyphic and stereoscopic viewing operate differently. The red and green colour is not required for forming a sensation of depth in a stereoscope and can confuse the merging of the two images.

The faithful reproduction of the originals as coloured red and green testifies that Duchamp's aim was indeed to create an anaglyphic film. To experience the full effect, stereopticon viewing is incongruous; the fragments need to be projected in light and viewed with corresponding colour filter glasses to retrieve depth.[54] As we have seen, at least one of the frames must have been projected around 1924 for the purpose of tracing the drawing of the globe with spiral. We can only assume that Duchamp may have also projected both frames, superimposed from one projector or from two separate projectors, to view the anaglyph volume of the virtual three-dimensional relief of the globe that was cast in the film with red and green glasses.

To recreate the anaglyphic relief of the globe with the spiral that Duchamp was aiming for, I digitally tinted and superimposed the two film fragments, matching the red and cyan images of the stereo pair on the central small circle of the eccentric circles' pattern. I cast the anaglyph digital image on a wall using a single video projector. Viewing with red and cyan gelatin glasses, a vivid impression of the convex dome is formed (Figure 12.7). Like a spectral presence captured more than a hundred years ago, the virtual model of the globe with a spiral is cast protruding from the wall and inviting touch.

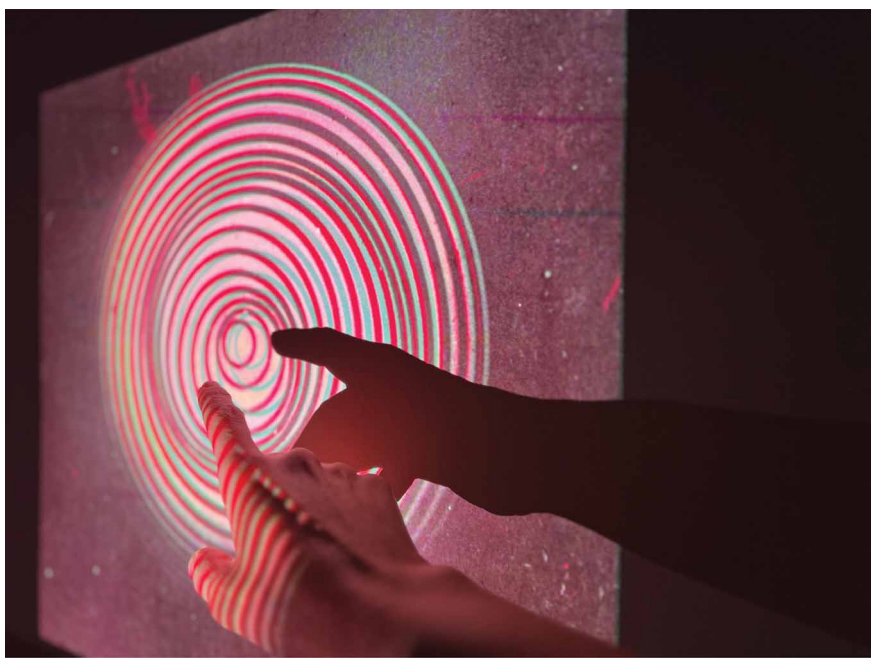

**Figure 12.7** Anaglyphic projection of the stereoscopic film frames (digitally coloured red and cyan) with finger touching the spiral globe. Image courtesy of Penelope Haralambidou.

If the coloured filters for each eye are swapped when viewing an anaglyph image, the form is optically inverted. In the case of the globe, when the red and cyan filters are switched this appears concave rather than convex, a hollow depression rather than a protruding half sphere. The visual effect of this reversal resembles a mold, the negative from which the positive volume is visually cast. Furthermore, by digitally shifting the images horizontally in relation to each other, it is possible to alter the depth of the illusory contour; a left or right displacement of the two images exaggerates or lowers the perceived relief and its position in relation to the picture plane.

## Stereoplotting

In an article entitled 'Science–Study of Invariables', published in *American Scientist* in 1944, Oliver S. Reading from the US Coast and Geodetic Survey describes the function of the most popular contemporary stereophotogrammetric apparatus for producing accurate maps of landscapes (Figure 12.8):

> The apparatus most widely used in the United States at present is the 'Multiplex Stereoplotter' … Reduced prints of the photographs on glass are so projected by this machine that the rays of light duplicate in miniature, but with high precision … One photograph is projected through a red filter, and the overlapping one through a complementary green. When viewed through spectacles of complementary colors a neutral-toned stereoscopic model is perceived on the platen of the tracing table. A small spot of light in the center of this table is kept in apparent contact with the surface of the stereoscopic model, and the pencil immediately beneath it

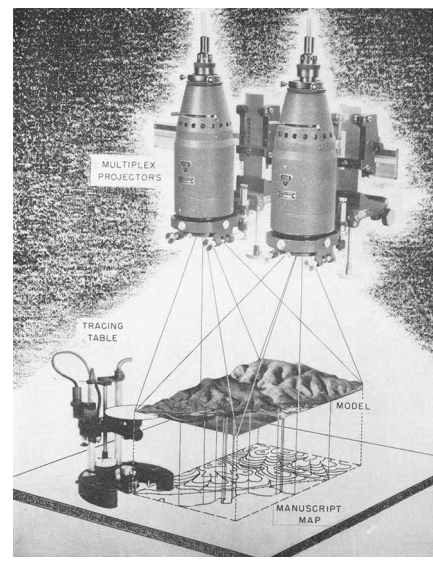


**Figure 12.8** Double projector with virtual model of landscape and plotter. Diagram showing the anaglyphic projection principle of the Multiplex Stereoplotter, *c*. 1944. Public domain.

> traces off the orthogonal map position. A scale at the side multiplied by suitable factors gives differences in elevation as the platen is raised or lowered.[55]

Greatly advanced during the Second World War for creating orthographic maps and measuring elevations of enemy terrain, the technique became more widely used immediately after. In contrast to highly complex earlier stereoplotting machines, this simple anaglyph double projector solution offered the operator the opportunity to visualize the form in vivid relief and accurately 'measure' it's elevation through direct observation with red and green glasses. Furthermore, the contour tracing of a terrain would be recorded on 'a sheet of acetate or polyester' creating a contour map that can be used to make an accurate physical scaled model.[56]

## Visual cast

According to Anne d'Harnoncourt and Walter Hopps one of the 'few odd bits of visual evidence' connected by the construction of the nude figure in *Given* is:

> A sheet of transparent plexiglass [Perspex] on which the outline of the nude figure is lightly traced in white gouache and through which small holes are drilled to conform with the contours of the figure, somewhat like a geodetic survey map. This rather mysterious object is not a work in itself but rather a working tool, apparently used by Duchamp at some stage of the evolution of the figure, possibly to transfer its outline and contour from one substance to another.[57]

In my earlier research, I have speculated that the Perspex sheet is indeed a survey map derived from Duchamp's careful plotting of an anaglyphic projection of the contours of a female body captured through stereophotography.[58] I have also suggested that Duchamp may have followed a process inspired by the workings of the Multiplex Stereoplotter machine described above, to directly guide the shape of the plastilene model of the nude figure, which would explain its peculiar distortions and low relief.

In this chapter, I propose that the origin of the idea to use stereophotogrammetry in the forming of the nude figure in Given lies in Duchamp's earlier stereoscopic experiment filming another female nude more than twenty years before. The striking similarity between the Baroness's pose during the stereoscopic filming of shaving her pubic hair and the form of Duchamp's lost plaster molded from the plastilene prototype for the nude figure in *Given* is, therefore, not a coincidence.

According to Clair, the 'virtuality of the stereoscopic image' could not fail to seduce Duchamp, 'who was repelled by the physicality, the odorous corporeality, of painting, by its excessive grounding in the sensory world, the stereoscopic image showed the way to a purely ideal configuration, the intelligible result of a synthesis certainly closer to the brain – and to the working of a *cosa mentale* – than to the retinal effect.'[59]

Coming across the description of the operation of the Multiplex Stereoplotter in 1944, around the time when he starts working on his final enigmatic assemblage, may have triggered Duchamp's recollection of the virtual model of the projected anaglyph.

It is not clear whether a fragment of the scene showing the Baroness's 'aggressive' pose while shaving, had survived. If it had, the vivid apparition of the Baroness's body in anaglyph relief must have been strongly memorable. The idea of not only capturing, but also plotting to accurately recreate a form in three dimensions, casting it in matter, must have been difficult for Duchamp to resist.

Taylor suggests that the pose of one of the first preliminary works for *Given*, a drawing belonging to Martins, gives the impression of the model standing on one leg while raising the other.[60] The pose also suggests perhaps resting one foot on a chair, which for Taylor has erotic connotations of urination or cunnilingus. But such a pose is also assumed for the purpose of shaving one's pubic hair, potentially even holding a mirror in the left hand, which some believe the nude figure was holding before this became a gas lamp. This supports the suggestion that the female figure was stereoscopically cast standing rather than reclining, perhaps explaining the impossibility of a human female body replicating the pose in *Given*.

So perhaps *Given* is a direct continuation of Duchamp's earlier stereoscopic experiment, this time testing the process of creating a replica of his lover, not by physically casting her body, but molding the contours of her skin from an entirely visual source projected in light. A gift from vision to touch, the visual cast of the nude figure in *Given* lies between tactility and vision: it is a fleshing-out of a gaze in three dimensions that can be virtually touched.

## Accelerator

Fast accelerating to today, from virtual and augmented reality to Lidar scanning, photogrammetry and 3D printing, the technologies for displaying and reproducing accurate digital simulacra of three-dimensional objects and bodies are literally at the tips of our fingers. In a final experiment, a 'mirrorical return' of the experiment at the start of this chapter, I tried to recreate the visual depth of the view of *Given* using Polycam, a 3D capture photogrammetry app on my iPhone.[61]

As source material I used the digitization of a stereo pair on the Duchamp Research Portal, one of several attempts that Duchamp made to stereoscopically capture the assemblage in the 1960s, found stored in a Cuvee Dom Perignon champagne box in his studio after his death – a further testament to the significance of stereoscopy in the conception and construction of *Given*.[62] By multiplying several times just the two images of the stereo pair, the app rendered a rudimentary depth map of the scene and created a three-dimensional mesh on which the images are wrapped. The resulting sinuous surface, created in a few seconds, resembles the 'direct sculpture' of the 'epidermis' and not 'the bones or the volumes' of the nude in vellum that Duchamp took ten years to perfect (Figure 12.9).

In his address to the Symposium at Philadelphia Museum College of Art in March 1961, entitled, 'Where Do We Go From Here?' Duchamp hints at the importance of projection and light as the new tool for the artist: 'If we now envisage the more technical side of a possible future, it is very likely that the artist, tired of the cult for oils in painting, will find himself completely abandoning this five-hundred-year-old

**Figure 12.9** Penelope Haralambidou, stills from an animated sequence of a model of *Étant donnés* created using a photogrammetry app, 2023. Image courtesy of Penelope Haralambidou.

process … the phenomenon of light can, due to current scientific progress, among other things, become the new tool for the new artist.'[63] As our world is accelerating, our reading of Duchamp is also perhaps unavoidably accelerated. Duchamp's early experimentation of 3D scanning and printing using stereoscopy, well before these techniques had a name, makes him a 'mediumistic being' who from the labyrinth beyond time and space is able to grasp the future of visual technology: an 'accelerator' of appearances.

## Notes

1 In this stereophotogrammetric experiment, I used the digitised stereo pair of photographs of *Given* that I took through each peephole when I visited the Philadelphia Musem of Art in 2000. Penelope Haralambidou, *Stereoscopic Pair of Given*, 2000.

2 Penelope Haralambidou, *The Blossoming of Perspective: A Study*, (London: DomoBaal Editions, 2007).

3 Penelope Haralambidou, *Marcel Duchamp and the Architecture of Desire* (Surrey: Ashgate, 2013).

4 See Marcel Duchamp, *Manual of Instructions for the assembly of Étant donnés: 1° la chute d'eau, 2° le gaz d'éclairage*, ed. Anne d'Harnoncourt (Philadelphia: Philadelphia Museum of Art, 1987).

5 Anne d'Harnoncourt and Theodore Siegl, 'Notes on the history of Étant donnés: 1° la chute d'eau, 2° le gaz d'éclairage…', 1969 September, Collection No. EDRB001F046001 https://www.duchamparchives.org/pma/archive/component/EDRB001F046001/

6 Melissa S. Meighan, 'A Technical Discussion of the Figure in Marcel Duchamp's *Étant donnés*', in Michael R. Taylor, *Marcel Duchamp: Étant donnés*, (Philadelphia and New Haven: Philadelphia Museum of Art and Yale University Press, 2009), 240–61.

7 Michael R. Taylor, *Marcel Duchamp: Étant donnés*, 66. According to Taylor there is information attesting to Duchamp and Martins taking private lessons in body casting in Ettore Salvatore's studio in the 1940s.

8 The final version is a cast of Teeny Duchamp's hand, but it was cast later to replace an earlier version that was damaged.
9 All the letters in French alongside their translations in English were published in, Marcel Duchamp, 'Marcel Duchamp's Letters to Maria Martins', trans. Paul Edwards, in Taylor, *Marcel Duchamp: Étant donnés*, 402–25.
10 See Duchamp, *Manual of Instructions for the assembly of Étant donnés*, especially Operations 11 to 12.
11 Denise Browne Hare, 'Denise Browne Hare on Marcel Duchamp's New York Studio', *Site* 19 (1987): 7–16. On A. J. Wyatt, see Taylor, *Marcel Duchamp: Étant donnés*, 158.
12 Therefore, the nude figure resembles the earlier relief small scale study in vellum held at the Moderna Museet, Stockholm. Marcel Duchamp, *Study for Étant donnés: 1° la chute d'eau, 2° le gaz d'éclairage*, c. 1946–48.
13 Julian Jason Haladyn, *Duchamp, Aesthetics, and Capitalism* (London: Routledge, 2020), 64.
14 Özkaya discusses the entire construction of this assemblage in his chaper for the current volume.
15 See Penelope Haralambidou 'C for Camera Obscura (Reversed)', *Public* 56: *Public Attendant A to Z*, eds. Serkan Özkaya and Robert Fitterman (2017): 20–29.
16 See Fernán Nápoles, 'J for Just Maria', *Public* 56: *Public Attendant A to Z*, eds. Serkan Özkaya and Robert Fitterman (2017): 44–45.
17 The online discussion with Özkaya took place on 29 January 2023.
18 Özkaya also attempted to cast a real female body, getting a model of a similar body shape and size to Martins to pose, but the results looked nothing like the figure in *Given*.
19 Francis M. Naumann, 'Notre dame des desirs', in *The Recurrent, Haunting Ghost: Essays on the Art, Life and Legacy of Marcel Duchamp* (New York: Readymade Press, 2012), 184–85.
20 Taylor, *Marcel Duchamp: Étant donnés*, 402–25.
21 Meighan, 'A Technical Discussion', 248.
22 For a detailed description see, Haralambidou, *Marcel Duchamp and the Architecture of Desire*, 156–74.
23 Jean-Michel Bouhours and Patrick de Haas, *Man Ray: Directeur du Mauvais Movies*, (Paris: Centre Georges Pompidou, 1997), 10.
24 In *Dada: Art and Anti-Art*, Hans Richter comments on the discrepancy between the two artists' accounts of the creation of the stereoscopic film: 'Duchamp says that he made his experimental stereoscopic film in 1923, while Man Ray gives the year as 1920… It is not surprising that facts and dates lead us such a dance in so many books on Dada, when two leading Dadaists, men of unquestionable integrity, have differing recollections of the same facts. We may do justice to their conflicting statements by accepting that twice two can sometimes equal five.' See Hans Richter, *Dada: Art and Anti-Art* (New York: Oxford University Press, 1978), 99–100.
25 Man Ray, *Man Ray: Self Portrait* (Boston: Little, Brown and Company, 1963), 99–100.
26 Man Ray continues: 'There was a young mechanic living in my building, out of a job. He drank and quarrelled continuously with his wife, Eileen, a fiery little redheaded Irish girl. We paid him in small instalments; he finally managed to join the two cameras together. Then he disappeared leaving his wife alone. Duchamp decided to develop the film himself; I helped him. First, we obtained a couple of shallow garbage-can covers for tanks, a round plywood board was cut to fit, then waterproofed with paraffin. To wind the film on these, Duchamp drew radiating lines

from the centers and hammered 400 nails along them. After taking fifty feet of film, we waited for nightfall and in the dark managed to wind the film onto the labyrinth of nails. I had already poured the development of the developer into one of the trays, the fixing liquid into the other. We immersed the board into the first and timed the development, then transferred it to the fixer tank. After about twenty minutes we turned on the light. The film looked like a mass of tangled seaweed it had swelled and it was stuck together, most of it not having been acted on by the developer … Duchamp and I went out to eat. He was imperturbable; if we could save a few feet to verify his experiment, he'd be satisfied … Duchamp came in towards evening; we did save some films, two matching strips which, on examination through an old stereopticon, gave the effect of relief. To carry on the experiment, capital was needed as well as several other adjustments to make it practical for public presentation; the project was abandoned.' Ray, *Man Ray: Self Portrait*, 99–100.

27 Jean Clair, 'Opticeries,' *October* 5 (1978): 111.

28 Schwarz, *The Complete Works of Marcel Duchamp*, 706. Inscribed on the outer edge of the copper ring is the following phrase: *RROSE Sélavy ET MOI ESQUIVONS LES ECCHYMOSES DES ESQUIMAUX AUX MOTS EXQUIS*.

29 Arturo Schwarz, *The Complete Works of Marcel Duchamp*, (New York: Delano Greenidge, 2000), 55.

30 The exact pattern of the *Rotary Demisphere* does not feature in the *Anémic cinéma* film.

31 Schwarz, *The Complete Works of Marcel Duchamp*, 55, 704–05.

32 Lars Blunck, *Duchamps Präzisionsoptik* (Munich: Silke Schreiber, 2008), 109.

33 Clair, 'Opticeries,' 109, and Schwarz, *The Complete Works of Marcel Duchamp*, 707.

34 Duchamp Research Portal, Collection No. MDEB019F001088 https://www.duchamparchives.org/pma/archive/component/MDEB019F001088/ and Collection No. MDEB019F001089 https://www.duchamparchives.org/pma/archive/component/MDEB019F001089/

35 The photograph is dated 1920 and shows the interior of Man Ray's studio in Greenwich New York http://www.manray-photo.com/catalog/productinfo.php?cPath=32&productsid=411&osCsid=a1e548b3bb158c78dda290bcb6e792cd

36 See letters from Duchamp to Doucet on 6 March, 14 September and 20 October 2024. Marcel Duchamp, *Affectionately Marcel: The Selected Correspondence of Marcel Duchamp*, eds. Francis M. Naumann and Hector Obalk, trans. Jill Taylor (Ghent: Ludion Press, 2000), 142–47.

37 Calvin Tomkins, *Marcel Duchamp*: *The Afternoon Interviews* (Brooklyn: Badlands Unlimited, 2013), 79.

38 Tomkins, *The Afternoon Interviews*, 79.

39 Man Ray's portrait of Duchamp *Cela Vit* (1923) appears hung on the wall in the background. The photograph is dated 1925, but it must be taken earlier than that, most likely in 1924, as the globe with a spiral has not been assembled into the *Rotary Demisphere* yet. http://www.manray-photo.com/catalog/productinfo.php?cPath=32&productsid=1623&osCsid=a1e548b3bb158c78dda290bcb6e792cd

40 Calvin Tomkins, *Duchamp: A Biography* (New York: Owl Books, 1996), 230.

41 Artist Lene Berg who has made a tribute film *Shaving the Baroness* (2010) has collected the contradictory reports about the original film in a blog post: https://b-post.no/en/11/berg.html

42 Irene Gammel, *Baroness Elsa*: *Gender, Dada, and Everyday Modernity: A Cultural Biography* (Cambridge: MIT Press, 2002), 290.

43 Elsa von Freytag-Loringhoven, quoted in Gammel, *Baroness Elsa*, 292.
44 https://bljd.aura-access.fr/index.php/Detail/objects/290
45 Gammel, *Baroness Elsa*, 292.
46 Naumann also mentions the Baroness film defining it as the one destroyed in the developing process. Francis M. Naumann, New York Dada, (New York: Harry N. Abrams, 1994), 205.
47 Ray, *Man Ray: Self Portrait*, 262–63.
48 Man Ray mentions that the film they tried to develop was 50 feet long. The fragments portraying the globe are clearly from 35mm film, which equates to a 44 second sequence, so each of the scenes must have been very short.
49 Blunck, *Duchamps Präzisionsoptik,* 234.
50 Duchamp had a long fascination with the anaglyph technique, which, according to Clair, started in 1912. Significantly, his last known work, *Cheminée anaglyphe* (*Anaglyphic Chimney*) (1968), was an anaglyphic drawing with blue and red coloured pencil on cardboard, for which he obtained the gelatine glasses on the day of his death. Clair, 'Opticeries,' 104. See, Clair, 'Opticeries,' 104, and Haralambidou, *Marcel Duchamp and the Architecture of Desire*, 153–54.
51 The term 'negative' that Man Ray and Schwarz use is not appropriate as this is a positive film for projection.
52 https://www.christies.com/en/lot/lot-6009038
53 Blunck has also confirmed that the slides in one of Man Ray and Schwarz's reproductions appear red and green, albeit faded. Although printed in black and white, the photographic prints of the stereoscopic film fragment frames in the online Duchamp Research Portal are clearly designated as coloured (left, green; right, red). Indeed, the left frame print appears paler than the right, which would support a green colouration of the original film fragment. See Blunck, *Duchamps Präzisionsoptik*, 230. Duchamp Research Portal: https://www.duchamparchives.org/pma/archive/component/MDEB019F001088/
54 Stereoscopic film creation and projection in 1920 was in its infancy, but one of the first tests of projecting a red and green anaglyph film by Edwin S. Porter and William E. Waddell to an audience took place in June 1915 at the Astor Theatre in New York City.
55 Oliver S. Reading, 'Science–Study of Invariables', *American Scientist* 32.1 (January 1944), 54–64.
56 https://en.wikipedia.org/wiki/Stereoplotter
57 Anne d'Harnoncourt and Walter Hopps, 'Étant donnés: 1° la chute d'eau, 2° le gaz d'éclairage: Reflections on a New Work by Marcel Duchamp', Philadelphia: Philadelphia Museum of Art, 1987. Second reprint of the Philadelphia Museum of Art Bulletin, v. 64, nos. 299 and 300, April–September 1969, 63.
58 Haralambidou, *Marcel Duchamp and the Architecture of Desire*, 145.
59 Clair, 'Opticeries,' 104.
60 Taylor, *Marcel Duchamp: Étant donnés*, 66. As an example, Taylor presents a painting by Balthus, *Alice* (*Alice in the Mirror*) (1933).
61 'Polycam is the world's most popular 3D scanning app for iOS, web and Android. We believe that 3D capture is for everyone, so we made it easy. Now you can scan the world around you with your mobile device, DSLR camera, or drone to get beautiful, accurate 3D models.' https://poly.cam. See also 'Color stereoscopic slides of female figure in Étant donnés,' Collection No. MDPB041F017001, as found in the Duchamp

Research Portal Collection. https://www.duchamparchives.org/pma/archive/component/MDPB041F017001/

62 Taylor, *Marcel Duchamp: Étant donnés*, 151. See also images of different examples of the stereoscopic photographs on page 153.

63 Marcel Duchamp, 'Where Do We Go from Here?' address to a symposium at the Philadelphia Museum College of Art, March 1961. Translated by Helen Meakins. First published in the Duchamp issue of *Studio International*, 1975.