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“Curious Machines”

Reproducing Sculpture via Machine and Its Modus of Display in the Nineteenth Century

Abstract

The relationship between the human body, sculpture, and machine is demonstrated by mechanical or artistic works performing at the intersection of aesthetics and scientific practice. Considering the mutual interaction of body and technology, the idea of delegating image production completely to machines can be traced to two main developments: the creation of drawing machines for multiplying portraits, like the physiognotrace, and to the conception of machines for reproducing sculpture, both of which were invented in the late eighteenth and the early nineteenth century. Thus, relevant to the development of modern exhibition culture, this paper takes up modern technologies for reproduction in the arts with a focus on practices in the field of sculpture: since 1800, industrial exhibitions, museum collections or public demonstrations of humanlike machines that replicate sculptures stand for a specific display aesthetic as well as the notion of the magical or even curios as a topic. Ultimately, machines and their active role in the reproduction process of artworks will be contextualized via Gilbert Simondon (1958) and will position the machine and the object as active agents in the entangled fields of art, science, and technology.

Key Words

Sculpture reproducing machines, physiognotrace, François Willème, John Isaac Hawkins, Benjamin Cheverton, Charles Willson Peale

The relationship between the human body, sculpture, and machine is the core element of exhibitions that demonstrate objects performing at the intersection of art and science from the modern era till the present. In 2007, for example, the ZKM | Center for Art and Media Karlsruhe exhibited current artistic positions that expanded metaphors of “intelligent machines” that were produced since Wolfgang von Kempelen’s (1734–1804) apparatuses, the chess automaton (1770). Two years later, the Berlin Georg Kolbe Museum was displaying “Romantic Machines” in the exhibition titled *90 Years of Kinetic Art, 9 Works,*[1] which

1 Marc Wellmann, ed., *Romantische Maschinen: Kinetische Kunst der Gegenwart* ,exh. cat. Georg-Kolbe-Museum-Berlin (Berlin: Wienand, 2009).

covered perspectives of automation and moving sculpture. Both exhibitions give insight into the technical-historical importance and intrinsic world of the apparatus. In particular, the display of the chess automaton found its expression literally in the notion of the "body" in the machine: "The secret of the machine that supposedly possessed artificial intelligence was later discovered to be a human hidden within it."[2]

Early automata exercised great fascination for the scholars in view of the philosophical discourses on "the genius" at the time, particularly considering the mutual interaction of body and technology. Mainly since the end of the eighteenth century, newly invented machines were increasingly popularized while displayed as spectacles to astonished audiences. Relevant to the development of modern culture, the notion of magic has thus shown a remarkable connection to technology—alongside sculpture, they were often presented in exhibitions or private collections. As a component of the royal cabinets of curiosities in the past, the magical or even curios became a relevant topic in the transition to modern exhibitions. Since 1800, industrial exhibitions, fairs or public demonstrations of human-acting machines have been used for a specific display aesthetic. Only a few decades after Kempelen's ruse on the European princely houses, in 1802, the American portraitist and museum owner Charles Willson Peale (1741–1827) was presented a "curious machine"[3] from Europe that enabled the production of two-dimensional profiles of living models through mechanical invention: the physiognotrace. Its creator, John Isaac Hawkins (1772–1855) later worked—like his contemporary James Watt (1736–1819)—on a machine for copying in three dimensions, which also received attention from the sculptor Benjamin Cheverton (1794–1876), who demonstrated the sculpture-reproducing machine successfully at London's Great Exhibition in 1851. A decade later, François Willème's "photosculptures" reevaluates different notions of dimensionality that as early as 1838 culminated in the virtualization of sculpture by referring to techniques such as stereoscopy.

This paper aims to elaborate on different notions of reproduction beyond the cultural- and media-critical implication of Walter Benjamin's analysis of reproduction.[4] By following Jens Schröter's research on the rendering of sculpture in the historical context of technical reproduction media,[5] this contribution pursues the developments from the plane reduction

2 See the exhibition documentation, Center for Art and Media website, https://zkm.de/en/event/2007/06/wolfgang-von-kempelen-man-in-the-machine (accessed November 2, 2022). See also Bernhard Serexhe and Peter Weibel, eds., *Wolfgang von Kempelen: Mensch in der Maschine/Man in the Machine*, exh. cat. Zentrum für Kunst und Medientechnologie Karlsruhe (Berlin: Matthes & Seitz, 2007), p. 6.

3 *Aurora*, Dec 28th, 1802, quoted in Wendy Bellion, "Heads of State: Profiles and Politics in Jeffersonian America," in *New Media, 1740–1915*, ed. Lisa Gitelman and Geoffrey B. Pingree (Cambridge, MA: MIT Press, 2003), pp. 31–60, here p. 32.

4 This paper is based at some points on the results of the journal article by Buket Altinoba, "Das 'Multiple' im 19. Jahrhundert: Von Skulpturmaschinen, Techniktraktaten und Porträt-Miniaturbüsten," *Figuren der Replikation, kritische bericht*e 48, no. 3 (2020): 67–80.

5 Jens Schröter, "Wie man Skulpturen rendern soll: Zur Geschichte der transplanen Reproduktion," in *Skulptur – Zwischen Realität und Virtualität*, ed. Gundolf Winter, Jens Schröter, and Christian Spies (Munich: Wilhelm Fink, 2006), pp. 231–74, here p. 233. See also Jens Schröter, *3D: Zur Geschichte, Theorie und Medienästhetik des technisch-transplanen Bildes* (Munich: Wilhelm Fink, 2009).

of a three-dimensional object to a surface (physiognotrace) to the automated reproduction of sculptural objects (sculpture machine, photosculpture). Therefore, this paper not only takes up machines regarding their active role in the reproduction process of artworks in different formats and sites in the first half of the nineteenth century in Britain, France, and the United States. In the theoretical context of the discourse about art and materiality, it also considers the ontological approach to machines and objects according to Gilbert Simondon, which will be contextualized according to the notion of the machine and the objects as active agents to position them in the entangled fields of art, science, and technology.[6] With the onset of industrialization, technologies for reproduction in the arts developed with a special focus on sculptural objects and materiality. A further aim is to assess how the increased mechanization and automation affected the traditional craftworking methods of sculptors in terms of authorship and control.

The contribution deals above all with achievements of industry and technology that mingle with the arts as new entanglements changed the perception of dimensional awareness through their display. Yet, with Jonathan Crary, it is crucial to note how science and art have been intertwined fields of knowledge and mechanical practice[7] since the nineteenth century, while according to Lorraine Daston the simultaneous "migration of imagination to the artistic pole"[8] fostered the new disunion of art and science. Extending these thoughts to the interactive change of visual perception, the display gets a realm where dynamic and moving aspects of the object can unfold in opposition to the immobility of the viewer. The medium of sculpture, which usually precedes the movement of the viewer in space, is here thoughtfully reversed with a special focus on the interplay between magic, technological virtuosity, and mechanical automata. With the variable positioning and installation of display in relation to the viewer, sculpture anticipating questions of today's notion of the sculptural in the digital context: rather, the machine, its output, the procedure as a whole, is to be understood as a kind of historical precursor of current procedures of transformation or simulation of sculpture (3D-printing, 3D-rendering, volumetric scanning), also regarding its onsite presentation: a new path in the field of three-dimensional reproduction.

6 Gilbert Simondon, *Du Mode d'existence des objets techniques* (Paris: Aubier, 1958). See also Bruno Latour, "Do Scientific Objects Have a History? Pasteur and Whitehead in a Bath of Lactic Acid," *Common Knowledge* 5, no. 1 (1996): 76–91. Bruno Latour, "On Interobjectivity," *Mind, Culture & Activity* 3, no. 4 (1996): 228–45.

7 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990), p. 15.

8 Lorraine Daston, "Fear & Loathing of the Imagination in Science," *Daedalus* 134, no. 4 (2005): 16–30, here p. 17.

I. Magic, Technological Virtuosity, and Mechanical Automata around 1800

> "This curious machine, perhaps, gives the truest outlines of any heretofore invented, and is placed in the Museum for the visitors who may desire to take the likenesses of themselves or friends."[9]

The so-called physiognotrace introduced in the United States in 1796, ten years after its invention at the French court,[10] was, in the beginning, a practiced mechanical process for image-making by French emigrants such as J.J. Boudier, Charles B.J.F. de Saint-Mémin (1770–1852), and Thomas Bluget de Valdenuit (1763–1846).[11] A modified version of the machine was developed by the British-born inventor John Isaac Hawkins who emigrated to the US around 1800 and received an American patent for it in 1802.[12] The following year, he presented the pantograph-based device that he had designed to trace portraits for the purpose to supply copies to Charles Willson Peale (fig. 1). A portraitist, Peale made use of the practical ability of the new acquisition, which was a device "so simple [of] construction, that any person without the aid of another, can in less than a minute take their own likeness in profile."[13] As a result, the physiognotrace was integrated into Peale's collection of "wonderful" curiosities (*Wunderkammer*) which he had only a short time later transferred into the Philadelphia Museum.[14] Here, he exploited the machine for "accurate representation"[15] commercially by demonstrating it publicly in his museum so visitors could get a machine-made profile included in the entry fee.[16]

Indeed, one can assume that Hawkins knew the apparatuses of Chrétien and Saint-Mémin. Yet, the progress in the machine of Hawkins was remarkable. According to Peale's letter to his close friend and president Thomas Jefferson, wherein he enthusiastically de-

9 Part of Charles Willson Peale's announcement in the newspaper *Aurora*, Dec 28th, 1802, quoted in Bellion, "Heads of State," p. 32.

10 Developed in Paris by Gilles-Louis Chrétien (1754–1811) and patented in 1786, the physiognotrace was in use till 1830. For further information, see Gisèle Freund, *Fotografie und Gesellschaft* (Munich: Rogner & Bernhard, 1974); Peter Frieß, *Kunst und Maschine: 500 Jahre Maschinenlinien in Bild und Skulptur* (Munich: Deutscher Kunstverlag, 1993), pp. 134–36.

11 "Saint-Mémin went to New York in 1793 as a refugee from the French Revolution and by 1796 had taught himself the techniques of engraving. From Thomas Bluget de Valdenuit (1763–1846), his partner in 1796–97, he learned to take profile portraits in the manner used by Gilles-Louis Chrétien in Paris in the 1780s and 1790s. Between 1796 and 1810, Saint-Mémin made about 900 bust-length profile portraits using a pantographic drawing device called a physiognotrace." Joan M. Marter, *The Groove Encyclopedia of American Art*, vol. I (New York: Oxford University Press), p. 353.

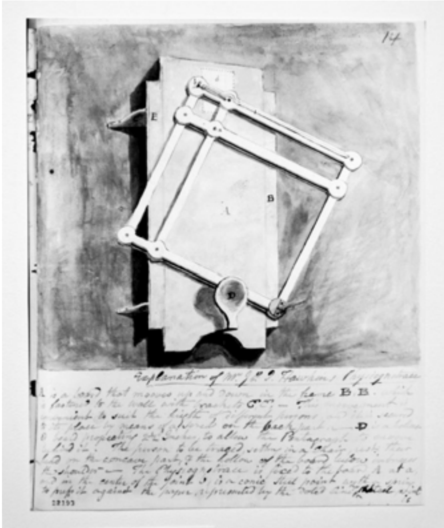
12 See Frieß, *Kunst und Maschine*, p. 138.

13 *Philadelphia Repository*, January 1, 1803, quoted in Bellion, "Heads of State," p. 32.

14 "Placed in the northwest corner of the Long Room, the instrument was one of many modalities of representation—visual, political, classificatory, didactic—operative within the space of the State House." Ibid., p. 44.

15 Bellion, "Heads of State," p. 31.

16 Ibid., p. 34.



1 Charles Willson Peale, *Explanation of Mr. Jno. I. Hawkins Physiognotrace*, 1803.

scribed the results,[17] this version could proceed "without the help of an artist or engraver."[18] In contrast to the French physionotrace (without the g) that—due to the political escape of Saint-Mémin—reached the US as a scaled-down portable model, the operator of the machine was now even able to portray himself:[19] Chrétien and Saint-Mémin's machines included a visor, allowing the artist to work at a distance and aim at their model. Against this, Hawkin's machine was bolted to a wall.[20] Thus, the sitter operated alone, and the machine allowed a direct and unmediated (and therefore representative) image. In her essay on the imagery production during the presidential elections and the making of immediate profiles at the turn of the century, Wendy Bellion not only explains the procedure of the exhibited physiognotrace but also mentions its visual and performative qualities.[21] As the machine's advertisement referred to the slogan "Friendship esteems as valuable even the most distant likeness of a friend,"[22] Peale "sat a plaster bust of his own distant friend, Thomas Jefferson, before the 'curious machine' and traced the simulacrum of the president's physiognomy"[23] in

17 See *Philadelphia Repository*, January 1, 1803, quoted in ibid., p. 32.
18 Quoted in Frieß, *Kunst und Maschine*, p. 138; translated by the author.
19 Frieß, *Kunst und Maschine*, p. 136.
20 While the model was sitting under the machine, the semicircular cutout in the board rested on his shoulder. For people of different heights, the board could be adjusted appropriately to the heights of the anchored guides. Then it was only necessary to touch the profile of the head with the stylus on the pantograph, and a drawing pen or engraver leaves the facial outline reduced on the drawing sheet or copper plate to be finished. See ibid., pp. 138–39.
21 Bellion, "Heads of State," pp. 31–60, here p. 32.
22 The beginning of Charles Willson Peale's announcement in the newspaper *Aurora*, December 28th, 1802, quoted in ibid.
23 Ibid.

2 Charles Willson Peale, *Smoke-Eater*.

front of the audience. This aspect of showmanship is interesting on two levels: on the one, Peale profited from Jefferson's celebrity along with the promotion of the physiognotrace on display: Jefferson's silhouette was reproduced and distributed to visitors at Peale's museum against the background of an ongoing presidential election. On the other, a sculptural bust was clamped into the device for the performance as an embodied signifier of bodily absence. This notion of absence, along with the prominence of the portrayed, is symbolized by the medium of sculptural portrait, demonstrating the place of the bust in Victorian culture—a topic corresponding at the same time with the sentiments of the epoch of classical romanticism. Another example of a bust integrated into a three-dimensional installation was Peale's *Smoke-Eater* (fig. 2), which recalled the Franklin stove or similar French versions, standing isolated and centered in the room, simulating sculptural aesthetics:

> Peale's "smoke-eater." Peale built his stove in brick, favoring its heat radiating qualities over iron; he covered the brick with plaster, which was whitewashed and then painted to look like marble. The bust on top was initially Cicero, but Peale later sought to replace it with one of Linnaeus. The smoke rose to the top of the stove and was then sucked down a pipe, which was perforated at the level of the fire, at which point it underwent further combustion. The hot air would then continue along a horizontal pipe under the floor to the outside of the building.[24]

Regarding the sculptural quality, the medium's title refers to the human features and the author's anthropological interest, resulting from prominent eighteenth-century lectures such as Julien Offray de La Mettrie's *L'homme machine* (1747). Peale, who viewed "the

24 *The Weekly Magazine*, vol. 2, no. 25 (July 21, 1798), pp. 353–54, quoted in Sidney Hart, "'To Encrease the Comforts of Life': Charles Willson Peale and the Mechanical Arts," *The Pennsylvania Magazine of History and Biography* 110, no. 3 (1986): 323–57, here p. 328, 340.

human body as a complex machine,"[25] had designed and installed this "fascinating and complex mechanism that not only supplied sufficient heat but became an exhibit itself." "Astonished visitors to the museum were able to look through a vent in the pipe and see a stream of smokeless hot air leaving the stove."[26]

Besides the aesthetic reflection, Peale was highly interested in the operating system that produced output seemingly without the human hand.[27] Though machines do not intervene all on their own—mechanical procedures commonly require in decisive moments the practiced hand of an instructed person—drawing machines in particular claimed to operate independently of human intervention. Elizabeth Bacon refers in her dissertation on *Drawing Machines* to the writing of Johann Caspar Lavater's (1741–1801) *Whole Works* and explains why he drew attention to the notion of the "machine alone, autonomous, unadulterated." The emphasis of outlining from nature as the "creator" stands in opposition to the "suggestion of the artist's body, [which] is hidden behind the physiognotrace's screen."[28] Especially considering Lavater's chair for outlining silhouettes (1776),[29] "[t]his rhetoric of automation and self-evidence is characteristic of period descriptions of the device."[30] Two thoughts arise from this: firstly, the pictorial output—called the *profile*—was the result of the cast of a shadow produced by a candle that allowed the hand of the artist to follow it naturally and without any seeming effort. Secondly, according to the "mysterious" or "strange" procedure during candlelight that hid the intervening body behind the animated machine, the latter was supposed to be perceived as "ghostly, haunted by the hand of an operator who never materializes."[31]

If we take a position on Bacon's remarks on the ghostly in the context of Lavater's method that was popular due to the emerging interest in physiognomy during the Enlightenment, we must put another contemporary example aside which is only little written about: the "Bou-Magie" (1778). Invented in Hamburg by Jacob von Döhren (1746–1800), the machine for portrait reproduction was supposed to act magically.[32] As the title

25 Ibid.

26 Ibid., p. 339.

27 Peale worked in his early career as a clock and watch repairer, an area of pre-industrial mechanics. Ibid., p. 325.

28 Ibid., p. 179. The fully automated process is questioned today and is assumed to be "semi-automated". Elizabeth Bacon, Drawing Machines: Image and Industry in Early America, PhD diss. (Harvard University, 2017), p. 180, http://nrs.harvard.edu/urn-3:HUL.InstRepos:41140245 (accessed January 7, 2021).

29 For further information on Lavater's chair, see Frieß, *Kunst und Maschine*, p. 132. See also Olaf Breidbach, "Physiognomische Präsentation: Zur Physiognomik Johann Caspar Lavaters," in *Natur im Kasten: Lichtbild, Schattenriss, Umzeichnung und Naturselbstdruck um 1800*, ed. Kerrin Klinger and André Karliczek (Jena: Friedrich-Schiller Universität, 2010), pp. 26–34.

30 Bacon, *Drawing Machines*, p. 180

31 Ibid.

32 The artist, writer, and naturalist tried to optimize printing processes from 1777 onward under the pseudonym Hans Plattversius. Döhren developed a technique for reproducing existing silhouettes, for which he used roughened, blackened plates of brass and zinc that he pressed onto the paper. This enabled him to generate numerous accurate copies in a short time, which he sold at a profit nearly a century before the practice of printing photography in mass reproduction emerged. See Gustave Kowalewski,

of Döhren's book *Silhouettes of Contemporary Scholars Made en Bou-Magie*[33] recalls the name of the machine, such an expression also emphasizes the ghostly expression "bouh" ("boo") and the magic as it emanates from likewise automated machines based on the pantograph. The mysteriousness is strengthened by the fact that the author says in the preface of the cited writing, what Bou-Magie is not, but promises to still explain what it is.[34] Within this rhetoric of the childishly simple, enigmatic, or even magical, we also find an idea reiterated in many of the period's visual representations of automated mechanisms, tracing back to an image tradition related to the pantograph. The latter, a widely employed copying and perspective device, was a well-known drawing aid and auxiliary tool (comparable to the surpassed perception of the "drawing" in art history) during the seventeenth and eighteenth century.[35] It was only recently that Margarete Pratschke analyzed the frontispiece of a treatise that the physician Christoph Scheiner had published in the early seventeenth century concerning the construction and use of this device taking into account art-theoretical issues. The manual, titled *Pantographice: Sev Ars Delineandi*, was introducing a newer version of the stork's beak, the pantograph which Christoph Scheiner (1575–1650) had invented as early as 1603, and finally published the treatise in 1631 in Rome.[36] Pratschke understands the pantograph's illustration on the front page as a "visual instruction manual," referring to the mode of presentation: it demonstrates to the viewer the new possibility of using the already known rod parallelogram as a full "automated procedure."[37] For this purpose, the depiction (fig. 3) shows an anthropomorphic cloud, equipped with a hand and an eye, floating in the center of the picture, magically presenting both modes of operation: a small and equally sized reproduction. The audience illustrated here had to be convinced of the new and innovative potential of a device already known, and contrasting to the old drawing tradition embodied by the putto.

Even further developments of the pantograph—as a "collapsible mechanism of levers"[38]—are significant for the artistic production of scale, also in the third dimension: the sculpture reproducing machine that was invented at the beginning of the nineteenth century was also based on the pantograph system. However, Martin Kemp mentioned sculpting machines (and there are different types of them) solely as the idea of "[a] variant on

"Bou-Magie und Physionotrace: Ein Beitrag zur Geschichte des Bildnisses," *Hamburg in Zeitschrift des Vereins für Hamburgische Geschichte* XXII (1918), pp. 168–79.

33 The book depicts silhouettes made with his machine. Jacob von Döhren, *Die Silhouetten Jetztlebender Gelehrten en Bou Magie* (Hamburg, 1778).

34 Gabriel Christoph Benjamin Busch, *Handbuch der Erfindungen*, vol. 2 (Eisenach, 1803), p. 142.

35 See Robert Dossie, *The Handmaid to the Arts*, vol. 1 (Oxford: Nourse, 1758).

36 Christoph Scheiner, *Pantographice seu ars delineandi res quaslibet per parallelogrammum lineare seu cauum, mechanicum, mobile* (Rome: Ex Typographia Ludouici Grignani, 1632).

37 Quoted in Margarete Pratschke, "'Wie von selbst' – Strategien der Innovationslegitimierung in Christoph Scheiners Frontispiz zum Pantografen von 1631," in *Imagination, Repräsentation und das Neue*, ed. Pablo Schneider, Christiane Kruse, and Horst Bredekamp (Munich: Wilhelm Fink, 2010), pp. 321–33, here p. 323; translated by the author.

38 Bellion, "Heads of State," p. 42.

3 Christoph Scheiner, Frontispiece (book illustration), *Pantographice seu Ars Delineandi,* 1630.

the Scheiner-Wren system."[39] Yet, recently, pantographic apparatuses were perceived in the art-historical literature as auxiliary instruments that were irrelevant to the creative process because they undermine the artistic myth of the original idea. Since the pantograph at best "copies," it was merely discussed on an art-historical or art-theoretical level. But sculptures, profiles, and busts, which were "multiplied" in different materials, shapes, and sizes at the beginning of industrialization, must be discussed here as "products" of technical ingenuity and interpreted together with the machine in their agentive role in the setting of image making as well as for their role in building the art-historical canon.[40]

While this part mainly discussed the two-dimensional aspect of mechanical reproduction in the context of drawing machines invented and presented publicly as a magical spectacle from the early modern period till the end of eighteenth century, the following section will introduce types of sculpture machines that carry this fascination for the machine and its output on in the nineteenth century. Arguing then in the final section that the display of these machines certainly possessed qualities of sculptural exhibits and serve to produce a magical spectacle, it is the aim to highlight the perception of the viewer and the attitude toward the genre of sculpture that continued to change with the beginning of the nineteenth century.

39 Martin Kemp, *The Science of Art: Optical Themes in Western Art from Brunelleschi to Seurat* (New Haven: Yale University Press, 1990), pp. 182–83.

40 See Buket Altinoba, "Das 'Multiple' im 19. Jahrhundert: Von Skulpturmaschinen, Techniktraktaten und Porträt-Miniaturbüsten," in *kritische berichte*, 2020.

II. From Sculpture to Invention: From Invention to Sculpture

The same year, in 1803, John Isaac Hawkins returned to England, so the technology also moved there: together with Hawkins's return, the physiognotrace arrived in London not via France, where the apparatus was developed, but via the US detour. Improvements of the physiognotrace established a new portraiture technique in Britain as Hawkins made the first machine-made profile of Benjamin West, the president of the Royal Academy of Arts.[41] In London, Hawkins pursued his dispositioned mechanical and scientific interests,[42] which he had intensified in the workshop of Peale's Philadelphia Museum.[43] As reported in 1808 by *The Monthly Magazine*, Hawkins "has established a museum for the reception and exhibition of useful mechanical inventions and improvements."[44] This exhibition referred to his own inventions, yet not exclusively, as other technical innovations were also introduced. Overall, the exhibits served to astonish the audience by displaying objects and machines with curious, humorous, practical, and visual qualities including another machine for reproducing the scale of the recorded.[45] Yet again, the term "curios" is here used as one of the main features of Hawkins's collection. This topic is not only linked to the elites' gained knowledge from access to royal cabinets of curiosities since the early modern period; it also stands close to the display of sculpture, technology, and science, such as the painted exhibition view by Samuel Rayner titled *Interior of the Mechanics' Institute (Derby Exhibition)* from 1839 (fig. 4) is illustrating three decades later—an industrialized cabinet of curiosities. Here, the display shows the status and importance of sculpture, especially demonstrating the portraiture bust presented in the context of science and industry and its popularization in the first half of the nineteenth century.[46]

Meanwhile, Hawkins started to work—like many at the time—on machines for reproducing in the third dimension. According to Ben Russell it was the time of "technical challenge and financial rewards of making high-quality copies of sculpture,"[47] and it was far

41 Frieß is also noticing that by selling his American patents to colleagues and friends in the US, Hawkins not only could afford further investigations, but also obtained patent protection in Britain for most of his inventions, including the physiognotrace. See Frieß, *Kunst und Maschine*, 1993, p. 139.

42 Hawkins is described as a "multifaceted man, a civil engineer, inventor and sometime composer, poet, preacher and phrenologist whose father had been a clockmaker." Ben Russell, *James Watt: Making the World Anew* (London: Reaktion Books, 2014), pp. 213–15.

43 Hart, "To Encrease the Comforts of Life," p. 341.

44 *The Monthly Magazine*, no. 17 (June 1, 1808), p. 355; See also *The Medical and Physical Journal* 19 (1808), p. 575.

45 "[A] machine, to be towed across a river, which will at the same moment drawn on paper, to any reduced scale, the exact shape of the bottom; shewing, at one view, the depth of water in every part, together with the width of the river." *The Scots Magazine*, June 1, 1808, p. 445.

46 The high number of visitors proves the emerging public interest in the scientific and academic fields as "[n]early 100,000 people visited the exhibition during the eighteen weeks it was open." Martina Droth, Jason Edwards, and Michael Hatt, eds., *Sculpture Victorious: Art in an Age of Invention, 1837–1901*, exh. cat. Yale Center for British Art, (New Haven/London: Yale University Press, 2014), pp. 30–31.

47 Russell, *James Watt*, p. 213.

4 Samuel Rayner, *Interior of the Mechanics' Institute (Derby Exhibition)*, 1839.

more than just the economic gain. Against the backdrop of industrialization and the growing interest in automated procedures for reproduction, the engineer and inventor James Watt had already begun to build "sculpture-copying machines" in 1804 that were conceived as "enigmatic."[48] In her article "Nineteenth-Century Sculpture and the Imprint of Authenticity," Angela Dunstan explains the notion of the "inanimate sculptors" in the context of the "recurring dream of inventors"[49] to create sculpting machines starting with the activities of James Watt:

> [D]uring the years of his retirement to his garret in the early nineteenth century, [James Watt] developed prototypes for just such a machine which would build upon the replication principles of his copying press in order to copy sculptures using parallel hinged arms: one with a pen which was traced around the original work while the other arm was attached to a blade which replicated the original in a soft material such as wax or alabaster.[50]

48 Ibid., p. 217.

49 Angela Dunstan, "Nineteenth-Century Sculpture and the Imprint of Authenticity," in *Interdisciplinary Studies in the Long Nineteenth Century*, no. 19 (2014): 11–12.

50 Ibid.

The idea of experimenting with independent processes that turned three-dimensional originals into three-dimensional copies came up during Watt's stay in Paris in 1802, where he had observed "an implement … used for tracing and multiplying the dies of medals"[51] at an exposition.[52] Such a machine, called the *tour à medaille*, was according to Frieß displayed at the Conservatoire des Art et Métiers and the Institut de France as early as the beginning of the eighteenth century.[53] Whereas Watt's interest in three-dimensional objects was probably first aroused in the 1770s in the famous workshops for pottery making of his friend Josiah Wedgwood, where many of his acquaintances had been portrayed after medallions taken from plaster molds.[54] As a consequence, Watt had a large number of plaster casts delivered from Paris in 1792, so the later workshop of Watt recalled a "sculptor's atelier:" As Russell reports, the famous engineer not only set up this collection of antique sculptures that should have made him a collector, but also collected the casts, so he was an "avid collector of molds for antique figures."[55] After seeing the machine in Paris, Watt made several attempts "by experimentation" to develop two machines, one for full-size copies (equal sculpturing machine) and one for reduced copies (proportional sculpturing machine) between 1804 and 1809. While both machines were based on the pantograph mechanism, as Russell explains the procedure,[56] the equal-size machine was, in addition "more capable of producing three-dimensional objects with a greater degree of surface relief."[57] Since the first results still required manual reworking, Watt was able to produce smoothly polished surfaces for the first time with his machine, which he had improved in May 1809.[58] Similar to Peale's copy of the Jefferson profile, the first sculpture Watt copied was a small head of his friend the economist Adam Smith. When making portrait busts, including his own, Watt consulted experienced sculptors, such as Francis Leggatt Chantrey (1781–1841), from whom he had also learned to carve in stone in 1815.[59] Watt continued to work on these machines until his death in 1819—without ever obtaining patents for them. Insofar as

51 James P. Muirhead, *Mechanical Inventions of James Watt* I, 1854, p. ccxlii.

52 See Jane Insley, "James Watt and the Reproduction of Sculpture," in *Sculpture Journal* 22, no. 1 (2013): 37–65, here 43.

53 There, the machine came to France as a gift from the Russian tsar. See Frieß, *Kunst und Maschine*, 1993, p. 206.

54 Jane Insley, "James Watt and Reproduction of Sculpture," 2013, p. 43.

55 Russell, *James Watt*, p. 208.

56 "[A]n item to be copied and material to make the copy from, usually a block of plaster of Paris, were positioned on the machines side-by-side. A feeler and a rotating cutting tool were also positioned side-by-side, and mounted so that as the feeler was carefully traced across the surface of the original, the cutter followed and repeated exactly the same movement. As the tool was rotated at high speed by a treadle, so plaster was removed and the copy formed." Ibid., p. 206.

57 Russell, *James Watt*, p. 206.

58 In further steps, Watt changed the "shape of the cutters" to such an extent "that they could run without vibration and at high speed." See Insley, "James Watt and the Reproduction of Sculpture," 2013, pp. 37–65; see also J. G. Pollard, "Matthew Boulton and the Reducing Machine in England," *The Numismatic Chronicle* 11 (1971): 311–17.

59 For Watt's close collaboration with artists and artisans to produce portraits by machine, see Insley, "James Watt and the Reproduction of Sculpture," 2013, p. 45.

Russell questions its practicality and "purpose outside the workshop,"[60] Frieß notes that "only a small circle of friends learned of his experiments" and that it was Hawkins who "went public with his invention a few years after Watt's death."[61] It is worth considering whether the machines really worked and if so, better or worse than the technical drawing or design promised. Not until 1837 did Hawkins demonstrate the sculpture-reducing machine that relied on the use of an "engine lathe," before a committee at the British Association for the Advancement of Science meeting.[62] The same year, *The Literary Gazette* wrote enthusiastically not only about the features of the machine and its inventors—Hawkins together with his younger colleague and sculptor Benjamin Cheverton—but also marvelled that not "a single touch from the artist"[63] was required to execute the specimens of sculpture. Together with his mentor, Cheverton had developed further the idea of the automated procedure of sculpture making: combining both of the machines that Watt invented—one for equal-size reproduction and the other for proportional sculpturing or reducing—Cheverton was able to reproduce sculptures equally, as precisely as he could, and scale down proportionally with one machine.[64] In the editorial to the 2013 issue of *History of Photography*, Patrizia Di Bello informs us of the accurateness of these technical processes.[65] Information on the reliability and high precision of the machine-made replicas can be found later, according to Rebecca Wade, in Matthew Digby Wyatt's statement "for the opening of an exhibition of the Arundel Society at the Crystal Palace in 1855": taking the example of the sculptures "Theseus, Ilissus and Plate 47 of the Parthenon Frieze," reduced in size by Cheverton's machine, the considerable remark was that they were "microscopically, almost magically reproduced."[66] In the nineteenth century, how the objects were made became more and more the focus, while using Antiquity "as hooks for publicising new processes of reproduction"[67] become a spectacle. In order to shed some light on the notion of displaying a technique and process relevant in the context of the magical spectacle, it is important to outline the machine and its agency.

60 Russell, *James Watt*, p. 217.

61 Quoted in Frieß, *Kunst und Maschine*, p. 209; translated by the author.

62 *The Mechanics' Magazine, Museum, Register, Journal, and Gazette* XXVI (Oct. 1–March 31, 1837), p. 154.

63 *The Literary Gazette and the Journal of the Belles Lettres: A Weekly Journal of Literature, Science, and the Fine Arts*, ed. William Jerdan, vol. 21, no. 1078 (1837), p. 593.

64 See Frieß, *Kunst und Maschine*, p. 210.

65 "In Watt's and Cheverton's machines, original and copy are clamped to plates connected by geared arrangements that keep them in the correct spatial relationship as they rotate to carve new portions of the copy, layer by layer. This enables the manufacture of exact copies in different sizes but in the right proportion, which is impossible with moulding and casting alone." Di Bello, "Photographs of Sculpture," 2016, p. 9.

66 Rebecca Wade, *Domenico Brucciani and the Formatori of 19th-Century Britain* (New York: Bloomsbury, 2019), p. 52.

67 Gabriel Williams, *Industry and the Ideal: Ideal Sculpture and Reproduction at the Early International Exhibitions,* PhD diss. (University of York, 2014), p. 29.

III. The Machine between Actor and Tool and Sculpture

Twelve years after the exhibition of the Derby Mechanic Institute, the London Great Exhibition of 1851 offered "the display of sculpture alongside objects of science and industry … to reach a pinnacle."[68] The Crystal Palace in London hosted an array of objects testifying to both artistic and technical virtuosity while its display served as a spectacle for the audience.[69] This form of displaying inventive devices and equipment was something Victorian scientific society was all too used to; so, "Benjamin Cheverton exhibited busts and reductions carved on-site using his machine; and photography was declared by the juries to be 'the most remarkable discovery of modern times.'"[70] Cheverton was very busy in the years following the fair because of the growing demand for reproductions of artworks in different materials,[71] also fostered by institutions like the Art Union and the Arundel Society.[72] The latter institution had made it their goal to "promote a greater knowledge of art through … reproductions."[73] The same effect is to be said for David Brewster with his portable lenticular stereoscopes, who "claimed that half a million prism stereoscopes had been sold"[74] within a few months after its presentation at the Crystal Palace. While Brewster's optical device, which turned two-dimensional photographs into a three-dimensional visual experience, amazed the audience, Cheverton's success was granted for copying to scale "plaster versions of the marble sculptures."[75] In contrast to sculptors like Francis Leggatt Chantrey, who used the pointing machine in his workshop practice,[76] Cheverton's aim was to demonstrate

68 Droth, Edwards, and Hatt, *Sculpture Victorious*, 2014, pp. 30–31.

69 For further information on the presentation of the sculpture reducing machine at the Great Exhibition, see Buket "Engineers as Artists: Artists as Engineers—The Reproduction of Art Objects at the Great Exhibition 1851," in Buket Altinoba, Alexandra Karentzos, and Miriam Oesterreich, eds., *Gesamtkunstwerk Weltausstellung? Re-Visioning World's Fairs*, *RIHA Journal* (forthcoming). See also Paul Atterbury and Maureen Batkin, *The Parian Phenomenon* (Ilminster: Richard Dennis, 1989), p. 19.

70 *Morning Chronicle*, July 18, 1851, p. 2, quoted in Patrizia Di Bello, "Photographs of Sculpture: *Greek Slave's* 'Complex Polyphony' 1847–77," *Interdisciplinary Studies in the Long Nineteenth Century* 22 (2016): 16, doi: http://dx.doi.org/10.16995/ntn.775.

71 Due to its new design, Cheverton not only created "much more precise" copies, but was also the first to exploit the sculpting machine commercially, after having achieved great success at the Great Exhibition. Cheverton achieved a Class XXX Prize Medal for the alabaster copy of Theseus, "as exemplifying the reduction by machinery of statues." Authority of Royal Commissioners (1852b), CXVII. See also: Droth, Edwards, and Hatt, *Sculpture Victorious*, 2014, p. 67; Frieß, *Kunst und Maschine*, p. 210.

72 Different copies of the reproduced figures were mentioned in the catalogue as produced "for the Arundel Society, in electro-bronze." *Authority of Royal Commissioners, Official Descriptive and Illustrated Catalogue: Great Exhibition of the Works of Industry of all Nations* 3 (London, 1852), p. 672.

73 *Conservation Journal*, no. 23 (April 1997), http://www.vam.ac.uk/content/journals/conservation-journal/issue-23/the-arundel-society-techniques-in-the-art-of-copying/ (accessed January 5, 2021).

74 Anthony Hamber, *Photography and the 1851 Great Exhibition* (London: V & A Museum, 2018), p. 40.

75 Droth, Edward, and Hatt, *Sculpture Victorious*,2014, p. 67.

76 For further information, see Greg Sullivan, "Sir Francis Chantrey's Plaster Models, Their Use in His Practice, and His 'Improved Pointing Instruments,'" in *Il valore del gesso: Come modello, calco, copia per la realizzino della scultura*, ed. Mario Guderzo and Tomas Lochman (Possagno: Terra Ferma Edizioni, 2017), pp. 223–35, here p. 226.

the technological advancement in the production of sculptures within the sphere of machines, and offered to make the reproductive processes publicly visible: "Statuettes, busts, and bas-reliefs, in ivory, alabaster, marble, and metal; carved by a machine from originals of a larger size"[77] were displayed in the exhibition's section "Sculpture, Models, and Plastic Art, Mosaic, Enamels & Co." The additional comment, that "[t]hose in ivory and marble, [were] not finished by hand," underlines that under the sign of mechanical innovation and the technical application of materials, the presentation of "automation" via machine as an experimental arrangement generated popularity and was intended to serve for the entertainment of the audience: "It is well known that the Victorian had a taste for new scopic experience and optical drama. The nineteenth century saw a craze for magic lantern shows, phantasmagoria and camera obscura, and advancements in the technology."[78] And Patricia Di Bello summarizes popular nineteenth-century optical strategies as a "recreation that used magic lanterns to project images onto glass, cloth or smoke to create high affecting, ghostly public spectacles."[79]

A decade later, French artist and entrepreneur François Willème took aspects of fantasy and showmanship to the extreme by hiding his apparatus from the audience: "which contains no instruments, no apparatus, to highlight better the marvel that will follow."[80] Willème's process illustrates another method of reproducing sculpture that combined several processes to portray living models in the third dimension. His invention that he presented at several exhibitions,[81] acted as a visualization of sculpture made through different processes: behind the scene the copy of a model was reproduced with the help of hidden cameras and reworked by the hand of a skillful sculptor in the end.[82] So, it was not the actual product that counted, but the magical spectacle of the moment of its making comparable to photography.[83] The narrative of technological marvels continued to grow against the background of the changes resulting from late eighteenth- and nineteenth-century industrialization.

77 *Authority of Royal Commissioners,* 1852d, p. 832.

78 Jonathan Shears, *The Great Exhibition, 1851: A Sourcebook* (Manchester, UK: Manchester University Press, 2017), p. 60. He continues his explanation referring to the notion of the spectacle known as the "phantasmagoria" to explain new sensations of machine proceeded materials and surfaces that were capable of "enshrining fantastical possibilities." Shears, ibid., pp. 61–62.

79 Patrizia Di Bello, "'Multiplying Statues Machinery': Stereoscopic Photographs of Sculptures at the 1862 International Exhibition," *History of Photography* 37, no. 4 (2013): 412–20, here 413.

80 Quoted in Michele Bogart, "Photosculpture," *Art History* 4, no. 1 (1981): 54–65, here 55: "qui ne contient aucun instrument, aucun appareil, comme pour mieux fair ressortir la merveille, qui va suivre"; translation by the author.

81 It premiered in Dublin in 1865 and two years later again at the Paris World's Fair, where it received great attention. See *The Art Journal* IV (1865), p. 248 and p. 345.

82 As a final step, the resulting clay model was molded in the sculpture tradition and could be transferred to various materials such as porcelain or bronze. See Winfried Gerling, "Die eingefrorene Zeit oder das bewegte, stillgestellte Filmbild," in *Freeze Frames: Zum Verhältnis von Fotografie und Film,* ed. Stefanie Diekmann and Winfried Gerling, Metabasis vol. 4 (Bielefeld: transcript, 2015), pp. 146–71, here p. 153.

83 As Michele Bogart points out, it was Willème's intention to bring his invention closer to the technical wonder of photography: "Photosculpture is discoursed as if it were a three-dimensional photograph

5 Benjamin Cheverton, *Machine for Reproducing Sculpture*, 1826.

Displaying machines and experiments that turned two-dimensional or three-dimensional originals into copies of the same or smaller size created new potential by challenging the visual perception. Both the studio architecture and the recording process used in its place showed a great deal of emphasis on the effective staging of technology as magic.[84] The suddenness of the effect and the playful effortlessness of its occurrence, as well as its relative independence from human action, are among the distinguishing characteristics of procedures classified as magical: "Here, the automatism of the photographic process conveys the fantasy of an almost instantaneous sculpture."[85]

Magic was a central issue grounding this view of the industrial, scientific, or artistic display as slightly anachronistic byways and curiosity. Thinking of sculpture, this enabled meta-

rather than a laborious, multi-step, sometimes manual transcription process. … In photosculpture the artist and the machine were virtually one and the same." Bogart, "Photosculpture," p. 59.

84 See Albert Kümel, "Körperkopiermaschinen: François Willèmes technomagisches Skulpturentheater (1859–1867)," in *Skulptur,* Winter, Schröter, and Spies, 2006, pp. 191–212, here pp. 194–95. See also Schröter, *3D*, 2009, pp. 91–97.

85 Quoted in Bogart, "Photosculpture," 1981, p. 55: "L'automatisme du procédé photographique vehicule ici le fantasme d'une sculpture quasi instantanée"; translation by the author.

6 Plaster bust of Benjamin Cheverton.

mophoric potential insofar as some parts of the sculptural body were highlighted or hidden through visual effects and shades that generated new insights, while, to quote Jacques de Caso, "in a complex model individual parts may be reduced separately and later joined."[86]

Given the fact that there are no photographic or postcard illustrations of these machines on display, it is worth looking in more detail—especially considering the notion of the object made "without the use of human hand"—at a photograph, likely taken in 1924,[87] showing Cheverton's machine and three busts (fig. 5): the depiction presents an archaic-looking apparatus of wooden construction with an integrated three-dimensional pantograph. This is interesting because machines at that time were already made of industrial materials, an aspect which evoke notions of nostalgia. Also remarkable in this image is the "original" object: a plaster cast of an antique bust and the small blank, both mounted vertically. Apart from

86 Jacques de Caso, "Serial: Sculpture in Nineteenth-Century France," in *Metamorphoses in Nineteenth-Century: Sculpture*, ed. Jeanne L. Wasserman (Cambridge, MA: Harvard University Press, 1976).

87 The object number (1924-292) refers to the date when the machine was integrated in the collection of the Science Museum London.

some tools and the bust placed on the floor, no other elements of the reproduction process or setting are visible in the photograph. Indeed, the background of the image is empty. In this respect, the staging seems magical because Cheverton's machine appears to carry out the operational process "as if by itself." On closer inspection, the sculptor himself is present in the form of the self-portrait: a bust placed on the floor, acting as a sculptural stand-in for the author, testifies to the presence of Cheverton as the inventor of the machine (fig. 6). Besides this classical artist's topos, it is probably no coincidence that the plaster bust, which was mounted here for reproduction, is none other than another version of William Henry Fox Talbot's (1800–1877) "fancifully"[88] titled *Patroclus*. According to Geoffrey Batchen, who analyzes this well-known plaster bust in the context of Talbot's early photographic experiments: the ancient heroic tale of self-sacrifice would have been all too familiar to the contemporary audience who knew Homer's *Iliad*.[89] This specific form of rhetorical replacement is, as Batchen notes, exhausted in an endless string of medial substitutions: "the plaster bust stands in for a human figure, a photograph for the plaster bust, and the bust for the original marble carving (now in the British Museum)."[90] The mythological subject of the hero being replaced by someone ordinary could be—if we think further—an indication of the popularity of the reproduction itself. Whoever staged this scene must inevitably have drawn a connection to the English inventor's earliest photographic attempts: in 1844, the same year Cheverton was awarded a patent for one of his machines, Talbot published the world's first "photo book" and manifesto *The Pencil of Nature*, which shows the same plaster bust of *Patroclus*: plates V and XVII depict *Patroclus* from different viewpoints. One year later, in 1845, the Royal Society exhibited some of Cheverton's mechanically produced sculptural copies in ivory, including a bust of Queen Victoria, which he made after the original by Francis Leggatt Chantrey. One can assume that Talbot and Cheverton knew each other, especially as they must have met during different society events and presented their work results as Di Bello confirms:

> In London, machine carvings, electrotypes, daguerreotypes, and Talbotypes were seen and compared at the events organized by the Royal Society throughout the 1840s and 1850s, where Benjamin Cheverton's ivories, "mechanically sculptured" using his reducing machine, a perfected version of Watt's prototypes, could be admired next to displays of "excellent … Talbotypes," or "M. Claudet's photographic specimen."[91]

Each of these interfaces and overlaps between cultures of display, mechanical reproduction, and classical art are striking; it is no coincidence that the *Patroclus* plaster bust, which was

88 Geoffrey Batchen, "An Almost Unlimited Variety: Photography and Sculpture in the Nineteenth Century," in ed. Roxana Marcoci, *The Original Copy: Photography of Sculpture of Sculpture, 1839 to Today*, exh. cat. Museum of Modern Art (New York, 2010), pp. 20–26, here p. 23.

89 Ibid., p. 23.

90 In the battle for Troy against Hector, Patroclus, who faithfully replaced his companion Achilles, fell tragically. This specific form of rhetorical substitution is, as Batchen concludes, now exhausted in an endless string of medial substitutions. Ibid.

91 Di Bello, "Photographs of Sculpture," 2016, p. 9.

borrowed from the British Museum, was a popular motif both in the photographs made by Talbot and— as can be assumed—in the use of Cheverton's sculpture machine: in the current Cheverton collection at the Art Gallery of Ontario in Toronto, which comprises several hundred miniature ivory busts, there is a exact reproduction with a smooth surface titled *Patroclus* that the Thompson Collection Institute dates from early 1840.

Recent historical photography discourse has pointed to the fact that photographic pioneers like Louis Jacques Mandé Daguerre, William Henry Fox Talbot, and Hippolyte Bayard (1801–1887) collected modern as well as classical sculptures, plaster casts, or moulages, arranging these objects in groups for their respective photographic experiments.[92] What is less known is that the protagonists mentioned above were also interested in antiquity: the engineer James Watt and his successors John Hawkins and Benjamin Cheverton had amassed their own sculptural collections. So, they were not only interested in the machine's utility for art, but also wanted to make the ideal of Antiquity as the one "to be incorporated"[93] into the technical reproduction. It is important here to point out the common denominator, the common ethos, and the common dispositive: the machine. Mechanical modes for reproducing and multiplying three-dimensional objects or photography as a chemical process occur coincidentally at approximately the same time and were publicly demonstrated with references to a magical spectacle. Both techniques have decisive characteristics in common: on the one hand, the great interest in portraiture, on the other hand, the medium of sculpture. This historical context may plausibly explain the desire to reproduce the same motif twice—one in two-dimensions, the other one in three-dimensions—when it comes to the *Patroclus* bust, which was a subject of both symbolic and semantic discussion at the time.

Conclusion

This article has recast the machine and the medium of sculpture, its reproduction, and display alongside the collecting practice and inventive activity of engineers and mechanical-minded artists at the time of early industrialization. Referencing Russell, three levels intertwined when it comes to the self-awareness of the artists-engineers summarized: firstly, a new attitude and "world of mechanically reproduced sculpture" initiated by Watt's machine; secondly, Watt's—but also Peale's, Hawkins's and Cheverton's—ambition to set up a collection with both antique sculptures and their copies, finished casts, molds for Antique figures, and busts; that, thirdly, contributed to the creation of a museum that not only can be

92 See Anthony Hamber, "Higher Branch of the Art," in *Photographing the Fine Arts in England, 1839–1880* (Amsterdam, Gordon and Breach, 1996); Stephen Bann, ed., *Art and the Early Photographic Album* (Washington, DC/New Haven/London: Yale University Press, 2011).

93 For the topic of the incorporation of antiquity through material appropriation, see Charlotte Schreiter, "Bildhauerische Technik und die Wahrnehmung antiker Skulptur: Francesco Carradoris Lehrbuch für Studenten der Bildhauerei von 1802," in ed. Ernst Osterkamp, *Wissensästhetik: Wissen über die Antike in ästhetischer Vermittlung* (Berlin/New York, Walter de Gruyter, 2008), pp. 239–66, here p. 240.

understood as a "personal embodiment of a new mechanical age"[94] but also resulted in the immortality of the inventor and atelier owner.[95] On the basis of the examples discussed, a complex structure becomes visible into which the notion of the machines regarding pictorial and sculptural reproductions can be placed, i.e., between art and technology, art collection, *Wunderkammer* and world exhibition, materiality and performance, canon and "modernity." It turns out that in this context of theatricality the term "curious" is helpful: *curiositas* has very ambivalent connotations already in pre-modern times and has certainly become a leading category of the eighteenth and nineteenth centuries. It might also function as a pivotal link between popular and elite culture, art and the need to "show off." This shows that visuality played a key role in the nineteenth century (Crary), which also becomes apparent in the presentation of technical novelties of mechanical and optical media at various exhibitions: the briefly mentioned stereoscope, for example, was presented publicly and very quickly advanced to become one of the most popular visual devices for dimensional viewing, but photographic apparatuses and machines for mechanically reduced sculpture also played a central role here. And François Willème's "technomagic sculpture theater,"[96] which corresponds to the photo-sculpture process, can be compared to the current image generation of digital media. With such apparatuses, the limits of art were not only explored, but so too was the collective faith in the future of art, which coincides with the future orientation of technical developments, and which can be seen above all in the machines. All this can touch upon topics relevant for the nineteenth century, such as magic and phantasmagoria, which developed into mass media in modern times, but also "teaching media," which characterizes objects and apparatuses in a very appealing way: The subject of putting science into a scene is to be considered in terms of the specific civilization of culture, and also through popularization.

Against this given background, mutual conditions must be assumed: by exhibiting the sculpture reproducing machine as an image-making procedure alongside other media in Victorian society and staging it together with the miniature-like portrait busts, Cheverton suggests that he is on an artistic-technical level with the photo pioneers, scientists, and engineers. As a sculptor and artist, he also aims to inscribe himself in the history of the great inventors—just as important as the social advancement from artisan to gentleman status within Victorian society. Comparable to the painted portraits of presidents and painters such as the Royal Academy of Art, the first "artist-engineer" of modernity stages himself (qua self-portrait) together with the machine and speculates that his "perfect copies" (e.g., *Patroclus*), which were supposed to surpass the often "damaged" original, will be widely circulated by means of serial production—as a "multiple." Contrary to previous assessments that Cheverton's interest was of a purely commercial nature, it is more likely that

94 Russell, *James Watt*, p. 208.

95 Ibid., p. 205.

96 See the title of the book; Kümel, "Körperkopiermaschinen François Willèmes technomagisches Skulpturentheater (1859–1867)," 2006.

he intended to join the ranks of the great names as an artist, in keeping with the contemporary motto that the Great Exhibition of 1851 also aimed for British sculptors. With his "manifesto-like" concern, Cheverton celebrates the union of art and technology. This is not unlike today, when artists like Angelo Bulloch or Patrick Tresset exhibit audio-interactive and performative drawing machine installations or even exhibitions such as *Romantic Machines* displaying machines and their output as art: possessing qualities of the sculptural, Michael Sailstorfer's "popcorn machine" (titled *1:43-47*)[97] does not only testify to a specific form of theatrical production that has a humorous and at the same time threatening effect on the viewer, but can also be understood first and foremost as a sculpture.

97 Wellmann, ed., *Romantische Maschinen*, exh. cat. Georg-Kolbe-Museum Berlin, p. 63. For the image of the work, see the artist's website, https://sailstorfer.com//works/143-47-frankfurt-2008 (accessed January 5, 2021).