"MERVEILLEUX ET MATHÉMATIQUE"
THEATRE MACHINES AND THEIR DUAL ICONOGRAPHICAL REPRESENTATION

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ABSTRACT

Theatre machines are an integral part of seventeenth- and eighteenth-century court opera and its representation of power. They contribute to the performances of the sovereign's entry on stage and display his power over the realms of scene, court, and country. Few original machines have survived to this day, but we get a glimpse of their perceptual frame through iconographical representations such as frontispieces, scene designs, and sketches of machines. These sources often combine a rational mode of revealing with a phantasmagorical one of dazzling and concealing. Given this dual nature, researchers have often presumed the contradictory manner in which they are represented. By contrast, the author proposes an understanding of these images as a blending of representation ideals which serve as potent tools of power display and shape a specific reception behaviour.

KEYWORDS

tragédie en musique; French opera; Baroque theatre; court festivals; scenography; theatre machines; Louis XIV

THEATRE MACHINES AS A DISPLAY OF SOVEREIGN POWER

Machines were an integral part of seventeenth-century courts' representation of power. They served as manifestations of the human capacity to master natural (and seemingly supernatural) forces and showed the sovereign's (exclusive) power over knowledge and craftsmanship.[1] They were present particularly in court operas and festivals—the latter can be seen as the culminating point of machine display in the seventeenth century.[2] Theatre machines were often used for performances in which the sovereign made an entry on stage, thus displaying his power over the realms of the scene, court, and country. In French opera, machines outlasted their criticism by proponents of the Enlightenment such as Jean-Jacques Rousseau,[3] and their importance only began to wane at the end of the eighteenth century. Louis XIV's last dance entry in the *Ballet Royal de La Nuict* (Jean-Baptiste Lully and Isaac de Benserade), though not an entry made using stage machinery, can be seen as the paradigmatic model of a seventeenth-century representation of the sovereign's power. At the end of the ballet the young king, "representant le Soleil levant"[4] (representing the rising sun), transforms a scene of darkness and obscurity into a luminous, transparent, and well-regulated one, and in so doing gives form and colour to a formerly unshaped environment.[5] Seventeenth-century French opera takes up this powerful model of stage entry and produces a variety of sovereign appearances on stage that generate light, visibility, and order. In the restricted space of the Paris Opéra scene, the movements displayed are not horizontal ones on large dance floors or in garden spaces, as in court entries or dance displays. French Baroque opera verticalizes the sovereign's movements: it places him in theatre machines that lead from the upper stage to scene level in a spectacle of light, music, and movement. After the first opera representations in Paris in the 1650s and 1660s, the king is replaced by a stage actor while he himself sits in the centre of the auditorium.[6] In the prologue of *Cadmus et Hermione* (Jean-Baptiste Lully and Philippe Quinault), often considered the first French opera or *tragédie en musique*, a scene of darkness and chaos makes way for the spectacular vertical machine entry of the Sun. The divine sunrise establishes transparency, visibility, and power balance, which constitute the necessary preconditions for the beginning of the *tragédie en musique*'s plot and its implementation as a new genre.[7]

In these representations, the king no longer appears on stage himself, but is replaced by an actor sitting in a theatre machine. The theatre machines used in these displays were based on the

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[1]   Vincent Dorothée, "Machines et machinations. De l'usage des dispositifs spectaculaires, artifices et feintes entre Lorraine et France au début du XVIIe siècle," *Revue d'histoire du théâtre* 278.2 (2018): 86; Benjamin Ravier, *Voir et concevoir: les théâtres de machines (XVIe–XVIIIe siècle)*, PhD diss. (Paris I Panthéon-Sorbonne, 2013), 5.

[2]   Nikola Roßbach, *Poiesis der Maschine. Barocke Konfigurationen von Technik, Literatur und Theater* (Berlin: De Gruyter, 2013), 9, 37.

[3]   Jean-Jacques Rousseau, *Oeuvres complètes*, *Julie ou la nouvelle Héloïse* (Frankfurt: Bechhold, 1855), 4:262–63.

[4]   Isaac de Benserade, *Ballet Royal de La Nuict. Divisé en quatre Parties, ou quatre Veilles* (Paris: Ballard, 1653), 66.

[5]   Ibid.

[6]   Louis XIV still made his entry on stage in person in the operas (in Italian) *Le nozze di Peleo et di Teti* (1654), *Xerxes* (1660), and *Ercole Amante* (1662). See for example, Annette Kappeler, *L'œil du prince. Auftrittsformen der Oper im Ancien Régime* (Paderborn: Fink, 2016), 47–49, 71–75.

[7]   Jean-Baptiste Lully and Philippe Quinault, *Cadmus et Hermione* (Paris: Foucault, 1673), 6–7.

developments by Giacomo Torelli, who put into action a system of counterpoises in Paris in the year 1645, and of the Vigarani family who, from 1659 on, revolutionized theatrical machinery.[8] The technique used in Paris drew on inventions by engineers such as Nicola Sabbatini and Giovanni Battista Aleotti, who, in publications from the first half of the century, like Sabbatini's *Practica di fabricar scene e macchine ne' teatri* (1638/39), show the development of their machinery.[9]

Thus, while the sunrise scene in the *Ballet de la Nuict* relied on the physical presence of the king, the opera entry sustains its power through the spectacular vertical action of the theatrical machinery and the body of the king is superseded by brilliant technology. The king himself watches from the auditorium while his representations descend on stage. The king's absence from the stage, however, becomes ever more apparent in the *tragédies en musique*'s prologues. Verses such as "Le Héros que j'attens, ne reviendra t'il pas?" (The hero I am waiting for, will he not return?)[10] dominate their plots. The void created by the king's retreat from the stage seems to be obvious in spite of the presence of ingenious displays using theatre machines. The *tragédie en musique*, probably the most potent auto-representation of French absolutist governance, from now on will rely on a multitude of ever more spectacular machine entries that manifest the king's power over theatre devices, nature, and technology.

TYPES OF SOURCES

Few original theatre machines have survived to this day,[11] but we can get an idea about their representation modes through iconographical depictions such as frontispieces, scene designs, sketches of machines, and "machine books."[12] Machines are, furthermore, present in textual descriptions of theatrical representations in journals such as the *Mercure galant*, and in *relations de fêtes*, which constitute an important way of communicating the court's pomp to a larger audience across Europe.[13] Thus, textual and iconographical depictions of machines are a vital part of the French court's regime of symbolic representation.[14] They stage the king's power, convey an idea of governance that is based on a supernatural appearance and ingenious mastery of technology,[15] and transport these messages far beyond the realms

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[8] Marie-Françoise Christout, *Le merveilleux et le 'théâtre du silence' en France à partir du XVIIe siècle* (La Haye: Mouton, 1968), 99; Jérôme de La Gorce, *Féeries d'opéra: Décors, machines et costumes en France, 1645–1765* (Chambord: Patrimoine Centre des monuments nationaux, 1997), 13–14.

[9] Kappeler, *L'œil du prince*, 72.

[10] Jean-Baptiste Lully and Philippe Quinault, *Opera. Alceste, ou Le triomphe d'Alcide*, Bibliothèque Municipale de Versailles, Mm 95, 1678, n.p.

[11] Historical theatres such as Drottningholm or Český Krumlov have partly preserved their machinery and today provide scenes with a historical setup. See for example, Hélène Visentin, "Machine Plays," in *The Oxford Handbook of the Baroque*, ed. John D. Lyons (Oxford: Oxford University Press, 2019), 387.

[12] Roßbach mentions many examples for this genre in *Poiesis der Maschine*, 15, 45.

[13] See for example, Kirsten Dickhaut, "History–Drama–Mythology," in *History and Drama: The Pan-European Tradition*, ed. Joachim Küpper, Jan Mosch, and Elena Penskaya (Berlin: De Gruyter, 2020).

[14] Thomas Brandstetter, *Kräfte messen. Die Maschine von Marly und die Kultur der Technik 1680–1840*, PhD diss. (Weimar Bauhaus Universität, 2006), 25.

[15] Ibid., 26.
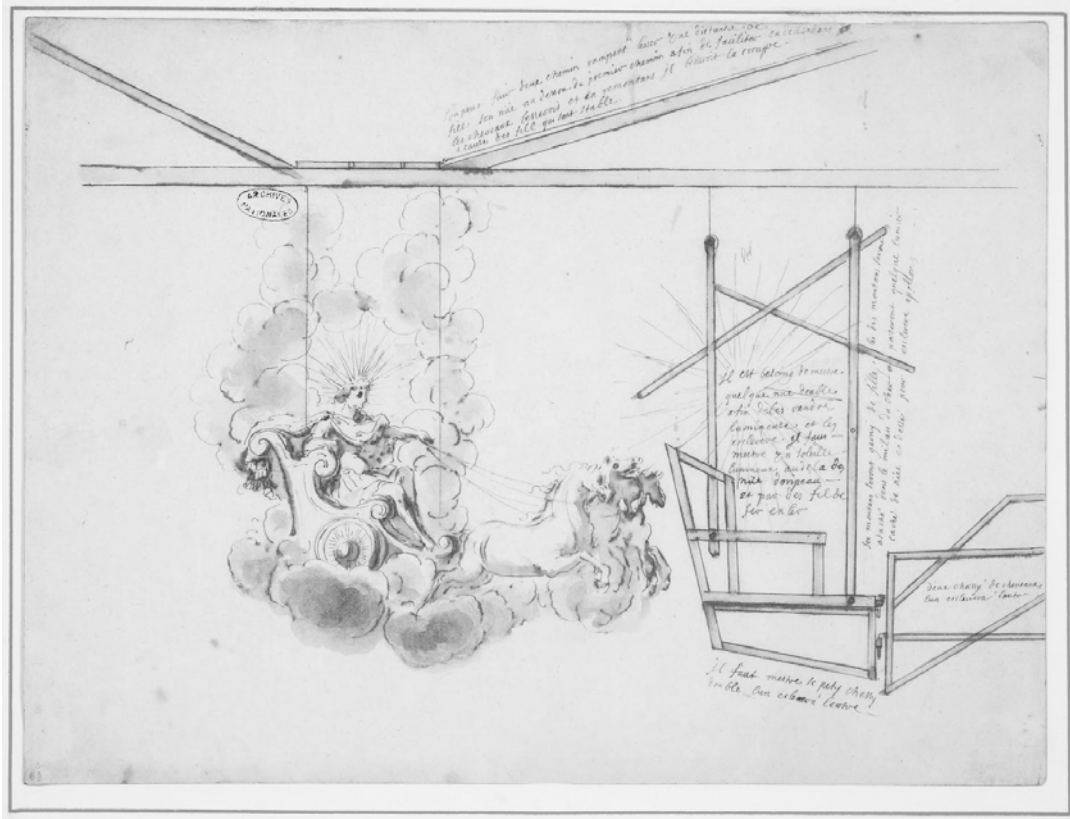
1. Jean Bérain, *Project for the Apollo chariot*, 1697, Paris, Archives Nationales, CP/O/1/ 3242/B/2.

of the opera house and France. Different types of images can be distinguished: theatre machines are visibly present in machine books, in frontispieces of the librettos' printed editions, in scene designs, and in sketches of machines. Clear borders cannot be drawn between these types of images, and they can be remodelled into one another: scene designs, for example, can be reproduced as frontispieces. Frontispieces are widely disseminated, but other types of images can also be dispersed in publications such as the *Mercure galant* or the *Gazette de France*.

Machine sketches, often called *projet* or *dessein*, are of particular interest in the context of the French court. They are frequently manufactured prior to representations by *machinistes* or *dessinateurs du Roi*, they satisfy a massive demand for new machines in theatrical representations,[16] and partly illustrate their operating mode. At the same time, they visualize the sovereign's power and attest to the Opéra's splendour. They often seem to reveal some of the machine's technical detail while concealing other aspects. This double mode of

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[16]   Julia Maillard, *Le recueil de Décors et Machines de Théâtre*, *Ad vivum: L'estampe et le dessin anciens à la BnF* (December 2016) (last accessed: 6 October 2021), https://estampe.hypotheses.org/tag/gravure.

representation seems to be typical of iconographical representations in machine books, i.e., collections of theatre and war machines, mills, fountains, and other devices, prominent since the Renaissance. They often present existing and utopian machines side by side.[17] Many of these pictures do not seem to enable engineers to construct similar machines, but they primarily serve to show the *ingenium* of their authors and to stimulate the inventiveness of the reader.[18] The machines depicted are not prototypes but models that can be used to invent similar ones.[19] Therefore, they do not need and often do not intend to be exact in the present-day sense. A detailed explanation could lead to plagiarism or criticism; new inventions can elicit prejudices in a world of established social order and pressure groups.[20] At the same time, machine books seem to intend to reveal secrets to their readers; however, "the use of secrecy remains limited, . . . the idea of discovering, of revealing, of making clear what was obscure, is part of the engineer's mission."[21] Many of these books uncover while guarding a secret, show while concealing.[22] Different source types depicting theatrical machines can thus serve very different purposes, but seem to share a mode of partly showing the machines' hidden inner lives while not disclosing their detailed functioning.

REVEALING AND CONCEALING

Thus, iconographic representations of theatrical machines are part of a seventeenth-century regime of representation that is situated between representation of power and technical design.[23] They often do not give away enough details to understand the machine's mode of operation thoroughly and thus cannot be seen as primarily building instructions for theatrical devices.[24] Some of these iconographic sources are dominated by hints at technical items, others hide details such as counterpoises and rope winches behind theatre decorations. The first type seems to illustrate above all technological knowledge, the second rather phantasmatic[25] representations of the sovereign's power. Most often, though, these modes of representation interweave and refer to heterogenous fields of knowledge and practices.[26]

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[17] Roßbach, *Poiesis der Maschine*, 15.

[18] Ravier, *Voir et concevoir*, 277.

[19] Luisa Dolza and Hélène Verin, "Figurer la mécanique: l'énigme des théâtres de machines de la Renaissance," *Revue d'histoire moderne et contemporaine* 51.2 (2004): 20.

[20] Ravier, *Voir et concevoir*, 194ff.

[21] Ibid., 196.

[22] Ibid., 7.

[23] Steffen Bogen, "Algebraische Notation und Maschinenbild. Eine Rechenmaschine avant la lettre," in *Visuelle Argumentationen. Die Mysterien der Repräsentation und die Berechenbarkeit der Welt*, ed. Horst Bredekamp (Munich: Fink, 2006), 186.

[24] Brandstetter, *Kräfte messen*, 14.

[25] When using the term "phantasmatic," I simply refer to its definition as "existing only in the imagination": https://www.merriam-webster.com/thesaurus/phantasmic (last accessed: 27 April 2021). It thus refers to the constructedness of the royal image, no longer rooted in a stable system of "magical thought," in opposition to the technical details relating to concrete objects.

[26] Brandstetter, *Kräfte messen*, 9.

An emphasis on one aspect or the other can coincide with a certain perspective of a virtual observer. Phantasmatic representations of court festivals or theatre pieces, often present in frontispieces, place the viewer in the centre of the picture, simulating the ideal view of a theatre stage constructed in a central perspective. They frame the representation with a proscenium arch which situates the viewer at the edge of the scene and points at the fictional character of the vision presented. Sketches of machines, on the other hand, often do not delineate a clear viewer's perspective that could encompass the whole of the pictured scene in a single glance. In his dissertation on the *machine de Marly*, Thomas Brandstetter describes this kind of perspective as a measured and distanced one, which guides the viewer towards an analytical way of seeing.[27] Thus, machine images can show and conceal their technical prerequisites, they can allow the viewer to see a stage illusion or disclose a backstage view.[28] They situate the viewer in the auditorium as a spectator or permit him/her a technician's view (although it is limited) which triggers an analytical perceptive mode. Very often, these images do both at the same time, letting the viewer's gaze oscillate between seeing theatrical surfaces and their technical interiors. This dual mode of seeing does not seem to be restricted to images. Textual sources, too, often describe the reception of machines or court spectacles as being of a dual nature: the wonder at a dazzling phenomenon is often succeeded by an insight into its technical feasibility and the amount of knowledge and artistry displayed.[29]

ADMIRATION OF THE MARVELLOUS

Seventeenth-century image and text sources are characterized by a tension between showing and hiding technical devices; they create a framework of revealing and concealing. Given the dual nature of these representations, researchers have often highlighted the "iconographical chasm" between technological design and "appearance ideal," a contradictory double mode of representation. On the one hand, spectators are thought to be dazzled by phantasmatic representations; on the other hand, their wonder is undermined by a revelation of the modes of operation, a measured and analytical mode of seeing.[30] By contrast, I propose an understanding of this mode of display as a blending of representation ideals which serves as a potent tool of power display and suggests a specific mode of reception. Astonishment at the marvellous machines displayed and the admiration for their technical feasibility complement one another in a powerful representation of sovereignty.

The terms wonder, admiration, surprise, and astonishment—as passions that evoke uncertainty and unsettledness, but also reflection and comprehension—are fundamental

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[27] Ibid., 36.

[28] Interestingly, in the Paris Opéra, depending on the place in the auditorium, one has a different perspective on the spectacle, having more or less insight into the backstage area, which seems to lead to a changing perception. See Christout, *Le merveilleux et le 'théâtre du silence'*, 357 and de La Gorce, *Berain*, 82.

[29] For example, Luigi Riccoboni, *Réflexions historiques et critiques sur les differens theatres de l'Europe* (Paris: Guerin, 1738), 40.

[30] See for example, Jan Lazardzig, *Theatermaschine und Festungsbau. Paradoxien der Wissensproduktion im 17. Jahrhundert* (Berlin: Peter Lang, 2007), 41–42 or Roßbach, *Poiesis der Maschine*, 41.

to seventeenth-century aesthetics, philosophy, and politics.[31] Admiration (*admiration*) and astonishment (*étonnement*) are often confronted in seventeenth-century discourse. René Descartes, in his volume *Les passions de l'ame* (1649), describes admiration as a sudden surprise of the soul at the observation of extraordinary things which, ideally, leads to a reflection on the observed: "L'admiration est une subite surprise de l'ame, qui fait qu'elle se porte à considerer avec attention les objects qui luy semblent rares & extraordinaires" (Admiration is a sudden surprise of the soul, which causes it to consider with attention the objects that seem rare and extraordinary).[32] The passion thus leads to a comprehension and memorization of the observed.[33] Astonishment (*étonnement*), in comparison, is seen by Descartes as an excess of the same passion, which leads to an overstimulation of the senses, a stupefaction, and an inability to reason.[34] According to subsequent thinkers like Edmund Burke, a certain amount of novelty but also obscurity is necessary to evoke these passions.[35] The marvellous (*merveilleux*) is another key term of French seventeenth-century discourse, closely linked to the idea of astonishment and admiration. It is not the opposite of the verisimilar (*vraisemblable*) but is often used for those appearances that are surprising or extraordinary.[36] Marie-Françoise Christout's *Le merveilleux et le 'théâtre du silence'*, still a reference work on the concept today, understands the term as combining aspects of admiration and astonishment.[37] The marvellous can surprise, enchant, and dazzle the viewer, it can lead to a sentiment of exuberance and dizziness,[38] but it can also reveal new things that lie beyond the scope of the known or even the imaginable.[39] The marvellous thus often implicates a "clair-obscur"[40] of mystery and insights into ingenious mechanics.[41] In analogy with seventeenth-century concepts, I will thus use the term "astonishment" for reception behaviours which implicate a certain degree of bedazzlement, and the term "admiration" for those which lead to a deeper understanding of the observed. I will use the term "wonder" when I do not distinguish between the two "passions." The marvellous can be the source of both, but often implies a certain amount of surprise and even stupor.

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[31] Nicola Gess, Mireille Schnyder, Hugues Marchal, and Johannes Bartuschat, "Poetiken des Staunens. Eine Einführung," in *Poetiken des Staunens. Narratologische und dichtungstheoretische Perspektiven*, ed. Nicola Gess, Mireille Schnyder, Hugues Marchal, and Johannes Bartuschat (Paderborn: Fink, 2019), 1.

[32] René Descartes, *Les passions de l'ame* (Amsterdam: Elzevier, 1650), 95.

[33] Ibid., 102.

[34] Ibid., 100. See also Christopher Miller, "The Surprising Permutations of Wonder in the Eighteenth-Century English Novel," in Gess at al., *Poetiken des Staunens*, 51; Nicola Gess, *Staunen. Eine Poetik* (Göttingen: Wallstein, 2019), 34–37; Angela Oster, "Meraviglia, Metafora, Maniera. Konzepte und Poetiken des Staunens (stupore) in der italienischen Barockliteratur," in Gess et al., *Poetiken des Staunens*, 231.

[35] Gess, *Staunen*, 54–62.

[36] Christout, *Le merveilleux et le 'théâtre du silence'*, 3. See also Catherine Kintzler, *Poétique de l'Opéra français de Corneille à Rousseau* (Paris: Minerve, 1991), 77ff; Laura Naudeix, *Dramaturgie de la Tragédie en musique (1673–1764)* (Paris: Honoré Champion, 2004), 35ff.

[37] Christout, *Le merveilleux et le 'théâtre du silence'*, 8.

[38] Ibid., 21.

[39] Ibid., 27.

[40] Ibid., 23.

[41] Ibid., 353.

A DOUBLE MODE OF SEEING

To illustrate the idea of a double mode of seeing, I will present two examples of machine representations from the end of the seventeenth century. My first example is a sketch for a machine entry of Apollo (1697) by Jean Bérain, one of the most important *dessinateurs du Roi* of the court's Menus-Plaisirs, who was, for a period, also responsible for most of the *tragédie en musique*'s machinery.[42] Bérain's sketch is an unpublished manuscript source which has functions other than printed images of machines in frontispieces or machine books. It is used within the court's "spectacle industry," but nonetheless seems to illustrate the double mode of presenting machines described above. Bérain's machine sketch shows a representation of the god in his coach on the left-hand side. Drawn by four horses and resting on a bank of clouds, the coach is suspended from the ceiling on two visible ropes. Apollo has an aureole on his head and is holding the horses' reins in his left hand. The lines representing the reins seem to connect with the aureole on the right-hand side of the image (see Fig. 1). The right side of the sketch shows a wooden frame which serves as the framework of Apollo's coach. It is covered in handwritten explanations which merge with the image.[43] The two parts of the image are connected through Apollo's aureole, which reaches out into the left section and through the ceiling, which holds both of the machines represented.

The sketch thus represents Apollo and his machine two times, showing both the visible surface of the device and its inner life. The two modes of representation are not separated from each other but blend. They are not only connected through pictural and textual details, but each one also includes parts of the other's representational ideal at its very centre: the technical sketch is characterized by an aureole, repeating a detail from the phantasmatic side of the image, whereas the phantasmatic representation displays the ropes holding the machine (echoing the ones on the right-hand side) in a very ostensible manner. Thus, this side of the image combines decorative details such as banks of clouds, which do not depict the materiality of the machine, but an ideal of visual perception, with ropes that are not hidden behind the clouds, but put in the foreground of the image for everyone to see.

The double sketch of Apollo's coach combines technical explanations with a representation of an ideal visual perception of the god's entry on stage. It does not simply juxtapose these modes of representation but interweaves them into a complex network of signification. The image represents an ideal of a dazzling theatrical effect and excites an interest in its technical feasibility. It suggests an oscillating mode of looking: once the left-hand side of the image has been absorbed, the right-hand side can be studied in order to understand how the left part is constructed. But as the technical sketch gives insufficient detail to understand the operating mode of the machine, the viewer is drawn back to the phantasmatic image, just to seek out more details on the right-hand side once again.

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[42]   Frederick Paul Tollini, *Scene Design at the Court of Louis XIV: The Work of the Vigarani Family and Jean Bérain* (Lewiston, NY: Edwin Mellen, 2003), 114–15.

[43]   In machine books of the seventeenth century, text and image are often interdependent, too. Ravier, *Voir et concevoir*, 295.

The precondition for this mode of seeing is a frontal view which does not correspond to the common observer's position in the theatre. The detached, measured, nearly geometrical view of Apollo's machine triggers a mode of seeing which implies admiration and astonishment: admiration in a rational way (for the ingenuity of the technical device) and astonishment in an astounded one (being baffled by the god's marvellous appearance).[44] This kind of double view does not seem to be restricted to visual sources. Textual representations of festivals and pageantries, such as André Félibien's *relations de fêtes*, can be understood as creating a similarly oscillating perceptive mode of the court's wonders. Félibien describes the machinery of a scene from the 1668 court festival in Versailles in the following way:

> Il estoit presque impossible de ne se pas persuader que ce ne fust un enchantement, tant il y paroissoit de choses, qu'on croiroit ne se pouvoir faire que par magie. Sa grandeur estoit de huit toises de diamétre. Au milieu, il y avoit un grand Rocher, & autour du Rocher une table de figure octogone chargée de soixante-quatre couverts. Ce Rocher estoit percé en quatre endroits: il sembloit que la Nature eust fait choix de tout ce qu'elle a de plus beau & de plus riche pour la composition de cét ouvrage; & qu'elle eust elle-mesme pris plaisir d'en faire son chef-d'œuvre, tant les Ouvriers avoient bien sceû cacher l'artifice dont ils s'estoient servis pour l'imiter.[45]

> [It was almost impossible not to be persuaded that it was not an enchantment, given the many things that one would think could only be done by magic. Its size was eight toises in diameter. In the middle was a large rock, around which was an octagonal table with sixty-four table settings. This rock was pierced in four places: it seemed that Nature had composed this work from all she had most beautiful and richest, and had taken pleasure in making it her masterpiece, so well had the workmen concealed the artifice they had used to imitate her.]

Félibien begins his description by stating (with a double negation) that one nearly has to see the court spectacle's wonders as an enchantment but continues by giving detailed numerical and geometrical information about the presented scene. He then goes on to declare that nature (spelt with a capital 'N') seems to have been responsible for such magnificent realizations but explains once more that the artifice has just been well hidden by its constructors.

The first reaction on seeing the scene, suggested by Félibien, is one of enthralment: the spectacle seems to be caused by supernatural powers. The second glance is a measuring one, which allows a rationalization of the observed phenomena. However, the indications such as "huit toises de diamétre" and references to geometrical shapes do not enable the viewer in any way to

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44 It seems surprising that de La Gorce, in his volume on Bérain, understands the sketch as a complete explanation of the technical mode of functioning: "Berain reveals here the mechanism of the machine allowing it to move sideways and is concerned with giving the horses an independent movement at their rump, so as to give the illusion that they are running in the sky." See de La Gorce, *Berain dessinateur du Roi Soleil* (Paris: Herscher, 1986), 98, 111.

45 André Félibien, *Relation de la feste de Versailles du 18e juillet 1668* (Paris: Imprimérie Royale, 1679), 23–24.

understand how they are constructed, they just give away enough detail for the viewer to become intrigued, to start a process of scrutinizing the unexplained phenomenon. In a third approach, the scene no longer appears to have supernatural causes; instead, the scenic phenomena are seen as natural ones which are beyond human artifice. In a fourth step, the artificial character of the observed is put to the forefront once more by insisting on their hidden character.

Félibien's descriptions seem to suggest vacillation between enchantment and disenchantment, between an engagement with the magical appearance of the scenic wonders and understanding them in a rational way. The interest seems to lie in a fluctuation between perception and explanation: what *seems* supernatural is in fact (humanly) ingenious, what appears to be natural has been devised to seem so. In my reading, it is thus a misunderstanding, often repeated in the current research about displays of theatrical machines or court spectacles, to see these descriptions as pointing to an ideal of complete illusion that masks their technical side behind a veil of enchantment.[46]

However, as the technical explanations given are never detailed enough to make it possible to understand what can be seen, the wonder experienced fluctuates between modes of perception that concentrate on the seemingly supernatural or the evidently ingenious, creating an endless loop which seems to be the ideal mode of perception for artifices conceived by the court's machinists. In other words, the spectator does not remain endlessly in an enchanted state: he/she passes into a state of discernment, which in turn leads him/her back to unexplained phenomena, which prompts questioning once again, etc. A sensuous overpowering alternates with intellectual pleasure over the mastery of technology.

Félibien's description of the court spectacle leaves no doubt about the identity of author of the marvellous phenomena:

> Mais comme il n'y a que le ROY qui puisse en si peu de temps mettre de grandes Armées sur pied, & faire des Conquestes avec cette rapidité que l'on a veûë. . . . Aussi n'appartient-il qu'à ce grand Prince de mettre ensemble avec la mesme promptitude autant de Musiciens, de Danseurs, & de Joûëurs d'Instrumens, & tant de differentes beautez.[47]

> [But as there is only the King who can in such a short time set up large armies and make conquests with the speed that we have seen. . . . Also it belongs only to this great Prince to put together with the same promptitude so many musicians, dancers, and instrumentalists, and so many different beauties.]

The king himself has designed the marvels displayed; he can, in an instant, create what seems to be beyond human craftsmanship and verges on the supernatural; in a word, the monarch is

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[46]   See for example, Roßbach, *Poiesis der Maschine*, 41: "In the description of the Versailles pageantry, the question of technical feasibility is omitted, not least for reasons of governance: the enchantment through the theatrical illusion of the machines is to be preserved." Roßbach seems to be surprised that these festival relations give away "backstage" details about the making of the spectacle. Ibid.

[47]   Félibien, *Relation de la feste*, 42.

the stage director of this *mise en scène*.[48] The wonder about the court's marvels is thus one for the ingeniousness and the (supernatural) power of the sovereign.

The sources discussed are designed to reveal hidden knowledge and interrelations, but without pushing it to an end. A detailed, all-encompassing explanation of the phenomena described would endanger the exclusivity of knowledge and power over one's inventions, and thus the power over the staging of sovereignty, as well as jeopardizing the powerful passion of admiration which needs to be nourished by a sense of surprise about the unintelligible.

THE MARVELLOUS AND THE SCIENTIFIC REVOLUTION

Thus, representations of the sovereign and his exploits are to be found in the descriptions of theatre representations and *fêtes*, as well as dominating machine sketches. They legitimise the king's power through an analogy with supernatural forces and delineate his reign over space and natural laws.[49] On the other hand, machine sketches and *relations de fêtes* stage the phantasm of a technical domination of nature's forces through meticulous explanations of seemingly supernatural appearances.[50] They combine magical patterns of thought with the paradigmata of the scientific revolution around 1700.

French seventeenth-century representation of sovereignty is very much influenced by the kind of magical thought Michel Foucault describes as "thinking in analogies": the world seems to be structured by similarities that link its parts to and influence one another.[51] In his *Feinte baroque*, Bayard describes this system of thought as follows: "Les Français de 1600 vivent encore dans la nature, perçue comme un être vivant, manifestation concrète de l'ordre surnaturel" (The French of 1600 still live in nature, perceived as a living being, a concrete manifestation of the supernatural order).[52] Constellations of stars, dance patterns, mathematical and musical proportions, kings and gods—all are closely related, explain and affect one another.[53] The appearance of the king as a solar god highlights the similarity between the two and strengthens the power of the former.

This system of thought draws to a close during the Baroque era and leaves a network of resemblances behind that can easily be recognized as phantasms by the viewer: "Derrière lui, il [the age of resemblances] ne laisse que des jeux. Des jeux dont les pouvoirs d'enchantement croissent de cette parenté nouvelle de la ressemblance et de l'illusion; partout se dessinent les chimères de la similitude, mais on sait que ce sont des chimères" (Behind him, it [the age of resemblances] leaves only games. Games whose powers of enchantment grow out of this new

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[48]   Roßbach, *Poiesis der Maschine*, 33.

[49]   Brandstetter, *Kräfte messen*, 32.

[50]   Ibid., 38.

[51]   Michel Foucault, *Les mots et les choses. Une archéologie des sciences humaines* (Paris: Gallimard, 1966), 47.

[52]   Marc Bayard, *Feinte baroque. Iconographie et esthétique de la variété au XVIIe siècle* (Rome: Académie de France à Rome-Villa Médicis, 2019), 13.

[53]   See for example Marin Mersenne or Claude-François Ménestrier on dance and movements of the planets. Margaret McGowan, *L'Art du ballet de cour en France. 1581–1643* (Paris: CNRS, 1963), 14; Claude-François Ménestrier, *Des ballets anciens et modernes selon les regles du theatre* (Paris: Guignard, 1682), 36.

kinship between resemblance and illusion; everywhere the chimeras of similarity take shape, but we know they are chimeras).[54]

Representations of the king as a god or mythological character still appear on stage in a dazzling spectacle of resemblances that transmits a message of power. At the same time, the onlooker knows that the king, in his materiality, is not on stage, that the actor playing Apollo is not analogous to him, that he/she is confronted with a game of illusions which suggest a world beyond that always remains elusive. The viewer enters an illusionary space where these analogies play themselves out, where different representations seem to connect to each other without being anchored in a stable system of thought.

During the Baroque period, a Cartesian world view becomes more prominent.[55] Part of the new paradigm is a structuring of phenomena as explainable mechanisms and calculable entities.[56] Foucault calls the fundamental logic behind this new world structure a "science de l'ordre" that creates divisions and classifications.[57] The new paradigm has also been described as a disenchantment of the world.[58] Forces formerly seen as supernatural are now measured and explained, leaving behind different layers of appearances that cannot as yet be reduced to rational thinking.[59] This pattern of thought becomes apparent in the various technical details and measurements that are applied to theatrical machines and court festivities and seem to relativize their seemingly supernatural origin.

At this stage, the king's appearances as mythical deities no longer suffice to create a powerful representational system of absolutist power. They set into action a game of resemblances that evokes traditional explanatory models, but at the same time, they are seen for what they are: (theatrical) illusions that hide another reality behind their facades. Marvellous appearances now need to be measured, classified, and explained, to open up a view on the world beyond their surface. These explanations, though, leave the viewer behind with another layer of appearances, which in turn needs to be explained. In his article "The Baroque as a Problem of Thought," William Egginton describes this intellectual stand as the approach of reality through a veil of appearances that promises a measurable reality behind the surface but undermines our ability to make clear distinctions.[60] The observer, thus, perceives that the phenomena are explainable without being able to see through their marvellous qualities.

Interestingly, in this age of "disenchantment," the "Begründungsphase einer sich zunehmend durch Regelhaftigkeit, Nachvollziehbarkeit und Nützlichkeit legitimierenden, mechanisch-experimentellen Naturforschung" (a stage of establishment of a mechanical-experimental natural

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[54] Foucault, *Les mots et les choses*, 65.

[55] Ibid., 66.

[56] Ibid., 70.

[57] Ibid., 71–72.

[58] Max Weber, *Schriften 1894–1922* (Stuttgart: Kröner, 2002), 488.

[59] See for example, Lucia D'Errico, *Powers of Divergence: An Experimental Approach to Music Performance* (Leuven: Leuven University Press, 2018), 88.

[60] William Egginton, "The Baroque as a Problem of Thought," *Publications of the Modern Language Association of America* 124.1 (2009): 144–46.

science that increasingly legitimises itself through regularity, confirmability and usefulness),[61] there seems to be a particular fascination for the marvellous and the spectacular, which is very present in theatrical genres of the French court. In his book *Theatermaschine und Festungsbau*, Jan Lazardzig describes this combination of the marvellous and the mathematical as illustrative of a paradoxical character of the art of machines, which can be located at the point where function and admiration, and rationality and the marvellous intersect.[62] In *Poiesis der Maschine*, Nikola Roßbach also sees machine representations as a paradoxical combination of illusionism and rationalism, as a vehicle of both enchantment and disenchantment.[63] Machines are shown as objects which closely interweave ingenuity and magic;[64] the enchantment caused by the marvellous does not (yet) get into the way of an interest for their constructedness.[65]

In an absolutist system of governance which traditionally justified itself through supernatural or mythological forces, the French court conserves its claim to power through a combination of the former system of thought with new explanatory models of the seventeenth-century scientific revolution. The sovereign's new representational mode is a blending of marvellous appearance and his mastery of an ostensibly scientific knowledge. The sovereign behind the scenes is perceived both as a magician and as an engineer. The king's self-fashioning as the god Apollo or the Sun is a symptom of this blending of scientific and magical approaches to power display: the appearance as the mythical sun god is combined with the knowledge of the so-called Copernican Revolution, which locates the sun at the centre of the universe.[66]

The fascination with marvellous appearances and the interest in their technical realization therefore do not seem unconnected—they actually appear to complement each other. Machine drawings and festival accounts combine different modes of representation to blend these systems of thought into one potent display of the sovereign's power. Their mode of operation is one of an oscillation between revealing and concealing that suggests the possibility of rational explanations for the marvellous appearances without enabling the viewer to make clear distinctions and penetrate them fully. The blending of these strategies of representation should be seen as a purposeful strategy of power display at an epistemological watershed.

DISENTANGLING *MERVEILLEUX* AND *MATHÉMATIQUE*

The representation ideal discussed above seems to be a fragile one throughout the eighteenth century. The (theatrical) marvellous is now attacked and vindicated from various sides, it is seen as necessary and dangerous, as ridiculous and sublime.[67] Theatrical machine entries

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[61] Lazardzig, *Theatermaschine und Festungsbau*, 12.

[62] Ibid., 31.

[63] Roßbach, *Poiesis der Maschine*, 9.

[64] Lazardzig, *Theatermaschine und Festungsbau*, 21.

[65] Ibid., 85.

[66] The king, interestingly, was a supporter of the "scientists" against the Church. See Dickhaut, "*History–Drama–Mythology*."

[67] Erika Fischer-Lichte, *Semiotik des Theaters. Eine Einführung*, vol. 2: *Vom "künstlichen" zum "natürlichen" Zeichen. Theater des Barock und der Aufklärung* (Tübingen: Narr, 1983), 96.

are eliminated and reinstated all too often, but they survive until the very end of the century in operas such as those by Christoph Willibald Gluck.[68] The combination of hypothetical and existing machines in Baroque books on this subject is highly contested, and irrational and utopian machines need sometimes to be omitted from these collections.[69] The oscillation between different forms of wonder does not seem to satisfy the ideal of reasoning in the age of Enlightenment. Text and image sources from the eighteenth century often try to disentangle theatrical illusions from the mode of their technical realization.

One telling example for this attempt at separation are the figures of theatrical machines in the *Encyclopédie*. In general, the contemporary machinery is not particularly present here, but a series of plates published in 1772 give an impression of contemporary theatre machines (Fig. 2).[70] These images cannot be compared directly to the machine sketch mentioned earlier—they have a very different function, one of disseminating the ideas of the Enlightenment throughout Europe in a published book. They neither serve to prepare theatrical representations nor to display the inventiveness of a particular engineer. Nonetheless they point to a tendency, present in the second half of the eighteenth century, towards drawing a line between a technical and a phantasmatic mode of representing theatrical machines. The *Encyclopédie*'s machine illustrations still combine phantasmatic machine appearances with explanations of their operational mode, much as the Apollo sketch discussed above did: in the said design, the technical representation with its wooden framework, its ropes, and rope winches takes up a good part of the image, letters from A to L refer to detailed explanations of their parts, and a scale indicates their size. The representation of what is actually seen on stage, on the other hand, is limited to small rectangles in the upper corners of the image. The overflow of marvellous appearances is reduced to a small footnote on their technical preconditions.[71] Both modes of representation are combined in one image, but distinctly separate from each other. A major part of the image presents what is behind the appearances that seem to be on stage. The machine figures in the *Encyclopédie* claim to separate illusion from reality; they suggest a clear-cut binarity which leaves little room for enchantment. While the Apollo drawing gave equal space and value to technical and phantasmatic modes of representation and merged them into one, the *Encyclopédie* reduces the latter to a minimum and disentangles what does not seem to be compatible anymore.

At the end of the eighteenth century, machines that present the marvellous become less and less important; they are problematized as an affront to rational thinking and the need to understand reality clearly, to distinguish between the so-called illusion and what lies behind it.[72] Phantasmatic representations of sovereigns are no longer convincing power displays, even if

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[68]   See for example, Kappeler, *L'œil du prince*, 170–71.

[69]   Roßbach, *Poiesis der Maschine*, 15.

[70]   Drawn and explained by Louis-François Petit-Radel, and conceived by Louis-Alexandre Giraud. See Laura Naudeix, "Pour une poétique des machines d'opéra," *Revue d'histoire du théâtre* 278.2 (2018): 120.

[71]   Denis Diderot and Jean-Baptiste le Rond d'Alembert, *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, par une société de gens de lettres*, 28 vols. (Paris: Panckoucke, 1751–1780), *Planches*, 10:1772, Machines de Théâtre, Seconde section, Planche 7.

[72]   Lazardzig, *Theatermaschine und Festungsbau*, 60.
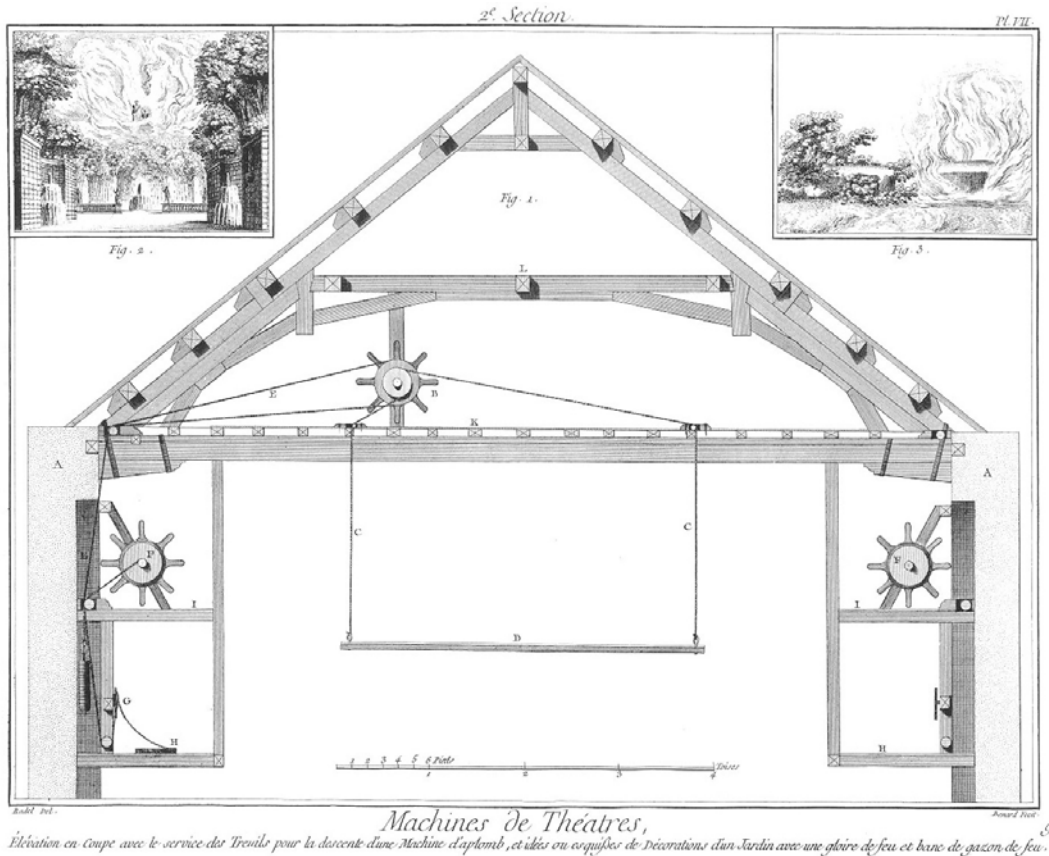
2. *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, par une société de gens de lettres. Mise en ordre et publié par M. DIDEROT . . . et . . . par M. D'ALEMBERT. . . .* Paris 1751–1780, Planches, vol. 10, 1772, Machines de Théâtre, Seconde section, Planche 7.

they are combined with a demonstration of their makers' technical mastery. Luigi Riccoboni's (1676–1753) advice on how to defend oneself against stage illusions by clearly remembering what lies behind them marks a historical turning point which indicates a separation of the marvellous and its technical preconditions: "Les machines sont les effets de la magie & du merveilleux; l'on a souvent besoin de se rappeler la construction du théâtre, & que tout ce que l'on voit est porté par des poutres, des cordages, des fers & des contrepoids pour se défendre de l'illusion de nos sens, qui nous persuade que ce que nous voyons est veritable" (The machines are effects of magic and the marvellous; one has often to remember that everything one sees is supported by beams, ropes, weights, and counterweights in order to escape the illusion of the senses, which persuades us that what we see is real).[73]

In his critique of opera and theatre machines, in particular in the *Nouvelle Héloïse*, Jean-Jacques Rousseau leads this separation to a point of culmination:

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[73]   Riccoboni, *Reflexions historiques*, 40.

Les chars des dieux et des déesses sont composés de quatre solives encadrées et suspendues à une grosse corde en forme d'escarpolette; entre ces solives est une planche en travers sur laquelle le dieu s'assied, et sur le devant pend un morceau de grosse toile barbouillée, qui sert de nuage à ce magnifique char. On voit vers le bas de la machine l'illumination de deux ou trois chandelles puantes et mal mouchées, qui, tandis que le personnage se démène et crie en branlant dans son escarpolette, l'enfument tout à son aise: encens digne de la divinité. / Comme les chars sont la partie la plus considérable des machines de l'Opéra, sur celles-là vous pouvez juger des autres. . . . / Voilà . . . en quoi consiste à peu près l'auguste appareil de l'Opéra, autant que j'ai pu l'observer du parterre à l'aide de ma lorgnette: car il ne faut pas vous imaginer que ces moyens soient fort cachées et produisent un effet imposant; . . . On assure pourtant qu'il y a une prodigieuse quantité de machines employées à faire mouvoir tout cela; on m'a offert plusieurs fois de me les montrer; mais je n'ai jamais été curieux de voir comment on fait de petites choses avec de grands efforts.[74]

[The chariots of the gods and goddesses are composed of four joists framed and suspended from a large rope in the form of a swing; between these joists is a plank across which the god sits, and on the front hangs a piece of coarse canvas, which serves as a cloud to this magnificent chariot. One sees at the bottom of the machine the light of two or three stinking, badly trimmed candles, which, while the figure struggles and shouts in his swing, smoke him to his heart's content: incense worthy of the divinity. / As the chariots are the most important part of the machines at the Opéra, you can judge the rest by them. . . . / This is . . . what the august apparatus of the Opéra consists of, as far as I could observe it from the parterre with my spyglass: for you must not imagine that these means are very hidden and produce an imposing effect. . . . One however assures that there is a prodigious amount of machinery employed to move all this; I have been offered several times to see them; but I have never been curious to see how small things are done with great effort.]

Here, a glimpse on the technical details of these machines is enough to reduce them to ridiculous falsehood. If one can see the ropes that hold a machine, their theatrical effect is destroyed. A simultaneous perception of miracles and technical ingenuity no longer seems possible: one cannot be stunned and intellectually intrigued at the same time. The double mode of representation and perception which was based on the oscillation between wonder about the magical and the technical, and supported the sovereign's power, cannot be upheld any longer, the "age of admiration" draws to a close. Machines seem to be more and more integrated in a discourse on economy, functionality, and practicability.[75]

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[74]   Rousseau, *Nouvelle Héloïse*, 262–63.
[75]   Roßbach, *Poiesis der Maschine*, 236.

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