

WE SHALL STUDY MOTIONS OF BODIES¹

Anna Craycroft



above
Berenice Abbott, *Drawing with light*, 1958–61

above right
Berenice Abbott photographs on the cover of *PHYSICS: Physical Science Study Committee, Student Edition*.

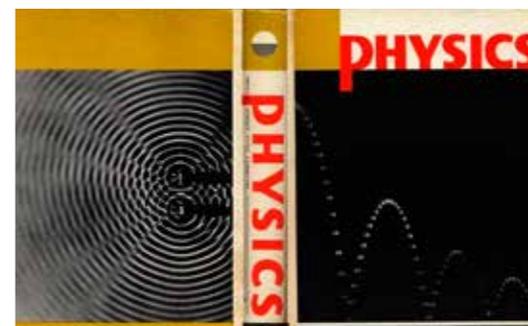
below right
Berenice Abbott, a House of Photography, Inc., advertising prospectus for 'Abbott Distorter' designed by Berenice Abbott, ca. 1950.

¹ From the cover of a Physical Science Study Committee textbook designed by Abbott <https://libraries.mit.edu/archives/exhibits/pssc/> (accessed October 11, 2016).

² Ron Kurtz [ed.], *Documenting Science* (Steidl, Göttingen, 2012), p.106.

³ Berenice Abbott, 'Manifesto' (1939), reprinted in Kurtz [ed.], *Documenting Science*, p.6.

Berenice Abbott's earliest water photogram, *Drawing with Light*, is all skin and surface. Silk. Velvet. Mercury. An uneven ripple appears to tug at the flatness of the page, quivering in a downward pull toward its bottom edge. The technique that Abbott used to make this seductive image is shockingly simple. Standing in her pitch-black darkroom, she plunged a sheet of photosensitive paper into a large pan of water. She rocked the tank and set off her flash. In a fraction of a second, the motion of a rippling

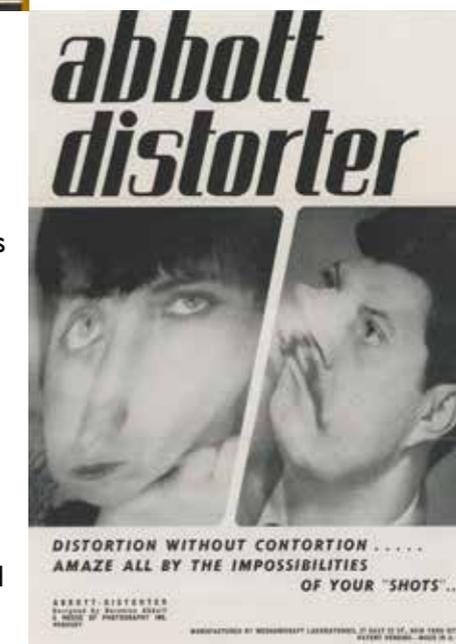


wave was transposed onto the paper as an undulating mass of light and shadow. Over a number of years, Abbott honed her photogram technique to include additional equipment such as strobe lights, point source lights and ripple tanks. But the guiding formula remained the same. There was no camera or lens, just the photo paper, a bright light and some material interference. This Spartan method is the standard fare of the photogram. But Abbott demanded more from the camera-less technique than her predecessors Man Ray or Maholy-Nagy. Rather than immobilising her subject in a blinding shadow, Abbott's images refract and capture the lightwaves that illuminate them. She referred to her method as 'a Rayogram in motion'.² In Abbott's photograms, bodies are unveiled to reveal how they exist in space through movement. Hers is a materialisation of time.

She likely shot *Drawing with Light* sometime in the 1940s. It was first published in her 1953 'how-to' book *New Guide to Better Photography*. After this preliminary study, Abbott went on to make other experiments with motion photography. Her photograms would more precisely compose the ripples of the water's waves. She would also capture the trajectories of objects bouncing, swinging

and careening through space by using the time-fractioning flash of stroboscopic technology. During the years that she was experimenting with these various methods, they began to take an interpretive turn, explaining the phenomena that they captured. In her 1939 statement on 'Photography and Science', Abbott articulates her sense of urgency to identify connections between the two fields:

There needs to be a friendly interpreter between science and the Layman. I believe that photography can be this spokesman, as no other form of expression can be. For photography, the art of our time, the mechanical, scientific medium which matches the pace and character of our era, is attuned to the function. There is an essential unity between photography, science's child, and science, the parent ... Today science needs its voice. It needs the vivification of the visual image.³



Abbott was well equipped to breathe life into the 'essential unity' that she identified between science and photography. As she developed this body of work, she also confronted and challenged the technology with which she was working. To aid in her process, Abbott invented cameras, tripods, darkroom devices, and a unique form of macro-photography. Her vast experiments and numerous

inventions gave her a wealth of knowledge about the inner workings of the camera, its limitations and its potentials. For many of these inventions Abbott sought and received patents. These items were then marketed to the public through her short-lived production company *House of Photography*.

Abbott's notebooks from these years are filled with catchphrases and tag lines to sell her various products. But these read as more than advertising copy. Her vernacular for promoting the wonders of the photographic process translated the complex mechanics of the camera for the average consumer. Even this brief entrepreneurial tap-dance belies the populism of Abbott's

as she had aspired to in 1939. She worked with the PSSC for four years creating a body of work that has been published in Physics textbooks worldwide ever since.

Abbott's photographs were included to aid students with their classroom laboratory work. These images were expected to be representative and instructional. They would provide a more tangible illustration than any linear diagram could. But Abbott's photographs did much more than this. Her images were both didactic and enigmatic. They were as much about provoking wonder as they were about explaining the phenomena that they depicted. Abbott created imagery in which 'the science made its own design ... the principle had to come through first and foremost.'⁵

One photograph that she discussed in this interview was *Spinning Wrench*, taken at MIT for the PSSC between 1958-61. The scene Abbott describes sounds strikingly like the one taking place in the later of the two photographs and which captures her at work on the science photos. In it, Abbott stands high on top of a tall ladder looking down, camera in hand.

We suspended it at its center of gravity on a long piano wire, which would not give or stretch ... The center of mass moves in a straight line, even though the wrench appears to travel erratically. The wrench was painted white. I was on a tall ladder, looking down, as near the wrench as possible. The wrench had been wound on the wire so that when it was thrown

Spinning Wrench is one of only a few photographs from her motion series that depicts an identifiable subject. But the wrench is recognisable only insofar as we might recall how the object is weighted. Other than this, the wrench as such has no meaning. The space surrounding it is a dark black void. It is pattern on an endless loop. If hung on a wall, the wrench appears to fly vertically across the photograph rather than horizontally along the floor, as it was shot. Any point of view has been disguised.

In removing evidence of real space, Abbott's motion photographs construct analogies between scientific principles and photographic processes. Movement is measured as either a particle (a ball) or a wave (a ripple).



greater agenda as a photographer. In the case of her science photography this is made evident by the platform for which it was ultimately realised.

In 1956 a team of MIT scientists and high school physics teachers assembled to revamp America's science textbooks. After the Soviet Union's successful orbit of Sputnik in 1957, the Physical Science Study Committee (PSSC) gained substantial support from the United States Government to realise their project. Shortly thereafter, the PSSC hired Abbott to create the photographic illustrations for the textbooks. Here Abbott could finally 'visualise the poetry of [science's] vast implications'⁴

Understanding precisely how Abbott constructed each photograph is something of a challenge. As simple as each appears, her methods of making them involved extensive experimentation and elaborate sets. There is limited information on the specifics of these processes. Only two images exist of Abbott working on the science photography, taken decades apart. Perhaps Abbott was concerned about having propriety over her methods. Or she may simply have been too deeply absorbed in her process to document it at the time. We can only speculate. But Abbott did give a smattering of anecdotal recounting that she shared years later, in a single interview.

it would turn. It was very near the floor and I had to have an assistant move the lights with it as it traveled, keeping the light off the background ... The law expressed is that of constant velocity.⁶ These two images – *Spinning Wrench* and the documentation of Abbott at work – depict two very different spaces. *Spinning Wrench* is sparse and deprived of any contextualising information, whereas the chaotic scene that Abbott towers over in the documentary photograph looks precariously rigged in the most DIY of ways. Noticing this contrast makes clear how painstakingly Abbott controlled the environments of her motion photographs.

It becomes visible to the camera through light. It is articulated through one of two photographic scenarios: how light is dispersed over time (captured in a flash) or how it is refracted through space (focused by a lens).

Like her spinning wrench, the spherical balls of Abbott's motion photographs swing,

above
Berenice Abbott, *Spinning Wrench*, 1958-61

⁴ Ibid.

⁵ Audio recording of Berenice Abbott in interview with Hank O'Neal, made between 30 August and 8 September 1980 (MIT archives, unpublished).

⁶ Kurz [ed.], *Documenting Science*, p.18.

bounce and orbit through a velvet black void. But there are no clues as to their weight, texture or scale. Any revealing detail is disguised in the final image. The photographs are simply a particle moving along a path. However, in the one interview that Abbott gave on her processes, she disclosed the specificity of her chosen props. They are golf balls covered in grey paint, or metal balls marked with a dot. They ricochet off marble surfaces. They fall from a six-foot ledge. They are released from a magnet.

Abbott used the technology that she created a space outside of real experience that still feels perceptually accurate.

Abbott trains our focus exclusively on the movement of a form. Her camera both captures and creates this effect. As she lights the sphere from multiple angles, it emerges but does not entirely separate itself from the dark ground. Each re-appearance marks a fraction of the camera's shutter speed. Each trajectory is carefully paced and distributed across the camera's frame. This choreography



To make these photos, Abbott alternated between techniques of multiple exposure, long exposure, flashing strobe lights, and stroboscopic cameras. By synchronising her camera's aperture to the flashing lights, she could stagger time to thirtieths, thirteenthths and even two-hundredths of a second. Abbott was working with extremely new technology to do this, as Harold Edgerton had only invented the strobe light a few years previously, in 1931. What is striking about how

of movement has been measured on the camera's mathematics, like a time signature.

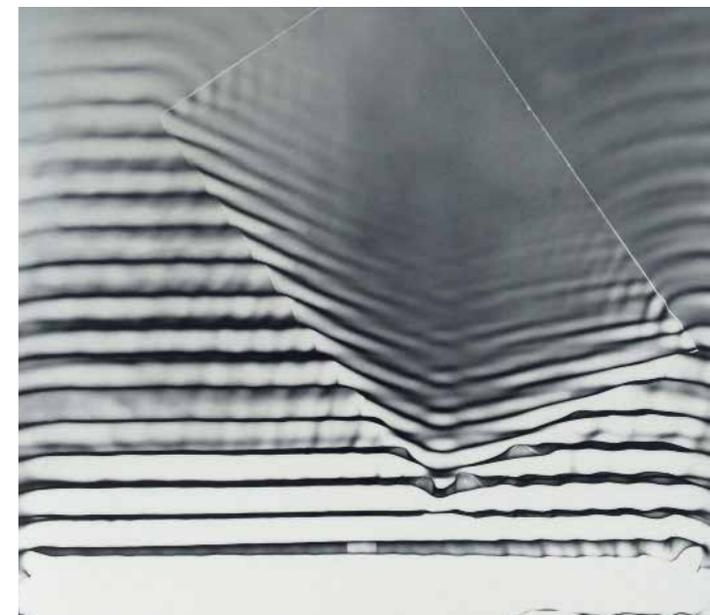
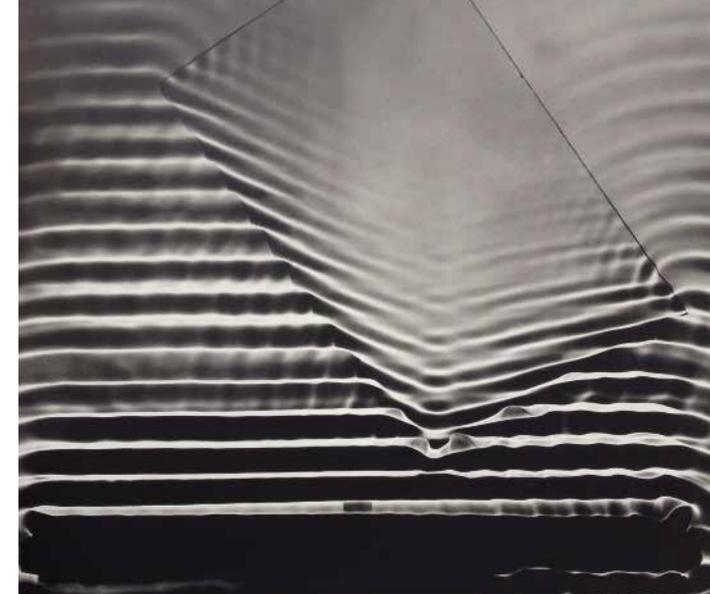
Similarly the water photograms are a measure of the camera's depth of field. Abbott's first experiment, *Drawing with Light*, was made by submerging the photo-paper. However, the resulting image described the outside of the form: the water's surface. It wasn't until further developing her technique in the later water photograms that Abbott was able to capture the physicality of this first immersion.

For the later photos Abbott used a ripple bed – a glass table holding a thin pool of water. The transparency of the glass allowed her to capture the water's image by placing the photo-paper beneath the table and outside the body of water. This distance allowed the refracted light of the water's waves to focus its image onto the paper. The depth of field was thus expanded beyond the material limitations of its liquid subject. At the same time, each photographic print appears to sit *within* the water's waves. Almost as though the waves made visible are not water waves at all but are the lightwaves that rise and fall in precise rhythms of expansion and rarefaction.

While these later ripple photos capture the density of each rolling wave, they too are a distortion of the real space in which the photograph was originally staged. In order for Abbott to achieve the final image, each photograph had to be reprinted in negative. In the original positive print (*Water Waves Change Direction* below, left) the bright flash of light dominates the image and overwhelms the wave pattern. In the second negative print (*Water Waves Change Direction* below, right) the shadows dominate, and the waves appear to rise from the dark ground.

This aspect of Abbott's process is rarely discussed. Looking at the two stages of *Water Waves Change Direction* side by side reveals why: the original light-washed image seems less substantive than the dark emerging forms of the inverted print, and this is confusing. How can something appear more tangible when it is even further from its material form? But the logic of these photos does not belong to real space, it belongs to the space of the photographic, where light fixes on a body for a fraction of a moment.

In Abbott's motion photographs, this moment is tangible because the light that we see is synonymous with the forms that move with it.



left

Berenice Abbott, *A strobe photograph of a bouncing ball*, 1958–61

centre

Berenice Abbott, *Time exposure of a bouncing ball*, 1958–61

above

Berenice Abbott, *A wave pattern with glass plate*, 1958–61

below

Negative version of Berenice Abbott, *A wave pattern with glass plate*, 1958–61