

The medieval hearing paradigm: insights from Dante's Commedia

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Abstract

At the beginning of the 14th century, the understanding of human physiology was still limited, and relayed mainly on what of the Aristotelian doctrines had been handed out. Nevertheless, several phenomenological approaches to the perception mechanisms were developed. Among the authors that contributed most significantly to the medieval conception of hearing phenomena, Augustin and Severinus Boethius were particularly relevant.

Among the medieval literary works, Dante Alighieri's *Commedia* stands out for the amount and the comprehensiveness of data on the medieval culture and philosophy, which provides to the modern reader.

In this paper, we will try to obtain insights about the medieval idea of hearing from Dante Alighieri's *Commedia*.

In this poem, it is possible to find traces of all medieval theories on hearing, integrated within the text, coherently with the narrative structure, the topic, and the stylistic register.

In particular, in *Inferno*, Dante seems to explore from a phenomenological point of view the topic of noise and its interaction with speech.

In *Purgatorio*, the focus is centered on the concept of time and its relationship with acoustic phenomena. As a result, the principal acoustic phenomenon treated is music.

In *Paradiso*, Dante moves from the description of physical phenomena, to characterize a completely metaphysical setting, in which the soul is the subject of perception, according to the doctrines of Bernard de Clairvaux.

In conclusion, in the medieval culture several theories on hearing coexisted and overlapped, creating a spectrum of concepts that ranged from physical to teleological interpretations.

Keywords: Hearing perception; Dante Alighieri; *Commedia*; Middle Ages; Acoustics.

Introduction

At the beginning of the 14th century, the understanding of human physiology was still limited, and relayed mainly on what of the Aristotelian doctrines had been handed out. Nevertheless, several phenomenological approaches to the perception mechanisms were developed, mainly as part of philosophical theories, which belonged to the late-antique era. Among authors that contributed most significantly to the medieval conception of hearing phenomena, Augustin and Severinus Boethius stand out for relevance.

They both explored the perception phenomena applying to their theological view the paradigms of Aristoteles' theories. Both Augustin and Boethius shared a mathematical approach to the acoustics, which was derived from the ancient Greek tradition, and understood that each sound could be analyzed in light of mathematizable properties.

Referring to the aristotelian concepts of *materia* and *forma*, Augustin stated that the sound (which was *materia* in the acoustic phenomenon) needed to be shaped in terms of pitch and rhythm pattern to become intelli-

gible. The principle of *numerus*, ruling the dominion of the *forma* of the acoustic phenomenon, made it possible to perceive and consciously recognize the sound in terms of mathematical relationships underlying pitch and duration.

Regarding hearing perception, Augustin theorized that an active process made possible by reason was needed to interpret and classify the perceived acoustic stimuli under the mathematizable categories of pitch and rhythm pattern (Augustin, 1992, 1996).

This essentially meant that the medieval culture recognized pitch and duration as fundamental qualities of sound.

Severinus Boethius introduced another important concept for understanding the acoustic phenomena: he described the sound (basically the human voice) as *flatus*, air movement (Boethius, 1990).

However, according to his philosophical theory, the object of hearing was not the sound in its physical sense in terms of *flatus vocis*, but the semantic (or musical) content of the *objectum auditum* that could be recognized due to the mathematizable qualities of the sound. Once again, in the medieval culture, perception was seen as a process in which the stimulus could be interpreted only when teleologically shaped into recognizable categories.

Probably the most relevant contribution to the medieval theories on hearing was provided by Thomas Aquinas, who moved from the Aristotelian and Boethian theories, to develop a novel conception: the hearing process and the recognition of the parameters of sound let not only to understand the mathematical relationships underlying the intervals, but also the concepts of consonance and dissonance (Thomas Aquinas, 1954). This view seemed to shed light on the perceptive phenomena of consonance and dissonance, defining them with paradigms not so different from those of modern psychoacoustics.

Among the medieval literary works, Dante Alighieri's *Commedia* stands out for the amount and the comprehensiveness of data on the medieval culture and philosophy, which provides to the modern reader.

In the present paper, we will try to obtain insights about the medieval idea of hearing from Dante Alighieri's *Commedia*.

Voice perception in background noise: hearing in the *Inferno*

As stated above, the medieval culture tended to characterize under a teleological view the acoustic phenomena. Those sounds which were in a mathematically commensurable relationship between one another (in particular, the diapason relationship, which referred to a 2:1 ratio in length between two strings) were considered as vehicle of the idea of the natural order. Such idea had also an ethical correlate: what appeared to be mathematically harmonic, was also considered as good.

Starting from this cultural background, Dante, in defining the acoustic setting of the *Inferno*, describes the sounds related to the ideas of evil and pain as the opposite of the positive qualities of sound. Consequently, the ordinate relationships in prosody and pitch, as postulated by Augustine and Boethius, were reversed into a confused mixture of sounds.

At the beginning of *Canto III*, Dante provides a first overall description of the hell, basing almost only on auditory elements. The first impression the reader receives is therefore related to the noise and the absence of an ordinate perceiving context:

*Quivi sospiri, pianti e alti guai
risonavan per l'aere senza stelle,
per ch'io al cominciar ne lagrimai.*

*Diverse lingue, orribili favelle,
parole di dolore, accenti d'ira,
voci alte e fioche, e suon di man con elle*

*facevano un tumulto, il qual s'aggira
sempre in quell' aura senza tempo tinta,
come la rena quando turbo spira.*

(Alighieri, 1966, *Inf. III*, 22-30)

Here sighs and lamentations and loud cries
were echoing across the starless air,
so that, as soon as I set out, I wept.

Strange utterances, horrible pronouncements,
accents of anger, words of suffering,
and voices shrill and faint, and beating hands

all went to make a tumult that will whirl
forever through that turbid, timeless air,
like sand that eddies when a whirlwind swirls.

(Alighieri-Mandelbaum, 1980, *Inf. III*, 22-30)

In these verses, the mathematical relationships between sounds are abolished, also in terms of duration and temporal ratio between one another. Moreover, time itself seems to be abolished: in fact, the hell is described in these verses as timeless (*sanza tempo*).

To the modern reader, it may seem obvious how time can affect perception and intelligibility of hearing stimuli, as time has been long viewed as a key concept for speech intelligibility, even in terms of temporal envelop (Apoux, 2001).

Clearly, the medieval culture could not rely on a detailed cognition of acoustic phenomena. However, time was a well-explored concept in medieval philosophy, at least under a phenomenological point of view (*Augustin, Confessions*).

In this passage, Dante seems to provide a sort of demonstration *per absurdum* on the importance of time in hearing perception. In these verses, he tries to figure out how could sounds appear in the absence of the dimension of time. According to his hypothesis, in such a condition, it would not be possible to discriminate between different stimuli, leading to confusion (*...facevano un tumulto, il qual s'aggira sempre in quell' aura sanza tempo tinta, come la rena quando turbo spira [... all went to make a tumult that will whirl forever through that turbid, timeless air, like sand that eddies when a whirlwind swirls]*).

Beside using a powerful association between pain, desperation, and unpleasant sounds, Dante seems also to provide an early comprehensive phenomenology of noise.

The medieval theories had mainly ignored the aspects of noise, which had been only briefly pointed out as the opposite of ordinate sound, and no specific description of it and its relationship with speech and hearing had been proposed by medieval philosophers.

On the other hand, Dante in *Inferno* seems to be interested in noise not only as a structural element of the narrative content, but also as a psycho-acoustic phenomenon. In fact, he provides some descriptions of confounding effect of background noise and speech-in-noise perception mechanisms.

As it is known from the modern psycho-acoustics, the intelligibility of a speech

target among competing talkers can be limited by both energetic masking and informational masking.

The first kind of masking refers to the interference occurring when the competing sounds overlap in terms of loudness with the target and render it inaudible (De Roche, 2017). The latter refers to an interference that cannot be explained in merely acoustic terms, but results from the difficulty in determining which parts of the speech mixture belong to the target (achieving segregation) and difficulties in attending to the right source in the mixture (overcoming confusion or distraction) (Kidd, 2017).

The verses from *Canto III* seem to describe something similar to both masking types. The loudness of the background noise (*alti guai... voci alte... [loud cries... voices shrill...]*) and the competing speech items (*diverse lingue, orribili favelle, parole di dolore... [strange utterances, horrible pronouncements... words of suffering...]*) prevent the listener from obtaining a clear perception of sounds.

In this passage, Dante seems to understand the importance of the interactions between the leading hearing signal and the background, potentially affecting the perceiving effectiveness.

In modern audiology, the determination of signal-to-noise ratio has been raising increasing interest, as it can also be considered as a useful tool to define different auditory conditions and it represents also a possible strategy for evaluating the contribution of auditory status to high cognitive functions (Castiglione, 2019).

Another passage from *Inferno*, seems to depict in a phenomenological manner some concepts related to hearing perception with limitations due to the distance and the background noise, underlining a certain degree of an empirical awareness of a concept not so different from the modern idea of signal-to-noise ratio.

In *Canto XXIV*, Dante and Virgilius hear from the distance a damned, the thief Vanni Fucci, who is shouting at them. As it is known from modern psychoacoustics, in case of decreased intelligibility of spoken messages, due to masking (e.g. noise) or loudness changes (also due to the distance of the speaking source), the segmental content of

the spoken message is often lost, and the listener can rely mainly on suprasegmental features. This can be normally deduced by variations in pitch, loudness and speaking speed. In this case, Dante acutely describes what can happen in a noisy context, while trying to focus on a speaking source from the distance.

*Parlando andava per non parer fievole
onde una voce uscì dell'altro fosso
a parole formar disconvenevole.*

*Non so che disse, ancor che sovra 'l dosso
fossi dell'arco già che varca quivi;
ma chi parlava, ad ire pareva mosso.*

*Io era vòlto in giù, ma li occhi vivi
non poteano ire al fondo per lo scuro;
per ch'io: «Maestro, fa che tu arrivi*

*da l'altro cinghio e dismantiam lo muro;
ché, com'io odo quinci e non intendo,
così giù veggio e neente affiguro*

(Alighieri, 1966, *Inf. XXIV*, 64-75)

I spoke as we went on, not to seem weak;
at this, a voice came from the ditch beyond
a voice that was not suited to form words.

I know not what he said, although I was
already at the summit of the bridge
that crosses there; and yet he seemed to move.

I had bent downward, but my living eyes
could not see to the bottom through that dark;
at which I said: "O master, can we reach

the other belt? Let us descend the wall,
for as I hear and cannot understand,
so I see down but can distinguish nothing."

(Alighieri-Mandelbaum, 1980, *Inf. XXIV*, 64-75)

In this situation, Dante cannot understand the semantic content of the phrases pronounced by Vanni Fucci, but he can deduce, from the suprasegmental features, that the speaker is agitated and restless, and probably is going to move (*ad ire pareva mosso*).

At the same time, the visual hints which can potentially support the comprehension of semantic content of the communication, appear to be unusable due to the surrounding darkness (*...com'io odo quinci e non intendo, così giù veggio e neente affiguro [for as I hear and cannot understand, so I see down but can distinguish nothing]*). Dante is therefore forced to come closer, to fully understand what Vanni Fucci is saying.

The time-related dimension of sounds: *Purgatorio*

In the second *cantica* of the *Commedia*, Dante provides a careful description of a different hearing perception context. In *Purgatorio*, background noises are not so preeminent as in *Inferno*, and sounds appear to be ordered also according to the time dimension.

In the narrative frame of the *Commedia*, time is an essential dimension for the *Purgatorio*: the souls of Purgatory need to remain there for a given time, in order to expiate their pities.

Moreover, within the narrative structure of the *cantica*, it is easy to find precise references to the exact time of the day in which the action is taking place.

As a result of the stress given by Dante on the dimension of time, music has a preeminent role in the sound landscape of *Purgatorio*.

At the beginning of the 14th century, the idea of time in musical theory was shifting from its traditional conception as an abstract principle ruling the proportion of sounds to a novel view as a concrete parameter related to the actual duration of each single sound in a composition (Cappuccio, 2009).

This was coherent with a simultaneous shift in the musical composition paradigm, from the traditional monodic style to the novel polyphonic one, proposed by musicians belonging to the *Ars Nova* movement.

However, Dante seems to remain still adherent to the traditional concept of time as described in Aristotelian theories. In *Convivio*, Dante states "... *Lo tempo, secondo che dice Aristotile nel quarto de la Fisica, è numero di movimento, secondo prima e poi; e numero di movimento celestiale, lo quale dispone le cose di qua giù diversamente a ricevere alcuna informazione... [Time, as Aristotle says in the fourth book of the Physics, is "number of motion with respect to before and after," and "number of celestial movement" is that which disposes things here below to receive the informing powers diversely...]*" (Alighieri, 1988).

Such an idea of time is probably implicit also in the *Commedia* and is consistent with the type of music Dante refers to in *Purgatorio*.

From the beginning of the *cantica*, Dante uses a peculiar narrative technique, directly

mentioning the musical piece which he refers to. Clearly, the music of the cited pieces should be widely known to the public at that time and this narrative expedient was able to induce the reader of the Middle Ages to mentally recall the cited motifs.

The music described in *Purgatorio* is mainly sacred music, composed according to the style of the Gregorian chant. It consists in compositions in which a melody is sung in unison without any instrumental accompaniment.

Dante describes this for the first time in Canto II, when some souls arrive to the Purgatory shore by boat, singing a psalm:

'In exitu Israël de Aegypto'
cantavan tutti insieme ad una voce
con quanto di quel salmo è poscia scripto.

(Alighieri, 1966, *Purg. II*, 46-48)

"In exitu Israel de Aegypto,"
with what is written after of that psalm,
all of those spirits sang as with one voice.

(Alighieri-Mandelbaum, 1980, *Purg. II*, 46-48)

In such a musical expression, the concept of time is matter of proportion, rather than of absolute values. The homorhythmic style of most these compositions determines that sounds are all equally long (except for the last tune, which is usually longer), but their exact duration is not so strictly specified.

On the other hand, the first attempts of polyphony by musicians of the *Ars Nova* required time to be more precisely identified, to allow the development of counterpoint techniques.

Dante, in Canto II of *Purgatorio*, also provides a description of such a new musical style, when the musician Casella sings the *canzona* [song] "*Amor che ne la mente mi ragiona* [Love, that discourses to me in my mind]", which had been actually written by Dante himself and firstly reported on his *Convivio*. Probably, the music of this *canzona* [song] was written using the novel polyphonic style, according to the *Ars Nova* principles.

'Amor che ne la mente mi ragiona'
cominciò elli allor sì dolcemente,
che la dolcezza ancor dentro mi suona

Lo mio maestro e io e quella gente
ch'eran con lui parevan sì contenti,
come a nessun toccasse altro la mente.

(Alighieri, 1966, *Purg. II*, 112-117)

"Love that discourses to me in my mind"
he then began to sing and sang so sweetly
that I still hear that sweetness sound in me.

My master, I, and all that company
around the singer seemed so satisfied,
as if no other thing might touch our minds.

(Alighieri-Mandelbaum, 1980, *Purg. II*, 112-117)

However, at the end of *Canto II*, this parenthesis of profane polyphonic music is interrupted by Cato Uticensis, who exhorts the spirits to go on with their journey toward the Purgatory Mountain.

In the following cantos, again, further descriptions of Gregorian chant are provided by Dante, who stresses especially the fact that it is performed in unison.

In Dante's view, the late-antique theories on sounds and hearing by Augustin and Boethius were consistent with the acoustic phenomena related to such a musical expression. As discussed above, the late-antique theories on time were considered coherent with this musical praxis, and Augustin's ideas on sound perception as a matter of mathematical proportions was consistent with the actual way in which the Gregorian melodies were composed. In fact, such motives consisted of a series of strict mathematical proportions between tunes, in a similar way to that described by Schenker regarding the construction of *cantus firmus*, in his analysis of the counterpoint doctrines (Schenker, 2001).

Physical hearing and interior hearing: *Paradiso*

In the third cantica, Dante moves from the description of physical phenomena, to characterize a completely metaphysical setting. The human dimension is completely overcome, and therefore the description of physical perceptions gives place to the characterization of a novel perceiving form in which the individuality and identity are labile, and the main perception paradigm is synesthesia rather than a unique modality.

Such a change in the narrative perspective is remarked in the following verses, which remark the ineffability of transcending the humane limits

*Trasumanar significar per verba
non si poria; però l'esempio basti
a cui esperienza grazia serba.*

(Alighieri, 1966, Par. I, 70-72)

Passing beyond the human cannot be
worded; let Glaucus serve as simile
until grace grant you the experience.

(Alighieri-Mandelbaum, 1980, Par. I, 70-72)

Although the description of physical acoustic phenomena could be extraneous to such a narrative context, the implications of medieval perceiving theories remain central in *Paradiso*.

For medieval philosophers there were two different planes of perception: the physical one and the inner one, which was related to the ability of soul to enter in contact with the semantic and the emotional content of the stimuli. In Dante's *Paradiso*, the understanding of the teleological meaning of sensory stimuli is often not just the result of a unimodal perception. Rather, it is a synesthesia process, as can be deduced by the following examples:

*E io udi' ne la luce più dia
del minor cerchio una voce modesta*

(Alighieri, 1966, Par. XIV, 34-35)

And I could hear within the smaller circle's
divinest light a modest voice

(Alighieri-Mandelbaum, 1980, Par. XIV, 34-35)

Ch'io vidi e anche udi' parlar lo rostro

(Alighieri, 1966, Par. XIX, 10)

For I did see the beak, did hear it speak

(Alighieri-Mandelbaum, 1980, Par. XIX, 10)

However, for Dante, hearing represented a privileged mean to understand the theological concepts.

The cultural background of such a view can be found in Bernard of Clairvaux's theories.

The importance of this medieval thinker for Dante's poetry can be easily understood, considering that he was cited into the *Commedia* in form of a character, as the ultimate guide for Dante's journey to the highest heavens.

Bernard thoroughly developed the topic of perception in his theological works. In his *Sermones in Cantica Canticorum*, Bernard emphasized the gnoseological value of hearing, as a privileged mean to understand the natural

order of the world. Similarly, according to Bernard, also the understanding of the religious revelation was necessarily mediated by hearing: "*auditus invenit quod non visus; oculum species fefellit, auri veritas se infudit* [Hearing found what sight did not; appearance deceived the eye, but truth poured itself in through the ears]" (Bernard de Clairvaux, 1895).

It is worth noting that in Bernard's doctrine, the focus shifted from the physical aspects to a theological view, in which the soul was the subject of perception, and the object of hearing was essentially speech or music. In both cases hearing was not considered just a neutral perception of external stimuli, but always as part of a communication process. Also, music in Bernard's view was strongly linked with a semantic content (as discussed above, the sacred music of the time was monodic, and therefore kept the attention of the listener on the text).

According to this teleological view of hearing as a sense for communication, Dante in *Paradiso* seems to limit the use of terms linked to hearing (*udire*) almost only to the narrative circumstances in which a character speaks. In this sense, in the third *cantica*, hearing means listening to a speaker, and there is no place for unfinalized sounds.

Conclusion

The medieval man could not rely on physiology concepts sufficient to explain hearing mechanisms.

The medieval philosophical theories, however, provided several interpretations of hearing and its gnoseological correlates. In the medieval culture, therefore, these theories coexisted and overlapped, creating a spectrum of concepts that ranged from a physical interpretation of the acoustic phenomena based on the mathematical models belonging to the ancient Greeks to a teleological view of hearing as a process in which the soul could become aware of religious revelations.

Dante's *Commedia* represent a summa of the medieval culture and provides to the modern reader countless hints on how a man from the Middle Ages could interpret phenomena. As a result, in Dante's *Commedia*, it is possible to find traces of all medieval theo-

ries on hearing, integrated within the text, coherently with the narrative structure, the topic, and the stylistic register.

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