Sonorous Mechanics
The Culture of Sonority in Nineteenth-Century France

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On Wednesday 24 May 1871, during the uprising of the Paris Commune, the Sacristine of the convent of the Sœurs Auxiliatrices des Ames du Purgatoire was disturbed by the sound of rapidly approaching gunfire and explosions.[1] From the secluded convent compound in the rue de la Barouillère in Paris, she wrote in the convent diary: 'Everyone believes that the house is shaking! . . . The Mother Superior makes an act of faithfulness to the Holy Will of God! . . . it is an explosion in the Luxembourg gunpowder magazine and our tiled floor shatters! The Tuileries, the Louvre, the Ministry of War, the Palace of the Legion of honour are in flames.'[2] However, the Sacristine's attention was soon shifted from the noise of conflict towards the many other types of sounds outside and within the convent. Even the sound of the doorbell began to strike with a seemingly ominous edge. At '1 o'clock pm: The bell rings very loudly, the Mother Superior looks out of the window, it is her brother!'[3] Amidst the noises of war surrounding the compound, the nuns continued their musical routine of song and organ playing: '6 pm: Les Mères nevertheless sing pieces to the Holy Sacrament and the Most Holy Virgin.'[4]

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1 Hereafter, I refer to the Sœurs Auxiliatrices des Ames du Purgatoire as Auxiliatrices. The Sacristine or 'keeper of the Sacristy' was in charge of keeping the diary in the convent.

2 'chacune croit que la maison s'écroule! . . . La Mère Supérieure fait un acte de conformité à la Ste Volonté de Dieu! . . . c'est l'explosion de la poudrière du Luxembourg et nos carreaux se sont cassés! Les Tuileries, le Louvre, le Ministère de la guerre, la Légion d'honneur sont en flammes!' (*Premier diarium de la maison* (24 May 1871), 487–8, Archives des Auxiliatrices, Paris [hereafter ASA]).

3 'Un coup de sonnette très violent se fait entendre, la Mère Supérieure regarde par sa fenêtre, c'est son Frère!' (*Premier diarium de la maison* (22 May 1871), 486, ASA).

4 'Les Mères néanmoins chantent des morceaux au St Sacrement et à la Très Ste Vierge' (*Premier diarium de la maison* (22 May 1871), 486 and *Premier diarum de la maison* (24 May 1871), 488, ASA).

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The emphasis on the quality and significance of sound in the Sacristine's diary underlines the privileged status of acoustical events within the discourse of nineteenth-century convent life. The level of sonic detail inscribed within the diary passage implies a world that is far from dull, repressive and restrictive. Unlike the conservative musical seclusion of its popular image, the French nineteenth-century convent emerges as an institution whose very identity was premised on an imaginative, heightened sensitivity to sound. The institution, an establishment founded for a specific religious or state purpose, was crucial to the formation of post-revolutionary France.[5] Recent research on institutions within nineteenth-century France has stressed its importance in our understanding of music history. These studies show that the institution was more than a place of musical education, and actually shaped musical society as a whole.[6] Annegret Fauser has revealed the implicit gender politics of the Prix de Rome and the Conservatoire de Musique, and examined the implications for women composers during the fin de siècle.[7] The salon is also of increasing scholarly interest to musicologists, particularly of French musical culture. There have been a number of studies of the salon, most notably by Jeanice Brooks and Mark Everist, showing that the private nature of this institution had a substantial effect on public musical life around it, on the commissioning of new works, and on the celebration and reception of past ones.[8]

Michel Foucault has revealed that the 'delirious discourse' of madness was strongly connected to the dislocated space of the nineteenth-century institution.[9] The sonorous construction of institutional spaces has yet to be examined. Such an examination not only reasserts the importance of the institution in musical culture, but provides crucial insights into the essence of Romantic music. The 'sounding' institution can be a valid interpreting tool for musicologists, equal to the musical work or literary discourse. The enclosed, abstract space of many French nineteenth-century institutions was characterized by the interplay of musical and non-musical sounds. These provided a framework of sonority for the development of acoustical patterns and approaches. Central to the development and articulation of such acoustical patterns was the French organ, a complex mechanical instrument undergoing huge changes in construction and design. After the French Revolution, religious institutions continued to champion the organ within their own walls. Secular institutions also sought to incorporate the organ and its acoustical resonances into their organizational structure. Overall, the nineteenth-century French institution sought to explore the interior world of the individual through sensory messages.

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5 For the specific development of enclosed institutional spaces, particularly prisons and asylums during the nineteenth century in France, see Michel Foucault, *Madness and Civilisation: A History of Insanity in the Age of Reason*, trans. Richard Howard (London, 1999).

6 Craig Monson, *Disembodied Voices: Music and Culture in an Early Modern Italian Convent* (Berkeley, 1995).

7 Annegret Fauser, '*La Guerre en dentelles*: Women and the *Prix de Rome* in French Cultural Politics', *Journal of the American Musicological Society*, 51/1 (Spring 1998): 83–129.

8 Jeanice Brooks, 'Nadia Boulanger and the Salon of the Princesse de Polignac', *Journal of the American Musicological Society*, 46/3 (Fall 1993): 415–68; and Mark Everist, 'Enshrining Mozart: *Don Giovanni* and the Viardot Circle', *19th-Century Music*, 25/2–3 (Fall/Spring 2001/2002): 165–89.

9 Foucault, *Madness and Civilisation*, 99.

Recent scholarship has shown that the Conservatoire de Musique in Paris was not the only important musical institution of nineteenth-century France.[10] It can also be interpreted and assessed as one of a group of institutions in nineteenth-century Paris emphasizing the sensory acoustical experience. The Conservatoire de Musique encouraged the latest acoustical mechanisms into its walls and utilized such mechanisms widely in its curricula. The Orgue expressif of Joseph Grenié, purchased in 1816 and placed in the Théâtre des Hommes of the Conservatoire de Musique, was very innovative in design using free reeds as an intrinsic part of its structure.[11] These could be subjected to a variety of wind pressures, and hence provided wide, dynamic and colouristic control. It was available to both male and female students from 1819, and formed an intrinsic part of the culture of sonority within the institution itself.

Alongside the Conservatoire de Musique were the Conservatoire des Arts et Métiers and the Institut des Aveugles, all established at the end of the eighteenth century.[12] The Conservatoire des Arts et Métiers deliberately fostered the creation of new mechanical inventions, and offered courses to French citizens in industrial and mechanical design. Of central importance were the various mechanical organs displayed on the site of rue Saint-Martin, an ancient abbey. Claude-Pierre Molard, the Administrator of the Conservatoire des Arts et Métiers from 1800, managed to have the organ of Saint-Denis transported to the institutional site, and consolidated the legal ownership of the keys to 17 official church organs in Paris.[13] A whole series of organ exhibits at the Conservatoire des Arts et Métiers were demonstrations of the principles of the science of sound developed by Hermann von Helmholtz in his work *On the Sensations of Tone*.[14] These demonstrations graphed sound using a basic apparatus of organ pipes, bellows and, often, a mirrored flame for effective visual transmission.[15] Displayed at the Conservatoire des Arts et Métiers were

10 See Mary Ellen Poole, 'Gustave Charpentier and the Conservatoire Populaire de Mimi Pinson', *19th-Century Music*, 20/3 (Spring 1997): 231–52.

11 See the document 'Rapport à Monsieur l'Intendant Général de l'Argenterie Menus-Plaisirs et Affaires de la Chambre de Roi par l'Inspecteur Général' (28 Nov. 1816), Archives Nationales, Paris [hereafter AN] AJ/37/3. Série AJ/37 refers to the Archives of the Conservatoire de Musique from 1784 to 1925 held at the Archives Nationales. The Conservatoire de Musique went by various names during the late eighteenth and nineteenth centuries: Ecole Royale de Chant, Ecole Royale Dramatique, Ecole Royale de Musique et de Déclamation, Conservatoire de Musique et de Déclamation.

12 For details surrounding the establishment of these two institutions see Zina Weygand, *Institut national des jeunes aveugles: Le temps des fondateurs 1784–1844* (Paris, n.d.), and Claudine Fontanon, 'Conviction républicaine pour une fondation', in *Le Conservatoire National des Arts et Métiers au cœur de Paris*, ed. Michel le Moël and Raymond Saint-Paul (Alençonnaise, 1994), 60–68. The Institut des Aveugles was also known as the Institution Royale des Aveugles and the Institution Nationale des Jeunes Aveugles, and it is currently named the Institut National des Jeunes Aveugles (INJA).

13 Claude-Pierre Molard, Letter to the Ministre de l'Intérieur, Paris (24 Oct. 1801), BIBL 118, Bibliothèque Conservatoire des Arts et Métiers, and 'Note relative aux orgues d'églises de Paris' (5 Mar. 1795), BIBL 43(4), Bibliothèque Conservatoire des Arts et Métiers.

14 Hermann von Helmholtz, *On the Sensations of Tone, as a Physiological Basis for the Understanding of Music*, 2nd edn in English, ed. and trans. A. J. Ellis (London, 1885).

15 Such apparatus are pictured frequently in acoustical treatises of the era, e.g. J. Gavarret's *Phénomènes physiques de la phonation et de l'audition* (Paris, 1877), 201.

E. Steins's 'Wooden Pipe with See-Through Glass Panel', Rudolf Koenig's 'Sonorous Pipe with Visual Compression', 'Five Pipes with Flames', and three exhibits involving the organ construction work of Cavaillé-Coll.[16] These included Cavaillé-Coll's acoustical bellows models and the *Mannequin*, a wild-looking set of 32 pipes that emitted the entire array of partials when the bellows were pumped.[17]

Two institutions in Paris stand out as successful cultivators of sonority. The first, the convent, re-emerged after intense persecution during the French Revolution, and flourished despite an increasingly anti-clerical world. The second, the Institut des Aveugles (Institute of the Blind), was a direct creation of the ethos of the Enlightenment, and developed in tandem with rising industrialization. Representing both the sacred and the secular side of nineteenth-century life, these institutions lead us to establish a closer connection between the success of the institution and nineteenth-century music itself.

The convent and the Institut des Aveugles articulated two powerfully distinctive types of acoustical expression appropriate to the different issues surrounding the inhabitants of each institution. These two types of acoustical expression reflect the two different sides of the philosophical debate surrounding musical mechanics in the nineteenth century: vitalism and materialism. In the French convent the new mechanical improvements to the organ were used to directly enhance the expression of the infinite and the divine, a primary concern of convent life. At the Institut des Aveugles the organ was used in the physical and aural articulation of mechanical functionalism and determinism. The resulting acoustical 'musics' of these two places reveal the nineteenth-century French institution as fertilizing ground for notions of Romanticism and absolute music.

The Institution as a Place of Acoustical Resonance

Victor Hugo noticed the sonorous atmosphere in the interior of the Parisian convent. His literary description of the convent in *Les Misérables* was based on the real-life convents of the Benedictines in the rue Sainte-Geneviève, Saint-Michel, Les Dames du Sacré-Cœur and L'Adoration Perpétuelle in the Saint-Antoine quarter in Paris.[18] Hugo depicts the Parisian convent primarily through descriptions of its 'voices' emanating from the silent space. He observes that in the convent, 'The effect of this rule of silence was that the faculty of speech was denied to humans and transferred to inanimate objects. At one moment it was the chapel bell that spoke, at another the gardener's bell.'[19]

The convent of the Auxiliatrices in the rue de la Barouillère was dominated by disparate sounds resonating around the compound. Behind the expansive reception room was a maze of echoing corridors. These extended in two different directions from the front leading backwards to two separate buildings.

16 These are listed along with acquisition dates in 'Tuyaux sonores, Souffleries, Salle No. 30', *Catalogue officiel des collections du Conservatoire National des Arts et Métiers* (Paris, 1905), vol. 2 *Physique*, 67, Bibliothèque Conservatoire des Arts et Métiers.

17 For a description of the *Mannequin* see Cécile and Emmanuel Cavaillé-Coll, *Aristide Cavaillé-Coll: Ses origines, sa vie, ses œuvres* (Paris, 1929), 80–81.

18 Victor Hugo, *Les Misérables*, trans. Norman Denny (Harmondsworth, 1982), 427.

19 Ibid., 444.

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In between was a large garden and grotto with ceramic statues. The two sides of the courtyard created a lively acoustical barrier, and footsteps and human voices could be heard clearly. An organ room was situated high above the dormitories where it could be heard by all those below. The chapel, positioned at the back of the courtyard, contained a new French organ. Placed in the tribune, this organ had a novel feature – a pedal board which could be converted to a walking platform. The pedal board, the keyboard of the organ played by the feet, blocked one side of the tribune from the other. However, this particular organ could be closed by a large plank of wood, and could be walked across during the service. After the organ stopped, the platform was lowered and the footsteps of the Auxiliatrices choir nuns echoed into the chapel space below. This was an 'acousmatic' environment in which the sources of the sounds were often invisible, and sometimes entirely unidentifiable.[20]

Previous studies of religious institutions have focused on the spoken or sung word. These include Katherine Bergeron's recent study on the revival of Gregorian chant at Solesmes in France, and Craig Monson's study of sixteenth-century Santa Cristina in Italy.[21] Monson has commented that the disembodied nature of the nuns' singing voices gave added power to their musical expression. In the nineteenth-century convent, those disembodied voices were part of a larger discourse of sonority occurring within the walls of the institution. Here, the organ became a more important transmitter of sonority than the spoken word. Music, the nuns believed, had not yet lost its power to enchant.

The notion of the disembodied voice was expanded beyond religious word and into the realm of pure sound in the nineteenth-century convent. Artificial acoustical resonances within the institution symbolized the interior mystical world of the convent inhabitants communicating with God.[22] The novices were warned:

> Each time you hear a signal calling you, tell yourself in a short, fervent prayer the words of young Samuel, [uttered] when he believed himself called by the Great Priest: '*Ecce ego quia vocasti me*.' There you will receive three benefits: the first, to be elevated and united with God more often; the second, to obey, not materially, but with a pure reason, '*quia vocasti me*'; the third, to obey promptly; for if you do not dare to make your Superior wait when he calls, still less will you want to delay when you believe it is Our Lord himself: '*Magister, adest et vocat te*.' You will abhor continuing your work or anything else as soon as obedience wants you somewhere else.[23]

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20 For a full definition of 'acousmatic' see Michel Chion, *Audio-Vision*, trans. Claudia Gorbman with a foreword by Walter Murch (New York, 1994), 32, 221.

21 Katherine Bergeron, *Decadent Enchantments: The Revival of Gregorian Chant at Solesmes* (Berkeley, 1998); and Monson, *Disembodied Voices*.

22 For a list of the special feast days see the *Coutumier*, ASA.

23 'Toutes les fois que vous entendez un signal qui vous appelle, dites-vous sous forme d'oraison jaculatoire ces paroles du jeune Samuel, quand il se croyait appelé par le Grand-Prêtre: *Ecce ego quia vocasti me*. Vous en retirez trois avantages: le premier de vous élever et de vous unir à Dieu plus souvent; le second, d'obéir, non plus matérielle-ment, mais par un motif pur, *quia vocasti me*, ce que rendra votre obéissance, vraiment méritoire; le troisième, d'obéir avec promptitude; car si vous n'osez pas faire attendre votre Supérieure quand il vous appelle, vous voudrez bien moins encore rester en retard, lorsque vous penserez que c'est Notre Seigneur lui-même: *Magister, adest et vocat te*. Ayez

The atmosphere of silence contributed to the effects of these sounds or 'signals'. Like the soft ticking of the clock, which was often swallowed up in the silence, the nuns' 'restrained tone of voice' and 'discretion' became part of the silent atmosphere or the silent effect.[24] Hugo incorporates low sounds into the silent atmosphere of his convent description when he observes the singing of the nuns. He writes that 'in the office for the dead the pitch was so low that women's voices could scarcely reach it. The effect was impressive and tragic.'[25] For its maintenance, silence required aural contrast. During the Commune, the nuns of the Auxiliatrices appreciated their silence all the more through the noise of the cannon ('One can only hear the cannon in the distance, my God how good this silence is!'[26]). Part of the silent atmosphere was the use of space and emptiness within the convent rooms.[27] This environment was heightened by the stark and almost bare quality of the convent building occurring as the result of the vow of poverty. In direct contrast to the ornamental interiors of the female bourgeoisie, convent spaces were often purposely empty, representing '*le silence de Dieu*'.[28]

Only a few streets away was the Institut des Aveugles on the Boulevard des Invalides in Paris (Fig. 1). Standing on its own allotment and surrounded by a tall iron fence, the large white building of the Institute seemed to retreat from the continuous rows of grey, terraced Parisian apartments. On entering the gatehouse, blind students proceeded to the Institute's main building where they experienced the aurally charged environment resonating with the echo of footsteps, music, voices and the machinery of the printing press. Outside the special rooms dedicated to the experience of silence, the large corridors and stairways transmitted the most distant sounds from the organ practice rooms, and from the central Salle des Concerts. Here *listening* became the interpretation of sounds into a form of communication or 'speech', an alternative form of 'sight'. Maurice de la Sizeranne described the sounds experienced by the blind as voices. Amongst his extensive writings is a passage headed '*Les voix de la maison*' (the voices of the house). Sizeranne quotes the Russian writer Nikolai Gogol, who also described the experience of blindness: 'I could not say why these doors sang. Was it because the hinges were rusty? Or else that the joiner had hidden in them some secret mechanism? I don't know, but the strangest thing is that each door had its own particular voice. The bedroom door was a fine soprano, the dining room a rumbling bass.'[29]

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en horreur la continuation de votre travail ou de toute autre chose, dès que l'obéissance vous veut ailleurs' (*Manuel du juvéniste*, [n.d.], 21–2, ASA).

24 *Premières règles de la Société des religieuses auxiliatrices des âmes du purgatoire*, 70, ASA. As Camille Mauclair noted in 1909, silence 'is full of sonorous realities' ('il se peuple de réalités sonores'), Camille Mauclair, *La Religion de la musique* (Paris, 1909), 54.

25 Hugo, *Les Misérables*, 432.

26 'On n'entend plus le canon que dans le lointain, mon Dieu que ce silence est bon!' (*Premier diarium de la maison* (26 May 1871), 489, ASA).

27 Hugo was conscious that in the convent, 'there was nothing to be seen or heard, not a footstep or a human sound. The walls were bare and the room was unfurnished, without even a chair.' Hugo, *Les Misérables*, 425.

28 Mauclair, *La Religion*, 53.

29 '"Je ne saurais dire pourquoi les portes chantaient ainsi. Est-ce parce que les gonds en étaient rouillés? Ou bien le menuisier qui les avait faites y avait-il caché quelque secret mécanisme? Je ne sais; mais le plus étrange, c'est que chaque porte avait

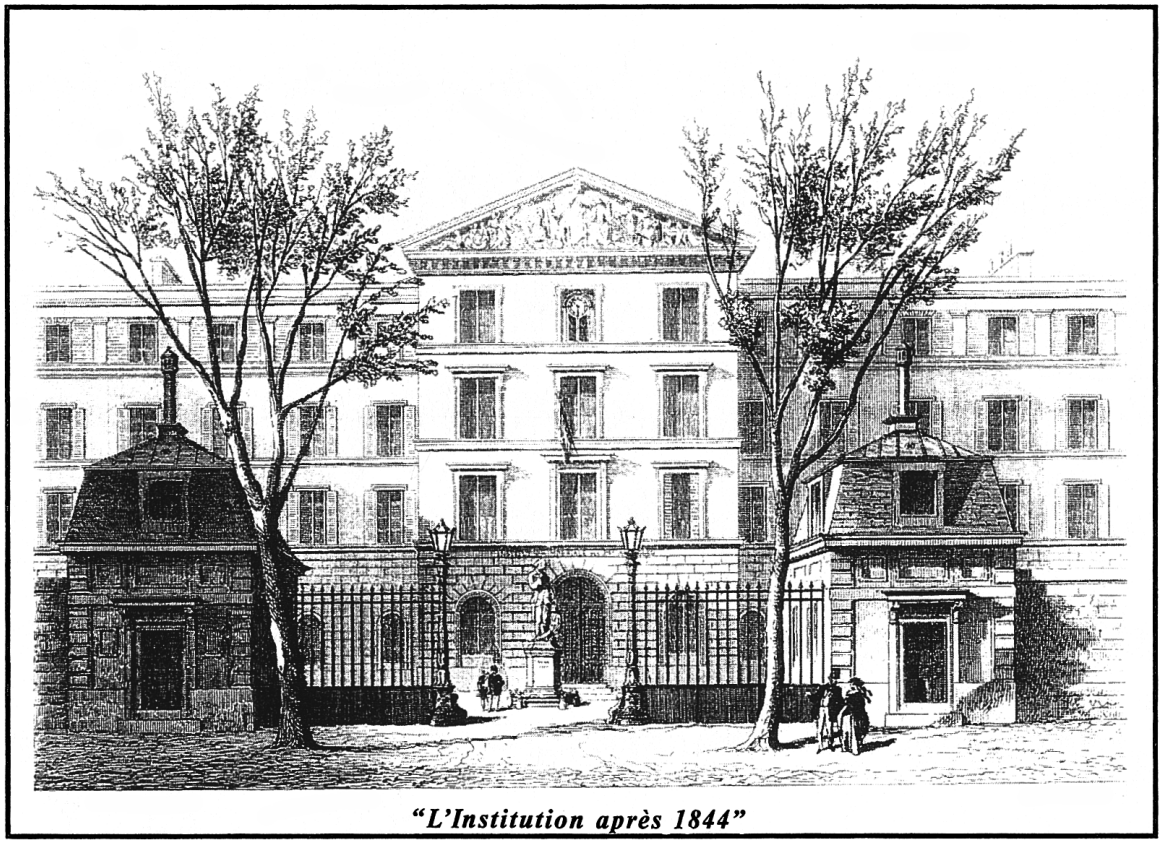

Fig. 1 L'Institut des Aveugles after 1844 (Paris, n.d.) (by permission of the Institut des Jeunes Aveugles, Paris)

The mystical meditation of the inhabitants of the enclosed convent space resembled the supposed interiorized sensitivities of the isolated blind in nineteenth-century France. Religiosity was first linked with blindness through the notion of an interiorized 'excessive, deluded vision' by Denis Diderot in *Lettre sur les aveugles*.[30] Later in the century Sizeranne explained that the blind were entirely separated from the exterior world, and that 'this is generally little understood by the sighted since, when they love nature, they only want to *look*, not *seeing*, and they can only *hear*, forgetting to *listen*; and even more to *feel*, to fill and intoxicate themselves with flavours, odours and sonorities as the contemplative blind can, who are not anaesthetized by the absence of vision'.[31] The division between the internal nature of the blind's sensibilities, and those outside the institution, closely resembles the emphasis on 'self' and 'group' within the convent. Such a division was formally embedded within the institutional environment. The *direction intérieure* (interior life) was a segment of each convent regulation, and demanded focus on the inner state of the individual as opposed to busier collective actions.[32]

The Convent and Romantic Notions of Artistic Genius and Art-Religion

For convent nuns, the sound of the organ became an ideal symbol for their conscious rejection of the human world and the acceptance of a heavenly sphere. By imaginative means and through mechanical technology, the convent revelled in sound as an object of perception. The mechanical organ created a distancing effect that deprived its music of human substance, infusing it with an otherworldly, supernatural character.

Most nineteenth-century *congrégations féminines* (or convents) commissioned new organs from nineteenth-century organ builders such as Joseph Merklin and Aristide Cavaillé-Coll.[33] From 1858 to 1895 more than 10 new Cavaillé-Coll organs were purchased by nineteenth-century *congrégations féminines*. The Congrégation de Sion and the Sœurs de Saint-Vincent-de-Paul spent 12 000 francs each on their 12-stop Cavaillé-Coll organs, more than twice that spent on organs in many Paris parishes. Many older convent organs had been destroyed by the events during the French Revolution and those few that remained required substantial restoration. Although the Congrégation de Notre-Dame

sa voix particulière. Celle de la chambre à coucher avait un soprano des plus fins; celle de la salle à manger, une basse ronflante"' (Maurice de la Sizeranne, *Les Sœurs aveugles* (Paris, 1901), 60).

30 See the discussion of Diderot's *Lettre sur les aveugles* in William R. Paulson, *Enlightenment, Romanticism and the Blind in France* (Princeton, 1987), 58.

31 'Cette part est généralement peu comprise par les clairvoyants qui, lorsqu'ils aiment la nature veulent *regarder* et non pas seulement *voir*; alors ils ne font plus qu'*entendre*, oubliant d'*écouter* et encore plus de *sentir*, de s'imprégner, de se griser de saveurs, d'odeurs et de sonorités ainsi que peut le faire l'aveugle recueilli, mais non anesthésié par l'absence de la vision' (Sizeranne, *Les Sœurs aveugles*, 28).

32 *Instructions du noviciat*, n.d., ASA.

33 For lists of convent orders that purchased models by these builders see Gilbert Huybens, 'Paris Communautés, Ecoles, Théâtres, Facultés', *Aristide Cavaillé-Coll – Opus List*, trans. Peter Swift (International Society of Organ Builders, 1985); and Michel Jurine, *Joseph Merklin, facteur d'orgues européen: Essai sur l'orgue français au XIXe siècle*, 3 vols (Paris, 1991).

bought an ancient organ from another old convent building for 1000 francs, the organ-builder Cavaillé-Coll restored it using 'modern' organ-building techniques for the much greater sum of 10 000 francs.[34]

In general, these orders were interested in the *Orgue de chœur* or *Orgue de tribune* models specifically made by these builders and which consisted of two manuals or keyboards, capable of producing around ten coloured sounds. Much smaller than the larger models developed for churches and cathedrals, they nevertheless contained all the new features of the instrument: high wind pressure, expressive swell enclosure, the *Flûte harmonique*, *Basson et hautbois* and *Voix céleste* sounds. Built in 1889, the Merklin organ illustrated below was a typical *Orgue de chœur* found in many nineteenth-century French convents (Fig. 2). The two manuals, or keyboards played by the hands (the *Récit* and the *Grand orgue*), each had 54 notes extending from F 19 notes below middle C to C two octaves above middle C. The *Pédale* division (keyboard played by the feet) had 24 notes from C two octaves below middle C to B just below middle C. The *Récit* had four stops all at 8-foot pitch, a *Bourdon*, *Gamba*, *Voix céleste* and *Basson et hautbois*. The *Grand orgue* had four stops, a 16-foot *Bourdon*, an 8-foot *Flûte harmonique* and *Dulciane* and a 4-foot *Flûte harmonique* extending the upper sounding range of the instruments to three octaves above middle C. The *Pédale* had two stops, a 16-foot *Bourdon* extending the lower sounding range of the instrument to three octaves below middle C and an 8-foot *Bourdon*. The *Récit* stops could be coupled to the *Grand orgue* and were enclosed in an expressive swell pedal and tremblant mechanism. The loud *Basson et hautbois* could be operated suddenly using a foot coupler.

Sometimes a convent purchased a particularly unusual model by Joseph Merklin or a Cavaillé-Coll instrument. In 1855, the Fidèles Compagnes de Jésus bought a Cavaillé-Coll *Orgue de chœur* in which all eight stops on the organ were enclosed in a swell box. This allowed gradual manipulations in volume across the entire organ rather than the expected portion of the stops. The Dames Bénédictines de Cuire bought one of the first electrical Merklin models for their convent in 1889.[35]

The Auxiliatrices also cherished a number of harmoniums built by Alexandre-fils, specifically considered impious by prominent writers and musicians of sacred music. In the article 'Du vrai style de l'orgue catholique' published in *Revue de musique ancienne et moderne*, Théodore Nisard 'investigates the musical characteristics which he feels create an acceptable and appropriate style for religious music'. Nisard explained that 'these organs have corrupted the true style of religious music with their ability of expression, and with their stops and tremolos which sound "like goats bleating". Consequently, the use of these sensual instruments has lead to the decline in tastes of the populace. Due to the dissemination of such "pernicious stops" the tastes of organists as well has erred.'[36] The nuns on the other hand valued these colourful instruments almost as if they were religious relics. The organist was given specific instructions on

34 Huybens, 'Paris Communautés, Ecoles, Théâtres, Facultés'.

35 For more examples of Merklin organs built for convents in France see Jurine, *Joseph Merklin, facteur d'orgues européen*, vol. 2. There are too many to list here.

36 Théodore Nisard, 'Du vrai style de l'orgue catholique', *Revue de musique ancienne et moderne* (1856): 337 from Timothy Scott Flynn, 'A Study in Music Criticism and Historiography: Sacred Music Journals in France, 1848–1870', Ph.D. diss. (Northwestern University, 1997), 63, 67.

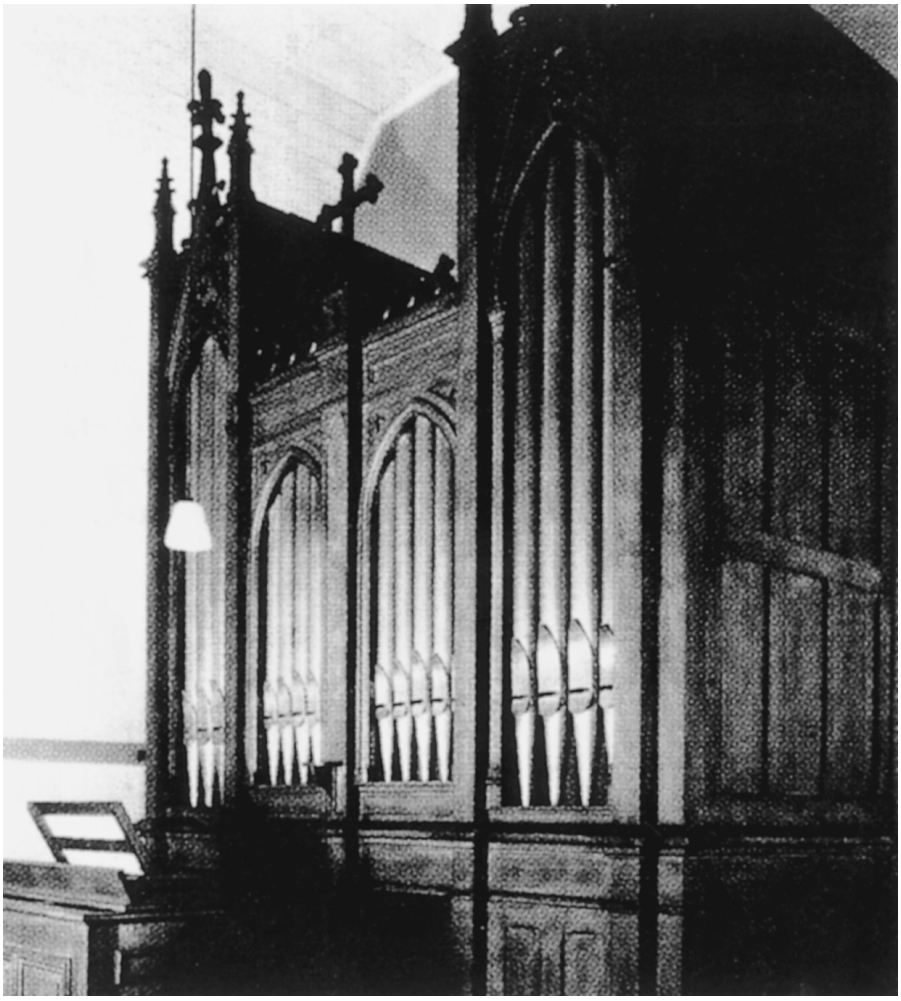

Fig. 2 *Orgue de chœur* **built by Joseph Merklin originally from the convent in Marseille of Les Religieuses du Sacré-Cœur de Jésus (photograph by David Fincham; by permission of the Organ Historical Trust of Australia)**

care of the instrument ('For daily maintenance, it is necessary to wipe the keyboard carefully with an appropriate cloth, in order that the keys stay perfectly white'[37]) and access to them was restricted to the organist herself.

Whilst large amounts of air pumped by electricity and steam enabled the characters of Jules Verne's *20 000 Leagues Under the Sea* to 'prolong at need' their stay 'in the depths of the sea', on dry land they fuelled the communicative

37 'Pour l'entretien quotidien, il faut essuyer doucement le clavier avec une flanelle propre, de façon à ce que les touches restent parfaitement blanches' (*Traditions de l'organiste*, [n.d.], 2, ASA).

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possibilities of the organ.[38] Aristide Cavaillé-Coll, the nineteenth-century French organ builder, applied a new action developed from principles of contemporary steam engineering.[39] Invented by the English engineer Charles Spackman Barker, the Barker Lever action was patented in France before it was used and accepted in England. It consisted of 'pneumatic assisting motors ("book pneumatics") interposed between the keys and the pallet pull-down wires', and was primarily designed to conquer the inertia of previous mechanical actions.[40] It permitted the maintenance of a large reservoir of air under pressure, allowing a greater number of different sounds.

Like the orchestra, the nineteenth-century organ was designed around two main groups of sounds, *les fondations* (foundations, equivalent to the string *tutti*) and *les anches* (reeds, including brass and wind instruments). However, the sounds of these two sections were completely distinguishable from their orchestral counterparts. Through the Barker Lever action, Cavaillé-Coll created the open harmonic flute (*Flûte harmonique*), increasing the pressure of the wind through an open pipe twice the length of its stopped flute predecessor. The full-blasting tone of the *Flûte harmonique* easily surpassed the tone of the orchestral flute in volume and depth, particularly when combined with its upper octave stops. Cavaillé-Coll reed stops also had an incredibly piercing sound. The *Voix céleste* was no longer a soft stop but gained a particular power accompanied by enormous amounts of air.

The pneumatic motors of the Barker Lever action also enabled the different types of sounds of the organ to be manipulated through various mechanical devices. These mechanical devices allowed greater spatial manipulation of the various 'voices' emanating from the organ. Combination pedals were added to the organ enabling the player to manipulate by foot various groups of sounds without lifting his/her hands from the keyboard. The listener heard crashing reed sounds from a different part of the instrument without warning, or an immediate transition from flutes to the *Voix céleste* from a different set of pipes.

For the convent organist, the organ was a tool for the expression of the divine. Nelly Pasquier (named Mère Marie de Sainte Clotilde) (Fig. 3) acquired an almost superhuman presence when she became the convent organist of the Paris house of the Auxiliatrices in 1865. Pasquier gave up her piano skills promising 'herself not to touch the piano during all her noviciate', and found herself powerfully drawn to the single musical sounds of the convent harmonium: 'When the novice as domestic work had to clean and dust the salon of the Missions and found herself in the presence of her dear harmonium, the temptation was strong; one day, she put her finger on one of the keys to hear at least a sound.'[41] Descriptions of her painful sickness and death are coupled with her artistic endeavours, such as 'a beautiful *Salve Regina* after Mozart and Haydn, for the Celebration of *Notre Très Révérende Mère*, and an *O Crux Ave*

38 Jules Verne, *20 000 Leagues Under the Sea* (New York, 1995), 63.

39 See Fenner Douglass, *Cavaillé-Coll and the French Romantic Tradition*, expanded edn (New Haven, 1999), 89.

40 Peter Williams and Barbara Owen, *Organ*, The Grove Musical Instruments Series (London, 1988), 294.

41 'lorsque la novice avait pour travail domestique de balayer et épousseter le salon des Missions et se trouvait en présence de son cher harmonium, la tentation était forte; un jour elle posa le doigt sur une des notes pour entendre du moins un son' (*Ménologe Mère Sainte Clotilde*, 4–5, [n.d.], 4–5, ASA).

Fig. 3 Photograph of Mère Marie de Sainte Clotilde, 1867 (Nelly Pasquier) (by permission of the Sœurs Auxiliatrices, Paris)

after Beethoven for the Celebration of the Supérieure'.[42] Her funeral, the *Ménologe* reports, was filled with '*les chants et morceaux d'orgue*' (songs and organ pieces).[43]

Traditionally a symbol of the soul, the organ merged with the nun's own identity as a 'soul' detached from the 'perishables of the world' in a 'happy

42 *Ménologe Mère Sainte Clotilde*, 27–8.
43 Ibid., 36.

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place of eternal beauty'.[44] The convent organist could supposedly converse with the Angels and Saints on an instrument now rich and penetrating enough to be heard and experienced by God.[45] Thus, there was a strong perception amongst Pasquier's fellow nuns that she, the nun organist, had divine powers of communication. At the ceremony of her final vows the nuns 'erupted', 'singing to the tireless devotion of their organist':

> Here is something on earth like the angels,
> God of peace, God of love,
> Celebrate in praise of the saints,
> In your chords of each day . . .
> To the angelic choirs, take up your lyre
> To celebrate you, they are jealous!
> In their divine concerts, they want to keep telling you
> What Jesus has done for you.[46]

Pasquier also followed her '*inspirations*' as a young child, and this later resounds in her *Ménologe* entry in a description of her improvising: 'Sometimes the Mother Director went up to the organ in the middle of an offertory and, finding the inspirations of the dear Mother greater than the pieces that she was playing, took away the scores and said to her, "Improvise".'[47] Pasquier's '*inspirations*' came directly in the form of improvisations, and these improvisations were held in far higher esteem than the repertoire that she played from scores.

The mechanics of the new nineteenth-century organ within the institution were implicit in Pasquier's identity as divine convent being. Each novel sound

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44 See e.g. the following passage from the *Cérémonial de l'Association religieuse des dames de la charité de S. Benoît, établie à Paris par H.L.G.D*** (Paris, 1809): 'It is in celestial Jerusalem where they taste a pure unaltered joy: all the sorrows of this world will cease in full view of the eternal splendours; and the sweet chords of music will ring out like hymns composed in the glory of your name. Oh, we shall be happy! If we can hear the concert of your divine cantors, and the hymns with which they honour the almighty and worshipped Trinity' (C'est dans la céleste Jérusalem où elles goûtent une joie pure sans aucune altération: alors toutes les peines de ce monde cesseront à la vue des splendeurs éternelles; et les doux accords de la musique retentiront ainsi que les cantiques composés à la gloire de votre nom. Oh, que nous serons heureuses! Si nous pouvons ouïr le concert de vos divins chantres, et les hymnes dont ils honorent la très-haute et très-adorable Trinité).

45 Thomas Connolly, *Mourning into Joy: Music, Raphael and Saint Cecilia* (New Haven, 1994), 189, suggests that 'the musical organ might have been an eloquent symbol of the instrumentality through which changes were wrought in the human soul'.

46 Voici qui sur terre comme les anges,
Du Dieu de paix, du Dieu d'amour
Célébrez les saintes louanges
Dans vos accords de chaque jour . . .
Aux chœurs angéliques remettez votre lyre
De vous fêter, ils sont jaloux!
Dans leurs divins concerts, ils veulent vous redire
Ce que Jésus a fait pour vous!
(*Ménologe Mère Sainte Clotilde*, 21–2).

47 'Parfois la Mère Directrice montait à l'orgue au milieu d'un offertoire, et trouvant les inspirations de la chère Mère bien supérieures aux morceaux qu'elle exécutait venait lui enlever ses cahiers et lui dire: "Improvisez" ' (ibid., 22).

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produced by the convent organ made some connection to an aspect of the diverse nature of the universe which was then communicated to her. The reflection of the earthly was achieved through the rich sounds of the stops that had clear 'sources', such as the flute, oboe and trumpet. These sounds intermingled with more non-musical sounds that were nevertheless representative of the human world outside the convent such as the mechanical noise of the organ. There were also sounds of the organ that imitated nature, for example, a high flute register producing the effect of birds singing. The high wind pressure of the new organ created a strong impression of wind in the trees or of human breathing. These sounds would sometimes intermingle with genuine natural sounds within the convent.

Finally, there were sounds that could not be classified according to their 'source'. These sounds became reflections of the celestial voices, to which only the ears of the nuns were privy. The most obvious stop without a clear identifiable 'source' was the so-called *Voix céleste* stop, perfected by Aristide Cavaillé-Coll. Although the techniques behind this stop were taken from previous organs, the Barker Lever action ensured that they would sound more powerful and more immediate to the ear than ever before. The *Voix céleste*, now a common stop on the convent organ, used 'narrow-scaled pipes' giving a 'sharp heterodyne effect'.[48] The pipe was tuned lightly sharp or flat producing an ethereal, shimmering quality. It had no obvious earthly 'cause', and would have become known to the nuns through its name, the *Voix céleste*, after repeated hearings. Any disagreeable or unintentional 'noises' from the organ were manifestations of the reality of the world hidden from view. The nasality of the *Voix humaine* or the *Hautbois* could be seen as positive and welcome expressions of the more extreme forms of nature: a person with a horrible voice, a particularly harsh bird-call or even a reflection of the industrially developing outside world. Finally, the *Voix Céleste* could comfortably be interpreted as a celestial voice, able to occur in any number of infinitesimal forms.

The contemplative image of Pasquier drawing the individual sonorities from the convent organ conforms to the strong association of Liszt and Chopin with the Cavaillé-Coll organs of Paris and France. The most prominent of these encounters was Liszt's visit to Saint-Sulpice in 1866 and Chopin's performance on the organ at Notre-Dame-du-Mont in Marseille at the funeral of Adolphe Nourrit in 1839.[49] Yet it is in studying the convent organ directly that the relationship becomes more clearly defined. It becomes clear that Pasquier's aim in music was identical to that attributed by Charles Rosen to the nineteenth-century artist, 'for an illusion of improvisation . . . The relation to the instrument, its mechanics as well as its sound, is all-important here: the improviser often feels as if the instrument itself is creating the music.'[50] As in the world of the nineteenth-century artist, convent art was produced 'not for a purpose but

48 Williams and Owen, *Organ*, 290.

49 Liszt's visit to Saint-Sulpice was reported in the *Revue et gazette musicale de Paris*, 1 Apr. 1866, 102, and Chopin's performance at Marseille in *La France musicale*. See Orpha Ochse, *Organists and Organ Playing in Nineteenth-Century France and Belgium* (Bloomington, Ind., 1994), 34. Liszt would also have been well aware of the Cavaillé-Coll organ in the Pauline Viardot salon as described in Everist, 'Enshrining Mozart: *Don Giovanni* and the Viardot Circle', 172–3.

50 Charles Rosen, *The Romantic Generation* (London, 1996), 40.

because he[she] must – out of an inner necessity . . . it often, indeed, entails a sacrifice of the self'.[51]

In the convent the sounds of the mechanical organ were recognizable as a logical form of discourse to the nuns. This language became meaningful to those who had 'left' the world for a position within a 'heavenly' sphere, and consisted of a variety of organ sounds articulating specific aspects of the universe, natural, human and celestial. The *Voix céleste* stop, for example, was used to symbolize the celestial heavens while the common *Unda maris* stop represented the 'sea waves' of the earth. The articulation of a language through sonority also, perhaps, resembles the foundations of absolute music, the desire to create a 'language *above* language'.[52] In the convent, music was also conceived as a separate 'speech' within a world of its own. Carl Dahlhaus explains that 'if instrumental music had been a "pleasant noise" *beneath* language to the common-sense estheticians of the eighteenth century, then the romantic metaphysics of art declared it a language *above* language. The urge to include it in the central sphere of language could not be suppressed.'[53] Dahlhaus has drawn the conclusion that another 'outside' factor influencing the development of absolute music was poetic language that was 'claimed for instrumental music: precisely because it forms an "isolated world for itself" it is a metaphor for the universe, a tool of metaphysics'.[54] We can equally suggest that the use of musical 'language' in institutional organ music may have interacted with the discussion of 'language' in musical genres more commonly associated with absolute music, such as the symphony or the string quartet.

From an artistic and literary perspective, the extra resonances given to the new organ greatly appealed to the Romantic illustration of distance particularly through the acoustic echo and 'acousmatic' dimension of the institutional chapel or church nave. The organ, like 'the bell, for instance, is "calling the romantic spirits" because its sound reverberates the longest, just as the horn and the flute carry over long distances'.[55] In his novel *La Duchesse de Langeais*, Balzac describes the feelings of his hero, Armand de Montriveau, as he experiences the sound of the organ in the convent chapel. The character is struck by its ability to express the ineffable through resonance:

> The organ is in truth the grandest, the most daring, the most magnificent of all instruments invented by human genius. It is a whole orchestra in itself. It can express anything in response to a skilled touch. Surely it is on some sort of a pedestal on which the soul poises for a flight forth into space, essaying on her

51 Ibid., 72.

52 Carl Dahlhaus, *The Idea of Absolute Music*, trans. Roger Lustig (Chicago, 1989), 9.

53 Ibid., 9.

54 Ibid., 144.

55 Berthold Hoeckner, 'Schumann and Romantic Distance', *Journal of the American Musicological Society*, 50/1 (Spring 1997): 55–132. Also see the quotation on distance from Dahlhaus, *Idea of Absolute Music*, 61: 'Everyone will have noticed at least a few times in their life that some otherwise utterly meaningless tone, heard, say, in the distance, has a quite wonderful effect on the soul if the mood is right; it is as though a thousand memories, a thousand dim ideas had awakened all at once with this tone and transported the heart into an indescribable melancholy.'

course to draw picture after picture in an endless series, to paint human life, to cross the Infinite that separates heaven from earth?[56]

The fundamental 'change in the conception of instrumental music . . . the interpretation of "indeterminacy" as "sublime" rather than "vacuous" . . . the "mechanics" of instrumental music [becoming] "magic,"' may be compared to the later application of steam and electrical impulses to instruments such as the organ and their use within such religious institutions as the convent.[57] The technological aspects of the industrial revolution, supposedly in ideological conflict with such sacred worship, and usually seen as manifestations of 'de-sacralization' or 'disenchantment' represented the distant and invisible 'voice' of God. The communication of the divine 'voice' was directly connected to the architectural and cultural construction of nineteenth-century French institutional space, and the activities of its inhabitants.

Institut des Aveugles (Institute of the Blind): Mathematics and Instrumental Rationality

The musical activities of the convent members were hidden from the public's view, confined entirely to the inhabitants of the convent space. At the Institut des Aveugles, however, the public were encouraged to view the students' music-making. The sighted musician came to see, as well as hear, the blind demonstrate their work on mechanical instruments. From the 1883 inauguration of the new Cavaillé-Coll organ in the Salle des Concerts at the Institut des Aveugles it was possible for sighted members of the audience to view the blind organist manipulating the stops. Paganini, a one-time visitor of the Institute, commented on the *sight* of blind musicians playing together. In her book on the blind, the writer Eugénie Niboyet reported that Paganini 'had never heard anything so well executed as an ensemble'.[58]

Despite the atmosphere of acoustical resonance within the Institute, the students themselves were under strict visual and aural surveillance. Surveillantes slept alongside them, going to their classes and restricting their letters, food and outside contact to a minimum. These Surveillantes were themselves under visual control by the director who granted them restricted free times.[59] Rules involving sound control at the Institute were more numerous than those in a regular *pensionnat règlement*. Blind children had privileges withdrawn if they made any type of random noise either in orchestral rehearsals or in the corridor. During mealtimes, cutlery and eating noises were consciously covered by a lecture by a sighted person.[60] The control of the physical body by stipulating ordered mechanized movement evoked the desire of the state to instil moral discipline into its institutionalized subjects. This was often achieved through

56 Honoré de Balzac, 'The Duchess of Langeais', *Great French Romances*, ed. and trans. Richard Aldington (London, 1946), 536.

57 Dahlhaus, *Idea of Absolute Music*, 63.

58 'il n'avait jamais entendu rien d'aussi parfaitement bien exécuté comme ensemble' (Eugénie Niboyet, *Des aveugles et de leur éducation* (Paris, 1837), 166–7).

59 *Institution royale des aveugles: Règlement d'ordre intérieur*, 1843, 19, Paris, Archives of the Institut des Aveugles [hereafter A/IA].

60 Ibid., p. 3, 8–9.

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the use of mechanical machines placed within the institution. In 1782 Claude-François Berthelot explained that the physical action of the pedal crane (an enormous piece of agricultural machinery operated by pedals) was necessary to 'obtain for the unfortunates a resource against idleness, inexhaustible source of vices desolating society'.[61] Artists, amongst others, were advised 'to find in this work ideas suited to constructing other machines by the application of the same principles used by Berthelot'.[62] French organ builders of the nineteenth century followed his advice by expanding the whole-body experience of organ playing through such inventions as the combination pedal, 'a system for operating manual couplers by foot'.[63]

The potential 'contribution' of the blind to the industries was the reason behind the government's decision to separate institutionally the young blind from the young deaf in 1795.[64] The association between music, as a skilled activity, and the blind was cultivated in the institution from the beginning. The first book of curricula for the blind, *Essai sur l'instruction des aveugles*, by the first director of the Institute, Sébastien Guillié, demonstrates the inclusion and importance of music within the institutional framework (Fig. 4).

By the end of the nineteenth century, music became the most important 'industry' cultivated within the establishment. The shift of emphasis from labourer to musician is shown in the 1889 *Règlement* specifying that a student would be rejected from the Institute after 18 months if shown to be unsatisfactory at music. Like many lower-skilled sighted craft workers in France, blind manual workers had been negatively affected by the introduction of manufacturing technology during the nineteenth century. Sizeranne implores the reader:

> Ask how much money one or other of these professions yields each day when you visit a school for the blind, especially a school extolling excellence in manual work: you will assuredly be given a suitable figure, for example 2 francs for women, 3 or 4 francs for men. But be inquisitive: ask for the name and address of a few former students engaged in these professions . . . sit down for a moment and ask them, it is instructive, you will see that they have never received the famous figure for a day shown above. The work is irregular, only three days a week; time is lost in the search for work; paymasters cheat workers, pay is only increased through competition.[65]

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61 'procurer aux malheureux une ressource contre l'oisiveté, source inépuisable de vices qui désolent la Société' (Claude-François Berthelot, *La Mécanique appliquée aux arts, aux manufactures, à l'agriculture* (Paris, 1782), 11).

62 'trouveront, dans cet Ouvrage, des idées propres à construire d'autres machines par l'application des principes sur lesquels celles du sieur Berthelot sont construites' (ibid., 12).

63 Douglass, *Cavaillé-Coll and the French Romantic Tradition*, 144. See esp. the chapter 'Cavaillé-Coll on Electricity'.

64 See Sébastien Guillié, *Essai sur l'instruction des aveugles* (Paris, 1820), 32, A/IA.

65 'Lorsque vous visitez une école d'aveugles, surtout une école où l'on vante l'excellence des travaux manuels, demandez ce que rapporte, par jour, tel ou tel de ces travaux: on vous indiquera avec assurance un chiffre très convenable, par exemple 2 fr. s'il s'agit des femmes, 3 ou 4 francs s'il s'agit des hommes. Mais soyez indiscret: enquérez-vous du nom et de l'adresse de quelques anciens élèves exerçant ces professions . . . asseyez-vous un moment et interrogez-les, c'est instructif, vous verrez que jamais ils n'arrivent à faire ce fameux chiffre de journée accusé plus haut. C'est le travail qui n'est pas régulier, on n'en a que trois jours par semaine; c'est le temps qu'il faut perdre pour aller chercher et rendre l'ouvrage; ce sont les mauvais payeurs,

ESSAI

SUR L'INSTRUCTION

DES

AVEUGLES,

OU

EXPOSÉ ANALYTIQUE

DES PROCÉDÉS EMPLOYÉS POUR LES INSTRUIRE;

PAR LE DOCTEUR GUILLIÉ,

Directeur-Général et Médecin en chef de l'INSTITUTION ROYALE DES JEUNES AVEUGLES DE PARIS, Chevalier de la Légion-d'Honneur, Docteur en Médecine de la Faculté de Paris, Membre de la Société Royale Académique des Sciences de la même ville; des Académies des Sciences, Belles-Lettres et Arts de Cambrai, Châlons, Caen, Dijon; de la Société de Médecine pratique de Paris; des Sociétés Médicale d'Émulation et de Médecine de Bordeaux, Marseille, Avignon, Évreux, Clermont-Ferrand, etc.

Μέγα βιβλίον μέγα εἶναι κακόν. CALLIMAQUE.

TROISIÈME ÉDITION.

A PARIS,
IMPRIMÉ PAR LES AVEUGLES,
ET SE VEND A LEUR BÉNÉFICE, A L'INSTITUTION,
Rue Saint-Victor, n° 68.

1820.

Fig. 4 Title page from Sébastien Guillié, *Essai sur l'instruction des aveugles* (Paris, 1820) (by permission of the Institut des Jeunes Aveugles, Paris)

The blind were encouraged to 'renounce low-skilled manual professions', and seek 'better salaries in professions demanding higher skill, specialized knowledge, in areas such as engraving and printing'. For the blind 'these more skilled professions correspond with piano tuning, music teaching and organ playing'.[66] Blind women were also included in the pay equation. 'The result', for female organists, 'is infinitely superior to that obtained by the female blind trained exclusively in manual work. In this field it is difficult to receive regularly more than 75 centimes each day for at least 10 hours of work.'[67] Earlier in the century, Niboyet emphasized the seriousness of the musical study at the Paris Institute by mentioning the poor state of musical education at the blind school in Boston where 'music that seems to be always necessary is only taught at Boston as an accomplishment and not as a useful profession'.[68] The emphasis on more highly skilled blind training by the end of the century ensured that blind craft workers were able to interconnect positively with the technology of the age. As Christopher Ansell writes in his recent study of the labour movement during the Third Republic in France, 'technology was used not to decompose crafts, but to make craft labour more productive ... Here productivity gains often came through craft specialisation. Rather than becoming machine tenders, skilled workers in industrial districts became "specialists" in craft production.'[69] For blind women, playing the organ was perhaps akin to supervising a complex new spinning machine or machine-driven cloth mill, and for blind men, weaving, woodcarving or printing (Fig. 5).[70]

Solidarity between highly skilled labour and technology in nineteenth-century France was exemplified in the organ training programme taking place within the Institute. Organ students were required to execute the feat of reading a given plainchant with the left hand on the Braille score whilst playing with the right hand and the pedal – a complex mental and physical exercise.[71] Three graduates of the Institute, Adolphe Marty in 1883, Joséphine Boulay in 1888 and Alfred Mahaut in 1889, had gained the difficult *Premier prix* in the organ

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l'augmentation de la matière première, la concurrence' (Maurice de la Sizeranne, *Notes sur les aveugles* (Tournon, 1893), 215–16).

66 'y renoncent et cherchent des salaires rémunérateurs dans les professions exigeant des aptitudes, des connaissances spéciales comme celles de graveurs, de compositeurs d'imprimerie. A ces professions correspondent pour les aveugles celles d'accordeurs de pianos, de professeurs de musique, d'organistes' (ibid., 205).

67 'Ce résultat est toujours infiniment supérieur à celui obtenu par la femme aveugle, adonnée exclusivement aux travaux manuels à laquelle, il est bien difficile de faire gagner régulièrement plus de ct75 par journée d'au moins dix heures' (Maurice de la Sizeranne, 'L'Enseignement musical pour les aveugles; son origine, son but, ses exigences, son programme, ses résultats', *Présenté au VI congrès d'instituteurs d'aveugles tenu à Cologne en 1888*, A/IA, 19).

68 'la musique, qui semble être pour eux un besoin de toujours, n'est enseignée, à Boston, que comme art d'agrément et non comme profession à utiliser' (Niboyet, *Des aveugles*, 74).

69 Christopher K. Ansell, *Schism and Solidarity in Social Movements: The Politics of Labor in the French Third Republic* (Cambridge, 2001), 64.

70 See Anne Quartararo, *Women Teachers and Popular Education in Nineteenth-Century France: Social Values and Corporate Identity at the Normal School Institution* (Newark, NJ, 1995), 135, for a description of teacher-training school trips to spinning and machine-driven cloth mills.

71 Sizeranne, 'L'enseignement musical pour les aveugles', 4–5.

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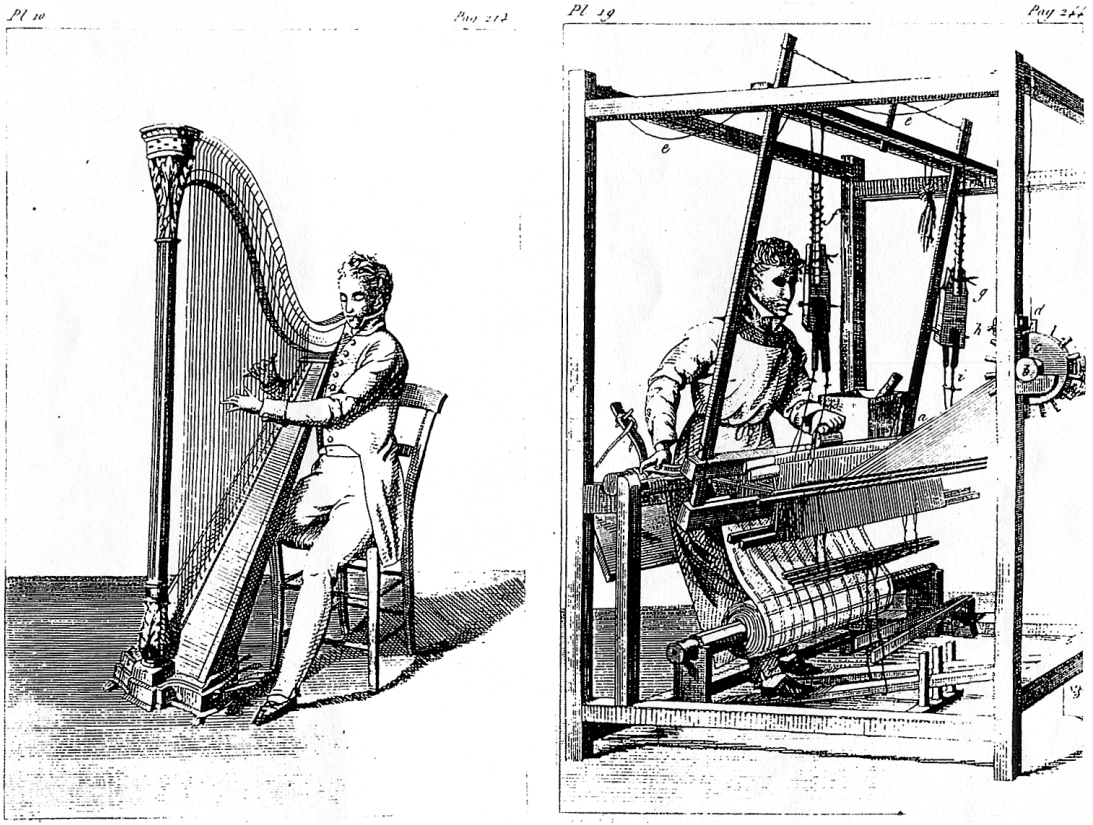

Fig. 5 'De la Musique, De la Tisseranderie', Sébastien Guillié, *Essai sur l'instruction des aveugles* (Paris, 1820), Planche 10, Planche 19 (by permission of the Institut des Jeunes Aveugles, Paris)

class of César Franck at the Paris Conservatoire de Musique. *Le Valentin haüy* reported that their success was evidence of 'the value of the musical teaching given at the Institute'.[72] Boulay, in particular, displayed the harmonic discipline of her former institution at her audition for the Conservatoire de Musique entering immediately 'on the decision of the Director' without completing the prerequisite course in harmony, and received her prize a year later.[73] The president and the chief professor of history at the Institute officially congratulated her at the *Distribution solennelle des prix*. In addition to 'proclaiming the success of Mademoiselle Boulay' the entire Institute was praised for its 'part . . . in this success'.[74] Boulay's teachers at the Conservatoire de Musique had been deeply impressed by her intense abilities in harmony. Franck described her as an 'extremely interesting student' and wrote rather uncharacteristically, 'I hope that she succeeds.'[75] Jules Massenet, who taught Boulay composition from 1894 at the Conservatoire de Musique, described her as a student with a 'very interesting nature'.[76] Both Massenet and his successor, Gabriel Fauré, emphasized her 'remarkable' fugues and 'perfect handwriting',[77] and Charles Lenepveu, her harmony teacher, wrote that she was a 'very distinguished student – remarkable and gifted nature doubled through a solid education'.[78] Such reports reflect to some degree the extraordinary focus on harmonic discipline within the walls of the Institut des Aveugles and its impact on the musicianship of such talented blind students as Joséphine Boulay.

Many writers of the period disputed the notion that the blind were creative, instead believing that logical processes more closely characterized the blind person's nature. Mathematics and memory were important factors behind the emergence of the organ as the most successful instrument taught at the Institut des Aveugles. Memory was a fundamental factor in the musical training of the blind, since, according to Sizeranne, 'the blind musician cannot have too much music inside his head and fingers, this is an incontestable fact'.[79] The use of memory was fostered alongside almost instantaneous playing from musical dictation via harmonic symbols. Indeed, the musical training received by the organists at the Institut des Aveugles began with the obligatory harmonic sequences of classical principles of strict functional harmony.[80] The hundreds

72 'prouvent la valeur de l'enseignement musical donné à l'Institution' ('Nouvelles et renseignements', *Le Valentin haüy* (Oct. 1889)).

73 *Contrôle des élèves* (1886–91). AN AJ/37/393.

74 'Mon premier but, en formulant cette revendication, est de proclamer le succès de Mlle Boulay et de rendre à chacun la part qui lui est due dans ce succès' (*Distribution solennelle des prix: Institution royale des jeunes aveugles, introduction* (1887–88), A/IA).

75 *Enseignement. Examens. Rapports des professeurs [Conservatoire de musique] sur leurs élèves pour les examens, 1842–1905*, Classe d'Orgue (9 Jan. 1888), AN AJ/37/291.

76 Ibid., Classe de Composition (9 June 1894, 4 Jan. 1895), AN AJ/37/294.

77 'excellentes fugues et quelques compositions vocales religieuses et d'un très pur sentiment et d'une parfaite écriture' (ibid., Classe de Composition (29 Jan. 1897, 17 June 1897), AN AJ/37/295). Blind students were still required to write by hand.

78 'élève très distinguée – nature remarquable douée et doublée d'une solide éducation' (ibid., Classe d'Harmonie (1892), AN AJ/37/293).

79 'le musicien aveugle ne saurait avoir trop de musique dans la tête et sous les doigts, c'est un fait incontestable' (Sizeranne, *Notes sur les aveugles*, 173).

80 Jean-Philippe Rameau's treatise on functional harmony *Code de musique pratique* was one predecessor of such rigorous training, and is notably intended as a tool for a blind musician; Jean-Philippe Rameau, *Code de musique pratique ou méthodes pour apprendre*

of musical scores transcribed into Braille in the library (including the entire works of J. S. Bach) resembled mathematical symbols.[81] Joséphine Boulay had achieved her *Premier prix d'orgue* at the Paris Conservatoire de Musique through the use of the Braille system. This had been developed earlier in the century at the Institute by Louis Braille while he learned the organ at the building in the rue Saint-Victor.[82]

Founded in the early 1820s, the organ class required three years of *solfège* preparation and then three years of harmony preparation.[83] Even at the Conservatoire de Musique organists were able to commence organ study before serious harmonic training. Sizeranne advocated 'a strong technical culture consisting of a profound knowledge of *solfège*, harmony and at least some notions of composition'.[84] Students began at age five, practising two hours a day, and by age 15 were studying for six hours a day.[85] By the time most students entered the organ class, they had already been playing the piano or harmonium for several years.

The organ programme itself was based on that used by the Ecole Niedermeyer, the most intensive Parisian training school for sighted organists. Sizeranne explained that there were three divisions of diplomas for organ: the first division, with distinction, the second, with high distinction, and the third with the highest distinction. For the diploma of the first degree, students were required, in the examination room, to: '1) compose a four-part fugue on a given theme, 2) compose for a liturgical choir with obligatory organ part on a given text, 3) answer questions on liturgy and religion, 4) answer questions on the history of sacred music.' Behind closed doors at the organ students were required to: '1) improvise preludes on a given plainchant, 2) accompany plainchant, 3) realize florid counterpoint and pedal part on a chorale melody by J. S. Bach to be placed in the soprano.' The diploma of the third degree was identical except that in the examination room candidates were required to compose florid counterpoint. In order to achieve all three degrees candidates had to: '1) play an organ piece given to them eight days before the examination, 2) 'sight'-read from Braille transcription, an organ piece with pedal part, 3) improvise in church style on a given theme, 4) perform an organ piece from the general repertoire, 5) perform a piano piece from the general repertoire.'[86] An

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la musique, même à des aveugles, pour former la voix et l'oreille, pour la position de la main avec une mécanique des doigts sur le clavecin et l'orgue, pour l'accompagnement sur tous les instruments qui en sont susceptibles, et pour le prélude: avec de nouvelles réflexions sur le principe sonore (Paris, 1760).

81 *Livres et autres objets servant à l'enseignment des aveugles* (Paris, n.d.), A/IA.

82 According to Marie-Louise Jacquet, 'L'Ecole française des organistes aveugles depuis la fin du XVIIIe siècle', *Jeunesse et orgue*, 26 (Jan. 1976): 7–13; Louis Braille became an *organiste titulaire* in Paris.

83 Information on certain procedures of organ training was kindly given to me by Solange Salvert on 25 February 1998, at that time the last surviving student of Joséphine Boulay. She was a student at the Institut des Aveugles from 1922 to 1930. For a summary of the musical curriculum at the Institut in the nineteenth century see J. Guadet, *De la condition des aveugles en France* (Paris, 1857), 23–40.

84 'une forte culture technique comprenant la connaissance approfondie du solfège, de l'harmonie et au moins quelques notions de composition' (Sizeranne, *Notes sur les aveugles*, 172).

85 Sizeranne, 'L'enseignement musical pour les aveugles', 6–7.

86 'Enseignement musical', Sizeranne, *Notes sur les aveugles*, 168–9.

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important part of the organ examination was highly disciplined improvisation. For those who controlled the musical education of the blind, the cultivation of the amateur blind organist who 'can never improvise comfortably in the classical plan' was to be avoided at all costs.[87] Blind organists were placed alongside other, non-musical blind graduates with highly skilled training abilities. By the late nineteenth century students were examined primarily on their musical ability and rejected for further admission if found to be unsatisfactory.[88] Niboyet wrote that 'symmetry, which for us is an affair of taste, of convention, for the blind can be only an object of study'.[89] Guillié and Niboyet both reported that the mathematical talent apparently inherent in the blind was most evident in the work of the blind eighteenth-century English mathematician Nicholas Saunderson.[90] Saunderson created a complex mathematical 'abacus' to assist him with his calculations in astronomy.

Thus, the Institut des Aveugles was not only a training-ground for blind musicians of the nineteenth century, but also a self-contained societal unit of Romantic mechanical expression.[91] The mathematically coordinated bodily movements and aural functionalism of the blind organists embodied instrumental rationality itself. This use of mechanical apparatus combining visual movement and acoustical organ resonance was also implicit in the most complex exhibits at the Conservatoire des Arts et Métiers. Léon Foucault was able to measure the velocity of light in absolute terms for the first time using a visual (designed by Paul Gustav Froment) and sonic (designed by Cavaillé-Coll) apparatus, later proudly displayed at the Conservatoire des Arts et Métiers where the procedure was re-enacted.[92] This experiment is of major scientific importance, and demonstrates the direct contribution of an acoustical apparatus, implicit in a prominent musical instrument, to scientific discovery itself. Such an apparatus, however, was also an intrinsic part of the institutional culture of *son et lumière* in nineteenth-century France. One of the most important aims of the institution in nineteenth-century France was to mesmerize the senses through the transmission of acoustical material, often with synchronized visual action. Such mechanical apparatus, fostered in the institution, became the most important vehicle for the transmission of meaningful music in France. Count de Pontécoulant, in his essay on the then recently invented Debain harmonium, explained that the organ wins where the piano loses, and he recommended that all French citizens purchase an instrument for their own personal institution – the domestic home. 'The piano lacks the capacity to sustain sounds. The pianist, deprived of this magic and mysterious power that penetrates the heart so deeply, in despair at his lack

87 Ibid., 177–8.

88 *Règlement général de l'Institution nationale des jeunes aveugles* (Paris, 1889), 4, A/IA.

89 'la symétrie qui, pour nous est une affaire de goût et de convention, ne peut être pour les aveugles qu'un objet d'étude' (Niboyet, *Des aveugles*, 52).

90 For an extensive discussion of Nicholas Saunderson by those at the Paris Institut see Guillié, *Essai sur l'instruction des aveugles*, 98.

91 For the most recent musicological research in this area see Caroline Abbate, 'Outside Ravel's Tomb', *Journal of the American Musicological Society*, 52/3 (Fall 1999): 465–530.

92 See the exhibit at the Musée des Arts et Métiers with an interactive display, Inv. 10177–8.

of power and struggling in vain against it, seeks other ways of exciting the public.'[93]

The relationship between institutional space and historical models of musical development is more immediate that we might think. To approach the institution as a sonic environment is to rediscover a lost musical repertoire, albeit one that was not defined in terms of an autonomous musical work. Indeed, institutional musical practices examined by present-day scholars such as Bergeron, Fauser, Monson and Poole can be situated within this larger 'repertoire'. In nineteenth-century France, the institutional regime allied with the application of increasingly complex musical technology produced a distinctive musical sound world. The institution's inhabitants, the social outcasts or the 'mad' as described by Foucault and Diderot, became active participants and 'performers' in this environment.

Hugo and Balzac described the musical world of the nineteenth-century convent through their own direct observation and listening. Their accounts of the convent as a world of sonorous voices and inspired improvisation is supported by individual reports found in convent archival material. The convent's musical practice epitomized a form of art-religion, the philosophical basis of Romantic music. Simultaneously, instrumental music at another French institution, the Institut des Aveugles, was presented as a pure spectacle of technology and mathematics. This 'industrialized' music, produced on a large and very public scale, reflected the imagined nature and condition of the blind person in nineteenth-century France. Transmitting sonorities in both institutions was the nineteenth-century organ, an instrument with the most complex mechanical design and acoustic diversity. Activated by the entire human body, the organ participated in a specific dialogue of sonority with other human and non-human aspects of the institutional environment. In this way, musical meaning became literally and figuratively inseparable from its surrounding social and physical context.

The Institut des Aveugles and the convent in the rue de la Barouillère stand today only as shells of their former selves, yet they still retain traces of the acoustical qualities that marked their presence in nineteenth-century France. At the highpoint of their cultural prestige, they articulated and defined an essentially Romantic discourse through a wide variety of sonorous means. Through critical attention to their acoustic contexts, the nineteenth-century institution becomes one of the most important 'sounding' tools we have in understanding the cultural practice of Romantic music.

93 'Le piano manque la tenue des sons; Le pianiste, privé de ce pouvoir magi et mystérieux qui pénètre si bien les replis les plus profons du cœur, désespéré de son impuissance et la combattant en vain, cherche par d'autres moyens à impressionner le public' (Adolphe de Pontécoulant, *Brevet d'invention: Harmonium Debain* (Paris, n.d.)).

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