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VIRTUAL RESTITUTION OF COSTUMES FOR FRENCH COURT OPERAS: PROLEGOMENA TO A FUTURE WORKSHOP

In the present contribution I intend to explore how far we could use 3D virtual restitutions to study the theatrical costumes worn by dancers and singers in French court operas. My discussion must begin with a few considerations. It should be noticed that massive documentation about the spectacles regularly staged at court theaters in France is indeed preserved. Thousands of drawings, mainly from the hand or workshop of Jean Bérain and Louis-Rene Boquet, are scattered worldwide, most of them belonging to the Archives Nationales, the Bibliothèque nationale de France (Départements Opéra et Estampes), the Musée du Louvre and the Musée des Arts Décoratifs in Paris, as well as in other national collections, including in Varsaw and Stockholm. Even more examples can be found in private collections. Furthermore, costumes are documented by hundreds of pages of bills and accounts – as for example the documents in the Archives Nationales in Paris, from which we can quote a few evocative titles:

> [O^{1}2986] 25 octobre 1749, Etat des frais pour la représentation de Coraline Magicienne Comédie italienne en cinq actes avec ses agréments attachés et deux divertissements /Fontainebleau 1749, Avances et fournitures faites par Silvestre, des deniers de la Troupe; [O^1 3022] Mémoire des ouvrages de peintures faites pour les habillements … pour les spectacles donnés pendant le séjour du Roy à Fontainebleau en l'année 1769 par Boquet; Programme de Dardanus donné le 9 novembre 1769 Pour le Plumassier / [O^{1}3266] La Tour Enchantée 1770: ajustements – Rôles – Habillements.[1]

In these documents, everything from shoes and gloves to garments, accessories, and headdress, is briefly described. We can often read indications for fabrics, colors, and other characteristics of the costumes on the drawings.

Furthermore, we are aware of descriptions of thousands of costumes in the wardrobes (described in 'Inventories'), which were made for every important festivity as, for instance, the spectacles for the royal wedding of Louis XVI and Marie-Antoinette in 1770, which called for 2711 costumes, new and repaired.

With such a massive amount of evidence, why not build a digital database, and why not a three-dimensional one? My current research project aims to build such a 3D interactive virtual model of French court theatres and stages,

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[1] Paris, Archives Nationales, series O^1. Most of the information about spectacles and costumes are located in the following sub-series O1: 01 3134-3133, 3180-3203 ("Magasins"), 3096-3133bis and 2984-3094 ("Pièces justificatives des dépenses"); a few spare references, as 3266 quoted above, provide additional information.

the first of which was presented in December 2012.[2] The point of departure of the project is to use the same methodology used for the 3D architectural models, 3D machines and 3D sets and wings, to build a digital 'library' of 3D elements for the restitution of the whole set, including costumes, that could be combined *à volonté*.

A SHORT OVERVIEW OF AVAILABLE SOFTWARE

There are dedicated software for fashion industry and trading, as well as for textiles. A second range includes software for Web2 and games as *Second Life*, *Sims*, etc. Furthermore, software used by the movie industry and for video games are also available. After conducting short tests, we found that all are specific and not so appropriate to our project. However, in best known professional 3D software, as Autodesk 3DS Max or Maya, there is a plugin called a 'garment maker' which allows to wrap a 2D pattern for a costume around the virtual body, with a dedicated polygonal mesh.

THE CHALLENGES

First, no original pattern for stage costumes has been preserved. Even books that describe the ways in which stage costumes were made are unavailable, one exception being Benoît Boullay's *Le Tailleur Sincère* of 1671.[3] We should therefore think of a way for recreating patterns and assemble them after the surviving originals, as in the work and new collection of publications *Seventeenth-century Women's Dress Patterns* by the Victoria and Albert Museum, even using X-Ray technology to deepen our analysis.[4] However, not many authentic stage costumes – particularly for opera – have been preserved: we can quote the collections of the Victoria and Albert Museum (from the Italian Teatrino in Castello Meletto), a few examples in Stockholm, very few in France, and a larger collection in Český Krumlov, in the Czech Republic. Most fantasy costumes, which helped creating fascinating Baroque stage productions, but also most basic costumes, are lost.

A second problem – or rather a sequence of problems – is constituted by the drawings. There is a noticeable difference between the seventeenth and eighteenth centuries: in reference to Renaissance standards, most drawings are accurate and refined, whereas in the 1740s and 1750s they become schematic, yet elegant sketches, with light colors, making large use of visual stereotypes. Furthermore, there is a difference between male and female singers: female singers and dancers are often portrayed with an elongated body, mainly in the legs,

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[2] The model has been displayed as part of the presentation by the author, *De la Salle des Machines à la Salle du Manège: L'espace de la danse à la lumière de restitutions virtuelles* at the *Colloque International "La danse française et son rayonnement (1600-1800) Nouvelles sources, nouvelles perspectives"* (Centre de Musique Baroque de Versailles, 17-19 December 2012).

[3] BENOÎT BOULLAY, *Le Tailleur Sincère*, Paris, Antoine de Rafflé, 1671.

[4] SUSAN NORTH and JENNY TIRAMANI, *Seventeenth-Century Women's Dress Patterns*, London, Victoria and Albert Museum, 2011.

associated to a tight wasp-like corseted waist (very unrealistic, when it comes to anatomy). Indeed, we notice the same characteristics today between drawings by high fashion designers and actual costumes worn by the dancer.[5]

Finally, most of the time we get only a front view of the costume, a few profiles (as the 'Sultana' designed by Boquet in *Scanderberg*, Fontainebleau 1763),[6] but no back views. However, 3D elements can be reconstructed by looking at German porcelains (an instance of sea or water god and goddess can be seen in a German antiquarian collection, likely after Jean-Georges Noverre's ballet).[7] All this information calls for corrections and hypothesis when we come to reconstructing the costume.

Presuming we can collect enough information from the sources discussed so far, we have to find the right texture for the models and the appropriate materials. Since costumes were meant to be seen from a distance, by candlelight, and were not court costumes, painting, a cheaper process to simulate rich fabrics, and special effects for reflecting light, were commonly used; likely, shapes of ornaments were not very refined.

After some rare documents recently emerged from archives and library collections, we postulate the existence of pattern books collecting samples of fabric for theatrical costumes. If the few pages in the volumes of samples collected by Maréchal de Richelieu in the 1730s, presently in the Bibliothèque nationale de France in Paris, Estampes (LH 45B), are an exceptional finding, we have also studied a pattern book of blue paper at the Bibliothèque-Musée de l'Opéra, with samples of fabrics, pasted with red wax on the paper, numbered from 1 to 88, without any written information except for «en cramoisie» on the sample n° 87 (Res 1081). The feeling shared by all the people who saw this pattern book, including me, is that it could have been compiled in the last third of the eighteenth century and could therefore be a document complementing Boquet's drawings. At the very least, even if this pattern book had been assembled during the *Directoire* or First Empire, we can surely say that some patterns are compatible with classic repertory, and traditions for theatrical fabrics were likely persistent.

We can notice some characteristics of this sample collection: same patterns – for example geometrical shapes, leaves, etc. – are found in several colors; painting techniques are similar to those we studied in the stage sets preserved at the Trianon and Fontainebleau (1754-1786), which is not surprising given that the painters who worked on the decorations of the sets and the costumes belonged to the same team, according to the records of the *Menus Plaisirs* account books cited at the opening of this contribution. In fact, gold paint made for a glittering effect that we found on some samples in this pattern book. The same effect was created by the stage decorations of temples and palaces: the built models attributed to Algieri by J. De La Gorce for Rameau's *Les Paladins* (1760), as well as

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[5] See for example Hervé L. Leroux for *Camera obscura*, Opéra de Paris, 1994, or the ballet by Roland Petit and Christian Lacroix for *Shéhérazade*, Opéra de Paris, 2001.

[6] Louis-René Boquet 'Costume de Mlle Vestris dans le rôle de la sultane dans Scanderberg'. Paris Bibliothèque Musée de l'Opéra, Rés. D216 [VI, fol. 93.

[7] The figures are probably by Franz Conrad Linck (1730–1793), Frankenthal Porcelain Manufactory, about 1765-70.

the preserved stage decoration «Le Temple de Minerve» (1754) for Fontainebleau are good references, and the original drawings by Paul-Ambroise Slodtz for this 'Temple', at the Bibliothèque de l'Opéra [Esqu. Anc. 18], specify the «parties rehaussées d'or». I have noticed a few correspondent remains on the original wings. As it could be seen on the Trianon stage during the last years of the twentieth century, the difference between the preserved yet not-restored wings, backdrops, and the gold decorations of the theater that Mique built for Marie-Antoinette was obvious to the visitors and in video captions. We thus postulate that for most theaters there was a continuous glittering gilded space, probably a little more intense on the stage itself, a visual effect which is lost today.

Among the patterns provided by the Opéra pattern book are «Grecques» – if we think about first to late eighteenth-century and First Empire times, we find these patterns in La Clairon's costume for Thomas Corneille's *Ariane* (gouache by Foech-Wirsker, in the collections of the Comédie Française), and the «Habit à la romaine» in Stockholm, Sveriges Teatermuseum [DTM43/1969], as well as in the exotic stage backdrop «Chambre de Sander» from the Fontainebleau collections, for André Grétry's *Zémire et Azor* – painted in 1774.

Gauze is widely used in dance costumes, and samples are provided in both, the Opéra and Maréchal de Richelieu pattern books. An example can be seen in the Richelieu pattern book, which specifies «servent pour les Spectacles» (see Figure 1). A striped pattern looks like the fabric described for a wrap added to a costume worn by the above-mentioned Sultana by Boquet in *Scanderberg*, performed at Fontainebleau in 1763.[8]

Among attendants and dancers were characters of warriors, the main character himself/herself wearing armors, «Cuirasse moiré d'acier écaillé» as in Boquet's drawings for *Persée* from 1770; these painted fabrics can be found in the samples of the pattern book from the Opéra – and the same range of patterns could be used for sea creatures or water gods.

The «tigré» painted fabric was widely used for bacchantes, gods and *sauvages*. The pattern in the book from the Opéra (both printed on gauze and white fabric) is close to the preserved costume dated from 1778 in Stockholm (Livrutskammaren 17/162), and Boquet specifies in an account «avoir tigré quatre ving trois aunes de satin et taffetas» in 1769 for Fontainebleau.

As explained in Corinna Tania Gallori's chapter in this volume, feathers were also profusely used in court spectacles and some parts of the costumes were painted with peacock feathers («Pour avoir peint deux douzaines de plumes de paon sur satin», writes Boquet in 1769 for a production at Fontainebleau); we see a painted drawing «habillement d'Huascar-Inca» maybe by Jean-Baptiste Martin for *Les Indes Galantes*, with the same range of colors and superposed feathers which matches the sample found in the Opéra pattern book n° 77 (figure 2).[9]

Magicians wore gowns with printed magic characters as used in printing or writing. A good example is the costume for Margian in *La Tour Enchantée* set in

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[8] Bibliothèque nationale de France, Opéra, D216 VIA-93.

[9] La Rochelle, Musée d'Art et d'Histoire, inv.83-6-483. See CORINNA TANIA GALLORI, *Penne a teatro, dal Rinascimento a Papageno* in this volume.

Versailles for the festivities of 1770, mentioned in the quoted [O¹ 3266] at the opening of this chapter, or the drawing for 'Dardanus' of 1763 by Boquet, and the Opéra pattern book contains several patterns of rusty copper magic symbols painted on blue fabric.

Masks of demons decorate costumes in the sketches, a set of two «Demonic Masks», one painted with red eyes, mouth, nostrils, and the other without, are classified under n.° 74 and n.° 76 (figure 3).

Assuming these samples date from the late Baroque time and reflect a traditional craftsmanship among makers of theater costumes (painted costumes were still used for Igor Stravinskij's *Le Sacre du Printemps*), the excellent state of preservation of this pattern book could be a reference for the production of virtual models. However, one must remember that in order to realize accurate 3D virtual models, LAB (more exactly CIELAB or L*a*b*) color pictures are necessary. This requires appropriate digital devices, and not the usual *TIFF files.

Painted fabrics are easier to render in 3D (same process is used for any costume in 3D texturing, where one should apply a 2D bitmap on a 3D form), but the glittering effects are difficult to simulate.

We can get a good idea of what these glittering effects must have been life by looking at costumes recreated for some Baroque spectacles, with pearls, glasses, called «pierreries», patches, stripes, and copper wires for gold or silver simulation. An interesting example can be seen in the reconstruction, for an exhibit and not for the stage, of a costume for an 'Allegory', made by French artist Ollivier Henry after a 17th century drawing, with paintings made using a similar technique.

THE NEXT STEP

To go further, we still need to address the question of a 3D model that would take into account animation in the restitution of Baroque stage costumes. In fact, no animated model can be created without an accurate reconstruction of steps and gesture in acting and dancing. The most obvious model we are looking at is the Motion Capture technology, but this requires a long series of experiments and expensive devices. During the 14th Dance Symposium, held at New College, Oxford, I participated in a meeting with dancers and computing specialists who are trying to acquire short 3D sequences of Baroque dance with their own devices. The 3D sequences could not only create an 'inventory' of actions and gestures, but could also be later converted to standard models and receive an appropriate dynamic costume. However, the problem that still remains unsolved is that of the recreation of the 'physics' of the opera and dance costumes, since we still do not know exactly what the structure of the costume was like.

A few basic rules are associated with the Baroque era: costume enhances the character of the dancer, singer and actor, while also making them more visible through reflections of light that is achieved through movements; costumes occupy space – 3D technology and practice in workshops are two ways for understanding how one plays in different spaces, from small stages (like the theater

of the Manège, first Paris Opéra, and Fontainebleau) to the Grand Théâtre de Versailles (which reportedly could house one hundred people or more), or long stages (about 50 meters for the Stuttgart Oper in Lusthaus designed by Philippe de La Guépière, according to the plans and a set for the ballet *Orphée* (1778), likely after Noverre's ballet of 1763, where Bacchus enters to rescue Orphée at the far end of the stage).

Analyzing videos of Baroque dancers, we have compiled a list of the main movements of the costumes in Baroque dance (seen, of course, only from the point of view of modelisation):

- Vertical (*saltatio*, up and down);
- Twist;
- Balance: left/right, back/front and, as Mickaël Bouffard added in his presentation at the conference *Fashioning Opera and Musical Theatre*, a fourth basic movement, vertical, collapse.[10]

Once we have established a basic set of movements, the 'physics' of the costume will depend on its structure. A first attempt to identify the 'physics' is to isolate three main categories for the behavior of articulated parts and fabrics:

- Still and rigid parts (as upper part of the corset), main structure of the sleeves,)
- Moving parts (semi rigid) : the underskirt, the tonnelet, headgear
- Moving parts (fluid and floating): gauze stoles, upper skirts, sleeves.

CONCLUSIONS

We can plan several levels of 3D virtual base: heavy high scaled models for parts or a single costume or light models for handling numerous characters on a virtual stage. But before the production of any model, such a project requires mainly a lot of research between historical sources and practice, to get a better knowledge of stage costumes. Software such as 3DSMax (or Maya, or even Blender) are a good choice as a crossroad between applications, the garment maker after a 2D pattern, which is «shaped», seamed around the character, and textured, can be exported to the range of applications in the database. Finally, we shall render still pictures or videos of animations; another step is using real time light models and real time models for the stage, since we plan to visualize and experiment after real time rendered 3D stereoscopic virtual models.

A virtual wardrobe based on our similar virtual Store of decorations, will be the final step, allowing researchers, students, professionals of opera, and even a

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[10] MICKAËL BOUFFARD, *Re-inventing costume designs for Alessandro Scarlatti's* Il Tigrane *(1715) with a historical approach*, paper presented at the International Conference *Fashioning Opera and Musical Theatre: Stage Costumes from the Late Renaissance to 1900* (Venice, Fondazione Cini, 29 March-1 April 2012).

wider public, to explore the wide range of Baroque and Classical stage costumes.

Figure 1. Samples of gauze, Bibliothèque nationale de France, Paris - Estampes LH45B - © Bibliothèque nationale de France.

Figure 2. Painted samples of feathers, Bibliothèque nationale de France, Paris - Opéra, Res 1081- © Bibliothèque nationale de France.
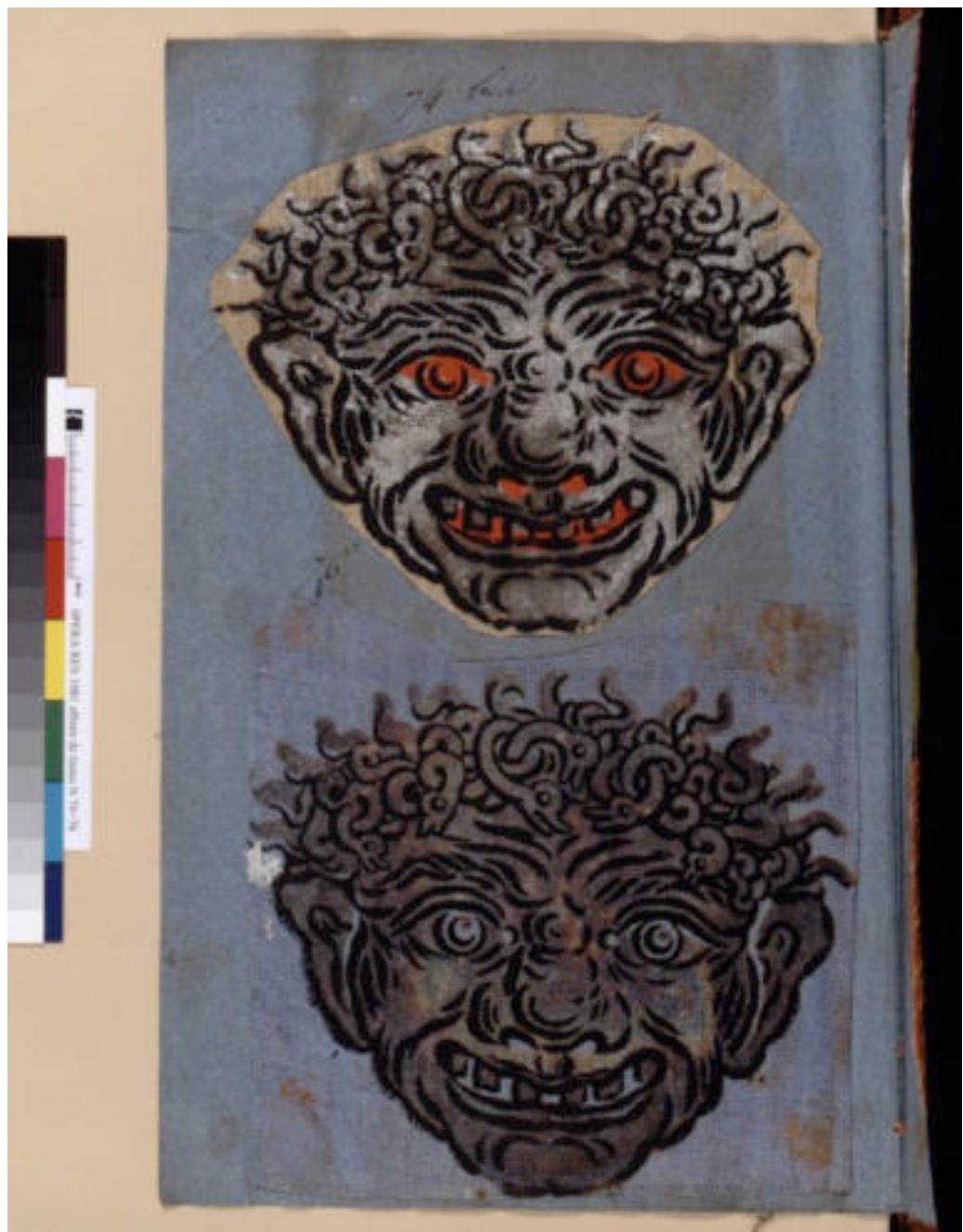
Figure 3. Painted samples of demons' masks, Bibliothèque nationale de France, Paris - Opéra, Res 1081- © Bibliothèque nationale de France.

Figure 4. A preview of the Virtual Baroque Stage project: *Thésée* (Lully), staged at Fontainebleau Court Theatre in 1754 – © DOMINIQUE LAUVERNIER