

Music from deafness: what can a clinician learn from Beethoven's late works?

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Abstract

At the dawn of the nineteenth century, Ludwig van Beethoven was at the height of his success, as both a piano virtuoso and a composer.

Beethoven became aware of a progressive hearing impairment probably around 1796-1798, which started probably as a sudden hearing loss in the left ear, with tinnitus, following a typhoid fever-like episode.

In the following years, the hearing loss became bilateral and worsened to a profound degree.

By 1815, due to his hearing loss, he could no longer perform on the piano, his social activity turned into isolation, and he started experiencing depression episodes.

Several causes have been proposed, including otosclerosis, Paget's disease, syphilis, lead intoxication and autoimmune diseases, none of them could be definitely proven.

During his illness, he also attempted rehabilitation strategies, including ear trumpets and the so-called *Gehörmaschine*.

Beethoven's late works have been rising interest and curiosity in critics and musicians since the time they were written. They are characterized by dramatic contrasts of character, style, meter and tempo, and they explore a novel concept of compositive continuity in binding themes and movements to one each other.

Regarding the impact of deafness on his compositions, a clear border between the mere consequences of a hearing impairment and the artistic evolution of a great composer cannot be defined. However, it may be rational to consider that the impossibility to hear his compositions may have allowed him to disregard the musical conventions of his time and to find a truly personal and innovative way of expression.

Keywords: Beethoven; Hearing loss; Music; Hearing rehabilitation

Introduction

At the dawn of the nineteenth century, Ludwig van Beethoven was at the height of his success, as both a piano virtuoso and a composer. He was an affirmed and renowned soloist, and his compositions were frequently played and appreciated all over Europe.

Fifteen years later, he could no longer perform on the piano, his social activity turned into isolation, and he started experiencing depression episodes.

As it is well known, the main cause of such a dramatic change in his life resided in the progression of his hearing loss, which brought him to an almost complete deafness by the end of his life.

Yet in 1812, after meeting Beethoven for the first time, Goethe wrote to Carl Zelter: "His talent astounded me; nevertheless, he

unfortunately has an utterly untamed personality, not completely wrong in thinking the world detestable, but hardly making it more pleasant for himself or others by his attitude. Yet he must be shown forgiveness and compassion, for he is losing his hearing, something that affects the musical part of his nature less than the social. He is naturally laconic, and even more so due to his disability" (Goethe 2016).

Also in the following years, despite an even deeper hearing loss and a subsequent further psychological and social deterioration, his contemporary audience noted that his creativity as a composer continued to evolve, reaching its peak with his last symphonic works.

Generally, the 19th century audience appreciated even Beethoven's his last and most experimental chamber music works, although some contemporary critics misunderstand the unconventional and astonishingly modern harmonic solutions employed in his last quartets for mistakes he would never have done if he only could hear his own music. A contemporary musical revue reported on the premiere of the String Quartet op. 130: "The reviewer does not dare to interpret the sense of the fugal finale; for him it was incomprehensible, like Chinese. If the instruments in the regions of the south and north poles have to struggle with gigantic difficulties; if each of them is differently figured and they cross over each other *per transitum irregularem* amid countless dissonances; if the players, not trusting themselves, probably also do not play completely accurately, then the Babylonian confusion is certainly complete... Perhaps so much would not have been written down if the master were also able to hear his own creations" (Anonymous 1826).

Also, the other late quartets and the *Grosse Fugue* were misunderstood by contemporary critics, including Francois-Joseph Fétis, Alexander Oulibicheff, and Joseph Frohlich (Wallace 2017).

However, Beethoven's musical evolution despite his worsening deafness fascinated the next generation of critics, and musicians.

Wagner, in his enthusiastic essay on Beethoven, develops the thesis of deafness as a mean to sharpen his musical genius: "A musician sans ears! Can one conceive an eyeless painter? But the blinded Seer we know. Tiresias to whom the world of Appearance has closed itself... his fellow is the deaf musician who now, untroubled by life's uproar, but listens to his inner harmonies, now from his depths but speaks to that world, for it has nothing more to tell him. So is genius freed from all outside it, at home forever with and in itself" (Knittel 1998).

Such "Beethoven renaissance", sustained by musicians of the subsequent generation, lead also to the formulation of a number of theories, conjectures and legends on the intimate link between Beethoven's creativity and illness.

Although a large number of biographies, and chronicles focusing on Beethoven's deaf-

ness are available, the reliability of the information they report remain controversial and hardly assessable.

This work aims to review available documents and Beethoven's own letters and musical works to find insight about the clinical characteristics of his deafness, the hearing rehabilitation strategies he attempted, and the possible impact of hearing loss on his compositions.

Clinical features of Beethoven's deafness

Beethoven became aware of a progressive hearing impairment probably around 1796-1798, as can be deduced by his personal correspondence with his friend and physician Franz Gerhardt Wegeler. In 1801, the composer wrote to his friend: "For the last three years my hearing has grown weaker and weaker... I cannot hear the high notes of instruments or voices... I can hear sounds, but I cannot make out the words".

His hearing loss has been reported to have a unilateral onset, affecting the left side earlier than the right one, with an invalidating tinnitus. Thayer, in his biography of Beethoven also reported that hearing loss started just following a typhoid fever-like episode in 1796, during which the composer suffered from severe abdominal pain (Thayer 1967).

Regarding the clinical features of his hearing impairment, the composer wrote to Franz Gerhardt Wegeler: "My ears are buzzing and ringing perpetually, day and night... I hear none of the high notes of instruments or singers... I often can scarcely hear a person if speaking low; I can distinguish the tones, but not the words, and yet I feel it intolerable if anyone shouts to me" (Thayer 1967).

In another letter to the same friend, he wrote: "The ringing and buzzing in my ears have certainly rather decreased, particularly in the left ear, in which the malady first commenced, but my hearing is not at all improved; in fact, I fear that it is become rather worse" (Thayer 1967).

From an audiological point of view, this seems to support the idea of a sensorineural hearing loss, involving principally the high frequencies, associated with tinnitus and pitch and loudness distortion.

Further insights supporting such clinical interpretation may be provided by L. Spohr, who described a rehearsal of the celebrated D-Major "Archduke" Trio, held in 1814, during which Beethoven could hardly play the piano in an intelligible manner. Spohr reported: "As at the time I made Beethoven's acquaintance, he had already discontinued playing both in public, and at private parties; I had therefore but one opportunity to hear him, when I casually came to the rehearsal of a new Trio (D-Major $\frac{3}{4}$ time) at Beethoven's house. It was by no means an enjoyment; for in the first place the pianoforte was woefully out of tune, which however little troubled Beethoven, since he could hear nothing of it, and, secondly, of the former so admired excellence of the virtuoso, scarcely any thing was left, in consequence of his total deafness. In the forte, the poor deaf man hammered in such a way upon the keys, that entire groups of notes were inaudible, so that one lost all intelligence of the subject unless the eye followed the score at the same time. I felt moved with the deepest sorrow at so hard a destiny. It is a sad misfortune for anyone to be deaf; how then should a musician endure it without despair? Beethoven's almost continual melancholy was no longer a riddle to me now" (Spohr 1878). By 1815, the progression of his hearing loss prevented him to continue performing as a soloist. Spohr reports on Beethoven's last concert at the Theatre An der Wien: "Beethoven was playing a new Pianoforte-Concerto of his, but forgot at the first tutti, that he was a solo player, and springing up, began to direct in his usual way. At the first sforzando he threw out his arms so wide asunder, that he knocked both the lights off the piano upon the ground. The audience laughed, and Beethoven was so incensed at this disturbance, that he made the orchestra cease playing, and begin anew. Seyfried, fearing, that a repetition of the accident would occur at the same passage, bade two boys of the chorus place themselves on either side of Beethoven, and hold the lights in their hands. One of the boys innocently approached nearer, and was reading also in the notes of the piano-part. When therefore the fatal sforzando came, he received from Beethoven's out thrown right hand so smart a blow on the mouth, that the poor boy let fall the light from terror. The other boy, more cau-

tious, had followed with anxious eyes every motion of Beethoven, and by stooping suddenly at the eventful moment he avoided the slap on the mouth. If the public were unable to restrain their laughter before, they could now much less, and broke out into a regular bacchanalian roar. Beethoven got into such a rage, that at the first chords of the solo, half a dozen strings broke. Every endeavour of the real lovers of music to restore calm and attention were for the moment fruitless. The first allegro of the Concerto was therefore lost to the public. From that fatal evening Beethoven would not give another concert" (Spohr 1878).

Hypotheses on Etiology of Beethoven's deafness

Many hypotheses have been proposed regarding the causes of Beethoven's deafness.

Beethoven himself associate his hearing loss with the onset of his abdominal pain episodes (Thayer 1967).

On the other hand, apart from his well-known intestinal disturbs, Beethoven also suffered from arthropathy during his youth, from jaundice episodes in 1821, from inflammatory eye diseases in 1823, from chronic pancreatitis, and finally from cirrhosis. The latter condition led him to hemorrhagic complications, including hematemesis and epistaxis, and, finally to a massive ascites in 1826-1827 (Thomas 2020).

Just after his death, the autopsy on his cadaver revealed the hallmarks of cirrhosis and chronic pancreatitis, but provided few elements suitable to solve the enigma about his hearing loss. Dr. Wagner, who performed the dissection, noted in its report:

"Cellulae conspicuae processus mastoidei magni, qui incisura non insignitus, membrana mucosa sanguinolenta, obvelatae erant. Ubertatem sanguinis similem substantia cuncta ramis vasorum conspicuis pertexta ossis petrosi, imperimis regione cochleae, eius membrana spiralis paulum rubefacta conspecta, aequae demonstravit. Nervi faciei valde incrassati erant. Nervi acustici e contrario, corrugati et sine medulla erant. Arteriae auditivae juxta eos decurrentes ultra lumen calami corvini dilatatae atque cartilagosae erant. Nervus acusticus sinister multo tenuior cum tribus lineis albidis

tenuissimis, dexter cum crassiori candida linea e substantia multo consistentiori et sanguine abundantiori in hoc ambitu ventriculi quarti orti sunt" (Wagner 1827).

However, such anatomical description of his inner ear did not provide sufficient elements to draw conclusions on the origin of his hearing loss, lacking also detailed anatomical data of his middle ear structures.

For the last 100 years several interpretations of Beethoven's deafness have been proposed, none of them definitely accepted.

One of the first hypotheses to be explored was otosclerosis (Gradenigo 1921, Frank 1935). The idea of a conductive hearing loss was mainly based on Rattel's reports, in which Beethoven was described as using a drumstick connected to the piano to better hear its sound, during his last years (Rattel 1886). However, Rattel was not a contemporary of Beethoven and nobody else reported this in other recalls on Beethoven's life.

Beethoven's skull thickness, as reported after the autopsy, led some clinicians to hypothesize he was affected by Paget's disease (Asherton 1965, Oiseth 2017), although not all the clinical correlates of his health status are consistent with such diagnosis.

Finally, syphilis has been proposed as another cause of his hearing loss (Jacobsohn 1927, Domic 2005), although none of his contemporaries mentioned him having such infection and no traces of mercury (at that time widely used as a therapy for syphilis) were found in modern studies on his hair (Martin 2000).

Another field of hypotheses regarded autoimmune diseases, including systemic lupus and Cogan's syndrome (Thomas 2020, McCabe 1979, Davies 1988). Although no clinical hallmarks typical of a definite autoimmune syndrome might be found, Beethoven suffered during his life from arthritis, conjunctivitis and, probably, kidney disease, which may be related to several disimmune syndromes (Thayer 1967).

Finally, chronic lead intoxication (Brotto 2020) was proposed as a possible explanation of both hearing loss and abdominal manifestations. This was also supported by the finding of a lead concentration around 60 ppm in Beethoven's hairs, more than 60-fold higher than the average values (Martin 2000).

The source of such lead poisoning may be found in the low-quality Hungarian wine, usually drunk by Beethoven, which was typically added to lead in order to improve the aroma and taste (an illegal but common practice at the time) (Periccicante 2020).

Hearing aids and rehabilitation attempts

Beethoven, in the second decade of the 19th century, tried several solutions to rehabilitate his hearing function, at least while playing or listening music. As a result, he began to cooperate with Johan Nepomuk Maelzel (1772–1838), a musician and engineer, who developed and manufactured for him several types of ear trumpets, all based on the same principle: the sound entered the trumpet via a wide bell, then it was channeled through a cone-shaped tube, until it reached the ear-piece, which was inserted into the external ear canal.

Maelzel also developed trumpets with resonating chambers, which allowed to concentrate the characteristic tones of the human voice, thus potentially providing more gain in the speech frequencies.

However, Maelzel did not shape the resonance "bucket" as a parabolic dome, rather he made it flat. As a result, such ear trumpet failed to focus the sound waves into the end of the ear tube as efficiently as a parabolic-dome would, and therefore did not provide a maximal hearing gain.

Another ear trumpet model developed by Maelzel had a "salt-shaker" design, characterized by a grill over the resonating chamber.

Periccicante et al. report the hearing gain of a 19th century ear trumpet, similar to those used by Beethoven, as comprised between 15 and 25 dB in the frequencies between 500 and 1700 Hz. However, outside such frequency range, the functional gain was far lesser (Periccicante 2020).

It is unclear whether Beethoven received a benefit from the use of ear trumpets. In a 1814 letter, he wrote: "Herr Maelzel promised me certain hearing aids ... At last, his mechanical aids were completed, but they were not any real use to me" (Thayer 1967, Periccicante 2020). However, just one year later, he stated that Maelzel's ear trumpets were the stron-

gest and he should have different ones in the room for music, speech, and also for halls of various size.

Beethoven used also other devices to use his residual hearing, while playing the piano. In September 1820 he firstly employed the *Gehörmaschine* (hearing machine), built by André Stein to be placed on top of Beethoven's piano. It was a sort of trumpet, like a prompter's box, made in the shape of a bent soundboard of thin wood, with the aim to concentrate the sound waves in the ears of the player (Thayer 1967).

Few years later, Conrad Graf, a master piano designer and manufacturer, created for Beethoven a similar device, the "resonating plate", which, being placed on the instrument, helped to convey its tone more distinctly to his ear (Pericicante 2020).

It is also possible that, since Maelzel's ear trumpets were up to 59 centimeters long, their opening may be attached to a coupling on the resonating plate (Pericicante 2020, Early 1994).

In 1825, Graf constructed also a special piano for Beethoven, with quadruple strings, and with an additional sounding board to increase the volume of the sound. Unfortunately, Beethoven did not receive this piano until January 1826, when he had already completed all his main musical works (Pericicante 2020).

Deafness and composition: Beethoven's last chamber works

Beethoven's late works have been rising interest and curiosity in critics and musicians since the time they were written. They are characterized by dramatic contrasts of character, style, meter and tempo, and they explore a novel concept of compositive continuity in binding themes and movements to one each other. The exploration of unusual harmonic solutions, as well as the renewed interest in counterpoint give to Beethoven's late string quartets a unique complexity.

In such compositions, the traditional formal paradigms seem to transfigure themselves into a unique and individual flux, in which sonata, fugue, and also early baroque elements coexist and follow each other seamlessly.

In brief, such music seems to be much the result of a sublimed reasoning on the art of

composition, rather than simply the attempt to compose by employing the means of musical memory.

However, some contemporary critics considered the evolution of Beethoven's art and the subsequent tendency to overcome the strict rules of the musical grammar commonly accepted at that time as the result of mere mistakes, made possible only by his deafness.

The String Quartet op. 131 (Beethoven 1824) represents a remarkable example of how Beethoven's need to expand the dialectic relationship between different melody lines, has been misunderstood as a lack of awareness of harmony's base rules. In his "Traité complet de La Théorie et de La Pratique de l'harmonie", Fétis stated that "it is certain that a musician of genius, such as Beethoven, would not write the bad harmony of this passage," if he only had known the theory of the formation of chords and their use as enounced by Fétis himself (Fétis 1844).

Lots of examples exist regarding the use of unresolved dissonances in Quartet op. 131. Fig. 1 shows two excerpts from the first movement, in which dissonant harmonies are allowed to stand alone without immediate resolution on a consonant chord.

Anyway, the revolutionary impact of Beethoven's late works was well understood by the musicians of the subsequent generation, who even came to idealize the consequences of Beethoven's deafness on his music, by considering it a mean of artistic sublimation, rather than the disabling illness which the composer actually experienced.

Conclusion

Beethoven's deafness still represents an unsolved enigma for both clinicians and musicologists. Several theories, none of them definitely accepted have been proposed to explain the etiology. Few historical reports are available to characterize the attempts of rehabilitation, which however could not prevent Beethoven to stop his career as a soloist in 1815.

Regarding the impact of deafness on his compositions, a clear border between the mere consequences of a hearing impairment and the artistic evolution of a great composer cannot be defined. However, it may be ratio-

nal to consider that the impossibility to hear and to find a truly personal and innovative his compositions may have allowed him to way of expression. disregard the musical conventions of his time

Fig. 1 Except from the first movement: a) bars 57-59, demonstrating the continuous generation of multiple dissonant intervals between the violon (which contains a progression) and the cello line (which contains a pseudo-progression); b) bars 104-107, demonstrating the extensive use of diminished seventh chords.

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