

# Vaucanson's Automata as Devices of Enlightenment

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The *Encyclopédie* entry 'Androïde' opens with a definition: 'an automaton in the figure of a human, which by means of certain well-arranged springs, etc., acts and performs other functions outwardly similar to those of a man.'<sup>1</sup> This definition is quickly followed by a short etymology from the Greek and a tantalizing bit of hearsay (or legend), 'Albert the Great [Albertus Magnus] was said to have made one,' which the entry's authors and *Encyclopédie* editors Jean Le Rond d'Alembert and Denis Diderot immediately counter with a striking testimonial of their own: 'We have seen one of them in Paris in 1738, *le Flûteur automate* by M. Vaucanson, presently a member of the Royal Academy of Sciences.'<sup>2</sup> D'Alembert and Diderot place the technical marvel of Jacques Vaucanson's automaton on the stage of enlightened demonstration, and their testimony draws from the protocols of the new science in which gentlemen observers testify to the empirical truth of experiment.<sup>3</sup> Consequently, the *philosophes* propose that the android be considered as an object of science not legend, knowledge not play. Similarly, in d'Alembert's related *Encyclopédie* article 'Automate', Vaucanson's two other automata – the duck and the tambourin player – are praised as working manifestations of an automaton, 'an engine that moves by itself, or a machine that carries in itself the principle of its own movement.'<sup>4</sup> On the basis of his wondrous machines, and his work in the silk mills, in 1757 Vaucanson managed to win a coveted position as associate mechanician at the Royal Academy of Sciences over another competitor for the post, Denis Diderot. Thanks to the publicity he received during his lifetime, almost alone among automaton-makers, Vaucanson's name became virtually synonymous with such devices for generations. Ever the wit, Voltaire quipped that without Vaucanson's shitting duck, there would be nothing to remind you of the glory of France; while, in a more salubrious vein, he hailed the inventor as a new Prometheus, thereby rivaling the Greek god's power to create life, to fashion men out of new materials.<sup>5</sup>

As much recent scholarship affirms, natural philosophy or the study of the workings of nature became a topic of interest among eighteenth-century European publics. Indeed, the *Encyclopédie's* 2569 visual plates across eleven volumes, linked to explanations, sought to provide studious readers with at least a preliminary understanding of processes of technology, labour, and science.<sup>6</sup> Yet science's appeal often took the form of a fascination with curiosities and popular amusements. Thus, among the exotic items from India featured in an auction of the collection of a deceased former British colonial servant was an 'India Figure and Bird in Silver, moving by Clockwork'.<sup>7</sup> Scientific popularizers devised ways to join science's utility to its entertainment value, even as they defended their role in the propagation of science as serving to benefit society as a whole. Vaucanson's staged demonstrations of his three automata are best comprehended within this double context of the growing dissemination of science among a wider populace, rather than as a restricted intellectual activity for an elite circle of scientists. At the same time, Vaucanson was not uninterested in the latter's approbation. Indeed, he succeeded in his aim of winning esteem for his scientific contributions among *savants*, as attested to by his election to the Royal Academy of Science, his elevation in 1741 to the royal post of inspector of silk manufacturing in France, as well as by the compliments paid by the editors of the *Encyclopédie* and so many others. Still, by presenting the works in such a high-minded vein, the *Encyclopédie's* compliments underplayed the extent to which, in the words of another savant of the day, the demonstration of 'physical phenomena [of all kinds] gave [people] an indescribable pleasure'.<sup>8</sup>

Residing at the interstices of high and low culture, pleasure and utility, wonder and technique, Vaucanson's automata belonged to what Michael R. Lynn refers to as 'a growing web of interconnections between Enlightenment, science, and commerce in Parisian urban culture'.<sup>9</sup> Automata were displayed in multiple venues ranging from courts to fairgrounds, aristocratic *salons* to bourgeois homes. They played a role in court-sponsored science and the institutions of the new cultural and scientific public sphere. In the popular world of scientific demonstration, a whole new series of intermediaries linked the objects to audiences, with the assistance of lecturers and demonstrators.<sup>10</sup> Originally shown to Parisian audiences for twenty-four sous, Vaucanson's automata were purchased in 1742 by a group of Lyonnais businessmen and brought to London, where they were shown at the Haymarket Theatre. A translation of the mechanician's writings into English by the Newtonian natural philosopher John Theophilus Desaguliers further publicized Vaucanson's works, which thereafter entered into a larger European fair culture, before disappearing sometime in the subsequent decades. The automata's

journey marks the movement of a class of objects, with precedents in the ancient world and early modern collections of utilitarian and fantastic objects within aristocratic *Wunderkammern*, into a wider world of consumption and entertainment available to increasingly less well-born audiences.

While the wider public attraction to automata has been noted, it is also necessary to address the nature of this appeal, which is derived from the automata's simulation of the workings of human and animal bodies. Posed as a question, however, what aspects of Vaucanson's android and his other automata led even such scientifically literate members of his audience as Diderot and d'Alembert, not to mention the members of the Royal Academy of Sciences, to regard these artificial bodies to be performing functions and moving independently – that is, ostensibly 'self-moving' – in the manner of a living being? A fruitful answer is offered by historian of science Jessica Riskin, who proposes that automata served as 'philosophical experiments', addressed to the problem of the mechanics of living bodies.<sup>11</sup> To amplify, if these 'philosophical experiments' gained their popularity in this context, it suggests a growing public demand for knowledge about the mechanics of the body, which, in turn, was satisfied in good measure by scientifically cast amusements.

Indeed, in the philosophical toys and public amusements of the Age of Enlightenment, we discover numerous automata, mechanical and plastic – or three-dimensional – representations of animals in which the body is in fact a machine. That is, the intricate movement of cams and wheels gave these devices the effect of moving of their own accord. Birds were particularly popular but other animals were also impersonated, and in the most audacious automata humans and human actions were presented. As imitations of life, automata aimed to traverse the border between brute matter and impassioned life. As the art historian Horst Bredekamp proposes, such self-propelled works of art are 'the most obvious expression of the desire to imitate life by inspiring movement'.<sup>12</sup> Enchanting members of the court and the aristocracy, these one-of-a-kind objects were the prized possessions of those who could afford their purchase or expect to receive such luxurious presents.

For example, during this period, the urban bourgeoisie and aristocracy began outfitting their drawing rooms with a simple sort of machinery, the newly fashionable tabletop or freestanding small cylindrical bird-organs. Associated with a kind of studied leisure, and variously named for a particular bird – *merlines* for blackbirds (*merles*), *perroquettes* for parrots (*perroquets*) and, perhaps most common, *serinettes* for canaries (*serins*) – these devices assisted in teaching caged birds to sing certain tunes as depicted in the two versions of the painting *La Serinette* by the great genre artist Jean Chardin, showing a woman turning away from her em-

broidery in order to give her full attention to teaching a song to a caged bird.<sup>13</sup> There was a virtual craze for canaries and parrots during the eighteenth century, and owners could avail themselves of a handbook first published in 1705 and reprinted many times thereafter: *Nouveau traité des serins de Canarie* by J. C. Hervieux de Chanteloup, a timber inspector and also 'governor' of the canaries of Mme la princesse De Condé.<sup>14</sup> The *serinette* even merited an appearance in the 1815 posthumously published work, *Harmonies de la nature* by Bernardin de Saint-Pierre (author and director of the zoo at the Jardin des Plantes, the revolutionary successor to director Comte de Buffon's Jardin du Roi), in which a parallel is drawn between these wondrous devices and nature's prodigious powers:

A clever mechanic arranged some harmonious pipes in a box. He made there correspond projecting notes that he put on a cylinder suspended from an axle. He makes it move, and at once a pleasant air is heard. He raises by notches the poles of its cylinder, and new airs successively come to charm the ears. Could man have therefore put into a *serinette* as much industry as nature has put into the earth?<sup>15</sup>

An interesting aside about the *serinette* concerns the circuit produced in such a setting between the purported object of nature and the invented subject of imitation. As Aurelia Gaillard explains, initially the machine imitated the bird, but then the relationship is inverted. The bird is forced to imitate a machine, which itself imitates the bird's song.<sup>16</sup>

The *Lady Musician*, the *Draftsman*, and the *Writer*, three stunning automata created between 1767 and 1774 by the Swiss father and son, Pierre and Henri-Louis Jacquet-Droz, and their assistants Jean Frédéric Leschot and Henri Maillardet, are more characteristic of the precious toys created for the adult amusement of the privileged classes. Yet the two Jacquet-Drozes were much more than plain toy-makers. While playing as many as five melodies on her instrument, the *Lady Musician's* fingers followed her eyes, and her breast raised and lowered, as if breathing in time to the music. The Jacquet-Drozes' goal of producing such an anatomically accurate, lifelike simulation of a harpsichordist suggests that they, like their French counterpart Jacques Vaucanson, were influenced by Enlightenment medical philosophy and anatomical science. In fact, accounts of the Jacquet-Drozes repeatedly call attention to their wide education and multiple talents – the father educated in philosophy and theology as well as mechanics; the son, trained by his father, was also a talented musician.

The most arresting automata were technical marvels and lifelike dolls, which replicated automatic movements like breathing and digestion, as well as volun-

tary motions associated with the different senses. Another example of exceptional workmanship is the magnificent *Joueuse de Tympanon* (*The Hammered Dulcimer Player*) by the clockmaker Pierre Kintzing and the cabinetmaker David Roentgen, which was acquired and then donated by Marie-Antoinette to the Royal Academy of Sciences. Like the *Lady Musician*, she exemplifies the extent to which makers were striving to simulate life at the level of the whole organism.<sup>17</sup>

Thus, Vaucanson was one of a number of astonishingly brilliant eighteenth-century mechanics who attempted to design material bodies capable of artificially replicating life. Their ingenious machines were indeed devices of Enlightenment, that is, philosophically animated experimental objects. The aim of these devices was to approximate what contemporaries like Diderot referred to as a 'sentient being' with a particular spatial and dynamic organization.<sup>18</sup> Over time, then, automata makers were challenged to imitate not just the body's mechanics but also the workings of the senses, to capture emotion as well as motion. The fingers of their artificial musicians touched the ivory keys of keyboards, plucked a string, and covered the holes of wind instruments. They not only wrote letters and drew pictures, but they did so with a gentle nod of the head, a lift of the chest, or a knowing look. In several cases, including one later observed by Goethe, talking heads were displayed that dared to reproduce the most human faculty of language.

Goethe's reference to a talking head doubles back in looping fashion to older instances: most notably, as referred to in passing in the *Encyclopédie* article with which this essay began, the artificial figure said to have been created and willfully destroyed by the medieval monk Albertus Magnus. As recounted in Matteo Corsini's moral treatise of 1371, *Rosario della vita*:

We find that Albertus Magnus, of the Black Friars, had such a great mind that he was able to make a metal statue modeled after the course of the planets, and endowed with such a capacity for reason that it spoke: and it was not from a diabolical art or necromancy – great intellects do not delight in such things because it is something that makes one lose his soul and body; such arts are forbidden by the faith of Christ. One day a monk went to find Albertus in his cell. As Albertus was not there, the statue replied. The monk, thinking that it was an idol of evil invention, broke it. When Albertus returned, he was very angry, telling the monk that it had taken him thirty years to make this piece and 'that I did not learn this science in the Order of the Black Friars'. The monk replied, 'I have done wrong; please forgive me. Perhaps I can make you another one?' Albertus responded that it would be thirty thousand more years before another could be made for him, as that planet had made its course and it would not return before that time.<sup>19</sup>

Unlike eighteenth-century automata, associated with the new science of reason and modern mechanics, medieval antecedents associate talking heads and other artificial figures with astrology and natural magic. Still, traces of the occult linger in the enlightened devices of the eighteenth century. Vaucanson was not averse to using a sleight-of-hand to produce realistic effects before gullible audiences. The duck, the most acclaimed of his devices during his lifetime, was applauded for its ability to approximate the movements and even the process of digestion of its animal model. It appeared to flap its wings, drink water, digest grain, and defecate. In the words of one contemporary, the Oxford scholar Joseph Spence,

If it were only an artificial duck that could walk and swim, that would not be so extraordinary: but this duck eats, drinks, digests and sh-ts. Its motions are extremely natural; you see it eager when they are going to give him his meat, he devours it with a good deal of appetite, drinks moderately after it, rejoices when he has done, then sets his plumes in order, is quiet for a little time, and then does what makes him quite easy.<sup>20</sup>

Unfortunately, the duck's most amazing feat, its ability to swallow and digest food, turns out to have been a fraud. The German writer Christian Friedrich Nicolai, reported on the automaton in 1783, in his account of his European travels. 'On closer inspection, Nicolair found that it [the duck] did not digest its food at all. There was no "chemical laboratory," he revealed — the food was simply aspirated into the neck with the aid of bellows and tubes, and a separate substance made to look like the digested version was held at the ready in another compartment near the bird's rear end. This was "expelled at the desired moment by a piece of mechanism".'<sup>21</sup> Having changed hands several times and fallen into disrepair, Vaucanson's three automata were brought to Paris for the Exposition Universelle at the Palais Royal by a Swiss clockmaker, who had spent three years working on the duck, and now enlisted further help from the celebrated magician Jean-Eugène Robert-Houdin. Once again, the illustrious automata-maker was discovered to have secreted pellets in a hidden chamber in order to simulate the process of digestion. 'To my great surprise,' Robert-Houdin reported gleefully in his memoirs, 'I found that the illustrious master had not been above resorting to a piece of artifice I would happily have incorporated in a conjuring trick.' Robert-Houdin reaffirmed what Nicolai had earlier discovered, that the digestion had been faked, and the emitted substance was a premixed preparation of dyed green breadcrumbs, 'pumped out and collected with great care on to a silver platter'.<sup>22</sup> Not until the year 2006, it seems, was Vaucanson's ambition to create a working

digestive automaton truly realized. In his 'Cloaca Machine', Belgian artist Wim Delvoye introduces a mechanical artwork that actually digests food and turns it into excrement. The excrement produced by the machine is vacuum-sealed in Cloaca branded bags and sold to art collectors and dealers; every series of excrements produced has reportedly sold out.<sup>23</sup>

In conclusion, Vaucanson's automata were enlightened devices in the ways discussed here: In one respect, these devices served as instruments of enlightenment, as 'philosophical experiments', provoking audiences to consider the workings of the body as a machine. In another respect, as devices tied to their theatrical staging in multiple spaces of exhibition, they produced an illusory effect of the real. Most significantly, composed of moving parts, automata sought to capture by artificial means the living body, a sensible and anatomically correct body. In doing so, however, they raised the possibility that viewers would do well to follow Diderot's caution to his readers in *Pensées sur l'interprétation de la nature*: 'Always keep in mind,' he wrote, 'that *nature* is not God, and that a *man* is not a *machine*.'<sup>24</sup>

## Noter

1. 'ANDROÏDE S. m. (Méchan.) automate ayant figure humaine & qui, par le moyen de certains ressorts, &c. bien disposés, agit & fait d'autres fonctions extérieurement semblables à celles de l'homme.' Jean d'Alembert, 'Androïde' (1751), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts, et des métiers*, éd. Denis Diderot & d'Alembert, 17 vols. (Paris, 1751–72), 1:448. All translations my own unless otherwise noted.
2. 'Albert le Grand avoit, dit-on, fait un androïde. Nous en avons vû un à Paris en 1738, dans le *Flûteur automate* de M. Vaucanson, aujourd'hui de l'académie royale des Sciences.' *ibid.*
3. See Simon Schaffer & Steven Shapin, *The Leviathan and the Air Pump* (Princeton NJ: Princeton University Press, 1989); Steven Shapin, *The Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago IL: University of Chicago Press, 1995).
4. 'AUTOMATE, s. m. (Méchaniq.) engin qui se meut de lui-même, ou machine qui porte en elle le principe de son mouvement.' Jean d'Alembert, 'Automate' (1751), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts, et des métiers*, éd. Denis Diderot & d'Alembert, 17 vols. (Paris, 1751–72), 1:896.
5. Voltaire, 'Discours en vers sur l'homme' (1738), *Oeuvres complètes, 10 vols.* (Paris, 1877), 9:420. Vaucanson's duck makes an appearance in Thomas Pynchon's novel *Mason and Dixon*, as does Voltaire's wry remark: 'Listen to what Voltaire wrote about me, to the Count and Countess d'Argental, — "... sans la voix de la Le More et le Carnard de Vaucanson, vous n'auriez

rien que fit ressouvenir de la gloire de la France”’, Thomas Pynchon, *Mason and Dixon* (New York: Holt, 1997), p. 668.

6. On this aspect of the *Encyclopédie*, see the recent study by John Bender and Michael Marinan, *The Culture of Diagram* (Stanford CA: Stanford University Press, 2010).

7. Mr. (Christopher Cock), ‘The last sale for this season. Being the most valuable part of the collection of Elihu Yale, Esq; (late governor of Fort St. George) deceas’d’. [London: s.n., 1722], item 390, p. 20, *Eighteenth Century Collections Online* (Gale. CIC Penn State University. Accessed 3 April 2011). Thanks to Patrick Rasico for calling this auction to my attention.

8. Polycarpe Poncelet, *Principes généraux pour servir à l’éducation des enfans, particulièrement de la noblesse françoise*, 3. Vols. (Paris: P.G. Le Mercier, 1763), II: 265–266, cited in Michael R. Lynn, *Popular science and public opinion in eighteenth-century France* (Manchester & New York: Manchester University Press, 2006), p. 15.

9. Lynn, *Popular science and public opinion*, p. 3. See also Simon Schaffer, ‘Natural Philosophy and Public Spectacle in the Eighteenth Century’, *History of Science* 21 (1983): pp. 1–43; idem., ‘The Consuming Flame: Electrical Showmen and Tory Mystics in the World of Goods’, pp. 489–526, in *Consumption and the World of Goods*, eds. John Brewer & Roy Porter (London: Routledge, 1993). On women’s role in the popularization of science, as well as the importance of amusement, spectacle, and salon society in the development of modern science, see: Geoffrey V. Sutton, *Science for a Polite Society: Gender, Culture and the Demonstration of Enlightenment* (Boulder CO: Westview Press, 1997).

10. On the dissemination of science, see the exhibition catalogue, curated by Barbara Maria Stafford and Frances T. Terpak, *Devices of Wonder: From the World in a Box to Images on a Screen* (Los Angeles CA: Getty Research Institute, 2001).

11. Jessica Riskin, ‘The Defecating Duck, Or, The Ambiguous Origins of Artificial Life’, *Critical Inquiry* vol. 20, no. 4 (2003), pp. 599–633.

12. Horst Bredekamp, *The Lure of Antiquity and the Cult of the Machine: The Kunstkammer and the evolution of Nature, Art and Technology*, trans. Allison Brown (Princeton NJ: Markus Wiener Publishers, 1995), p. 48.

13. The two versions of Chardin’s *La Serinette* are in the collections of the Louvre (Paris) and the Frick (New York).

14. See: René Démoris, ‘Chardin, la machine et l’oiseau’, *Revue des sciences humaines* 186–187 (1982), pp. 293–306.

15. He answers his own rhetorical questioning, continuing: ‘She distributed to its surface its various powers; she makes it turn, and she spreads in turn on them the solar harmonies of the days, of the months, of the seasons, of the years, of the centuries; she changes the poles; and new harmonies will reappear on each horizon.’ Bernardin de Saint Pierre, *Harmonies de la nature* (In *Oeuvres Posthumes*, vol. 2. (Paris, Ledentu, 1840[1814])), p. 177. ‘Un mécanicien ingénieux dispose des tuyaux harmonieux dans une boîte; il y fait correspondre des notes saillantes, qu’il fiche sur un cylindre suspendu à un essieu: il le fait mouvoir;

et aussitôt on entend un air agréable. Il relève par des crans les pôles de son cylindre, et de nouveaux airs viennent successivement charmer les oreilles. L'homme aurait-il donc mis dans une serinette plus d'industrie que la nature n'en a mis dans le globe? Elle a distribué à sa surface ses diverses puissances; elle le fait tourner, et elle répand tour à tour sur elles les harmonies solaires des jours, des mois, des saisons, des années, des siècles; elle en change les pôles; et de nouvelles harmonies vont reparaître sur chaque horizon.'

16. Aurélia Gaillard, 'De "la possibilité du flûteur automate" (Helvétius): les automates du XVIIIème siècle comme merveilles de substitution', paper presented to conference *L'automate. Modèle, Machine, Merveille: a multidisciplinary international conference sponsored by the Centre de Recherche sur l'Imaginaire (Université Stendhal-Grenoble 3) et de l'équipe Philosophie, Langages & Cognition (Université Pierre Mendès France-Grenoble 2)*, Grenoble, France, March 18–21, 2009, p. 7. Gaillard also acknowledges René Démoris's influential discussion of Chardin's work, and the passion of the Enlightenment for canaries and the amorous paradigm that constructed the representations of cages and of birds. See René Démoris, 'Chardin, la machine et l'oiseau' op. cit., and his 'L'Oiseau et sa cage en peinture', in *Esthétique et poétique de l'objet au XVIIIème siècle, Lumières*, 5 (2005), pp. 29–47.

17. Roselyne Rey, *Naissance et développement du vitalisme en France de la deuxième moitié du 18e siècle à la fin du Premier Empire* (Oxford: Voltaire Foundation, 2000), p. 4.

18. I refer to Wilda Anderson, *Diderot's Dream* (Baltimore MD: Johns Hopkins University Press, 1990), p. 48, where she refers to Diderot's understanding of the organization of a sentient being as 'a spatial and dynamic organization existing within matter'.

19. Matteo Corsini, *Rosaio della vita* (Florence: Società Poligrafica Italiana, 1845), pp. 15–16, translation by Arielle Saiber, reproduced in Minsoo Kang, *Sublime Dreams of Living Machines: The Automaton in the European Imagination* (Cambridge MA & London: Harvard University Press, 2011), pp. 70–71.

20. Joseph Spence, *Letters from the Grand Tour* (Montreal: McGill University Press, 1975), pp. 413–414; cited in Kang, *Sublime Dreams*, p. 104.

21. Gaby Wood, *Edison's Eve: A Magical History of the Quest for Mechanical Life* (New York: Anchor, 2002), p. 33.

22. Jean-Eugène Robert-Houdin, *Memoirs of Robert-Houdin*, trans. Lascelles Wraaxall (New York, 1964), cited in Wood, *Edison's Eve*, p. 38.

23. [http://en.wikipedia.org/wiki/Digesting\\_Duck](http://en.wikipedia.org/wiki/Digesting_Duck). Accessed April 9, 2011. For images of Delvoeye's Cloaca No. 5 (2006), mixed media, Kaohsiung Museum of Fine Arts, see <http://www.wimdelvoeye.be/cloacafactory.php>. Accessed April 9, 2011.

24. Denis Diderot, *Pensées sur l'interprétation de la nature* ([s.n.], 1754), p. 26. In the full passage, Diderot states: 'Encore un mot, et je te laisse. Aie toujours présent à l'esprit que la nature n'est pas Dieu, qu'un homme n'est pas une machine, qu'une hypothèse n'est pas un fait; et sois assurée que tu ne m'auras point compris, partout où tu croiras apercevoir quelque chose de contraire à ces principes.' English translation in Wilda Anderson, *Diderot's Dream*, p. 43.

Summary:

*Vaucanson's Automata as Devices of Enlightenment*

Residing at the interstices of high and low culture, pleasure and utility, wonder and technique, Vaucanson's automata belonged to what historian Michael R. Lynn refers to as 'a growing web of interconnections between Enlightenment, science, and commerce in Parisian urban culture'. While the wider public attraction to automata during the eighteenth-century has been noted, it is also necessary to address the nature of this appeal, which is derived from the automata's simulation of the workings of human and animal bodies. Vaucanson was one of a number of astonishingly brilliant eighteenth-century mechanics, who attempted to design material bodies capable of artificially replicating life. Their ingenious machines were indeed devices of Enlightenment, that is, philosophically animated experimental objects. The aim of these devices was to approximate what contemporaries like Diderot referred to as a 'sentient being' with a particular spatial and dynamic organization. Over time, then, automata makers were challenged to imitate not just the body's mechanics but also the workings of the senses, to capture emotion as well as motion.

*Keywords:* Vaucanson, automata, mechanics, body.