

Original Contributions - Originalbeiträge

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Acoustic Depth

For Paolo Bozzi

Introduction

Acoustic depth is a perceptual parameter that indicates the thickness a sound acquires compared to the surrounding sound processes. It is an essential yet fleeting indicator, as it touches upon the realm of emergent perception or perceptual focus in a peculiar way. The context in which these forms of recognition operate links media theory to perception theory and to aesthetic reflection.

To illustrate this topic with a straightforward example, we are accustomed to recognizing that acoustic space can be formalized through two sides: right and left. However, we encounter difficulties when asked to compare the depth of one sound to another or to explain the near-far dialectic in sound perception. These factors are crucial in spatial orientation processes, but they are structurally opaque.

This is not a measurement problem: any audio system manufacturer can quantify the dynamic extremes through which a sound is presented as oppressive or remote, and there are now mathematical systems of equations capable of indicating the extremes of an acoustic space and quantifying them. The problem lies within the modes of perception and takes form when a sound is focused on within the acoustic environment that surrounds it. We are very familiar with the approach of an ambulance, from its announcement as a distant sound to the intolerably intrusive dimension that compels us to cover our ears to mitigate its presence.

Although mathematical indices can be used to analytically describe all stages of the process, on a phenomenological level, the accounts do not add up. Sound variation involves not only an increase in decibels but also an increase in presence, an accentuation of the thickness of the sound mass on the timbral plane, and the development of a tactile sense of oppression that often draws the listener into the acoustic scene. It's clear that this chain of phenomena cannot be reduced to merely the increased impact of the stimulus; rather, it activates complex associative networks.

The complexity of the question also extends to a descriptive aspect: the factors of increase and decrease in sound thickness are expressed in metaphorical language.

Practical, tactile components build a lexicon of experience that allows us to describe acoustic stimuli and measurements through an imaginative interweaving of spatial elements and sound processes.

Expressions such as acoustic scene, depth or sharpness of sound, or, the last, acoustic image when discussing the receptive forms of various microphone models, are just a few instances where imaginative synthesis translates the sense of phenomena that arise from the resistance of sensitive properties to the structures of linguistic formalization. The language of media is full of these references, which seem to refer back to a plane of common sense that addresses the differentiation of perceptual channels. However, this is almost never clearly explained, except in the research of Gibson or, on the opposite front, David Marr. I would like to propose an interpretation of this theme by discussing two examples: one from Gustav Mahler's *First Symphony* and another from the concept of *Acoustemology* by Steven Feld. Additionally, I will mention the applications that this research develops in the field of hearing aids.

Opening of deep space

It is not easy to explain how the idea of depth can be formed in the world of acoustic phenomena or within the complex plane of musical form. Often, music, especially in musical theater, must stage the sound dramaturgy of distance. It's hard not to think of the many stagings of the close-far relationship, or the extraordinary evocation of the sound of horns that opens the second act of *Tristan und Isolde*. How does the occurrence of dynamics in sound articulate? In a deep observation, Giovanni Piana tried to explain it this way:

In the case of a piece of music, there are certainly no interpretations that lead to actual movement. However, it is necessary to recognize that in these variations of intensity, even in the pure sound phenomenon, the sense of near and far, of distance and approach, remains understood. *Pianissimo*: far away; *Piano*: closer; *Mezzo Piano*: even closer; *Mezzo Forte*: almost close; *Forte*: very close; *Fortissimo*: It's coming at me. We don't know what it is, nor do we care to know (Piana, 2013, pp. 59-60).

In its essentiality, this is a rich comment: it captures in a lightning-fast way how many complex relationships are inscribed in the immediacy of listening. Whether on an immediate level, as the expression goes in the pure sound phenomenon, you become part of the process only when you move beyond the concrete resonance of the instrument, which makes us feel the trace of a movement around or towards the listener.

From *pianissimo*, which is the distant, to the skin, which is the near, the sound process encircles, tracing around the listener the outline of a space: as the intensity

increases, the sound becomes closer. This character is also inscribed in the dynamics and intensity that accompany its emission. The simplest conclusion we can draw from this is that space, in musical sound or in noise, is becoming, constituting itself as a movement that implies a depth of origin.

In Piana, however, the leaning or retracting is linked not only to the force or fragility that integrates the sound processes into the context from which they emerge, but also to an explication of the movement towards that accompanies the emission. The *piano* dynamic indication, which seems to carry with it the idea of distance, can become the image of weakness, of something weakened by distance, of a decay of sound that can now take on a spatial sense, now a temporal value, now a timbral color: it is difficult to think of a strident *pianissimo* (Piana, 1991, p. 62).

Similarly, by manipulating the instrumental ratio through recording media, the character of the piano can evoke the idea of magnification. If a microphone amplifies the tonal character in the plane of a voice or an instrument, it creates the effect of an unnatural magnification that looms over the listener, imposing itself like a cone that swallows inward, as happens with a recorded performance that remodels the presence of a singer or an actor engaged in *pianissimo*. A few words can capture distance, timbre, and character.

Let us take another example, where the theatricalization of sound is not linked to an explicit dramaturgy. In Mahler's *First Symphony*, a fanfare is played as if it were a sound at a great distance; it suddenly fades away. This corresponds to a drawing of the oboes that closes, dying out. There is certainly a content aspect in these alternations, a way of looking at nature as immediate birth and then death, which refers to the passivity of the reception of sound: the listener barely has time to capture sound profiles in the distance before they are erased.

The cadential representation of the oboes creates a sort of response to the signal, the meaning of which is not easy to understand: it is difficult not to think that this fanfare is a trace of human presence and that the cadence traces a sort of response to that signal, as a response from within nature in front of the presence of man – a mute and unreflective jolt, merely gestural, and therefore expressive in an almost primary form. And, in the opening of this deep dialectic, the way in which the temporal value accompanies the emergence of sounds on the scene, or their retraction, has considerable weight: 'dying' indicates a sound that gradually loses strength until it disappears.

The figuration of fanfare passes in the distance, a fading distance, bringing to the foreground what was previously in the background after its sudden disappearance. The slow extinguishing of the oboes makes us feel the remoteness of the fanfare, its shining and its extinguishing: the erasure of the nearby is intertwined

with the distant. We might add that in this context, the sense of depth is played out between these markers, between these sounds that have distance inscribed in the dynamics of their presentation.

The entrance of the first fanfare identifies at least two sound planes, creating a qualitative diversification of the resonance space of the music and, therefore, altering the spatial balances in which the listener is ideally located. The significant work of attenuating the dynamics, in fact, must be able to satisfy at least two conditions.

The first, of course, is certainly to bring the listener closer to the iridescent consistency of sound events, imposing a particularly participatory listening, as happens with sounds at half-voice. The second is a direct consequence of the first: by working on the multiplication of sound planes constructed with a soft, rarefied dynamics, the listener approaches the onset plane of the sound, at the moment of its formation, working on absolutely tenuous fibers that are still able to differentiate in terms of near and far, of *piano* and *pianissimo*. It is the emergence of a sound of nature (*Naturlaut*), a distant acoustic processuality, that seems to prompt an acoustic zoom. We are, in short, on the threshold of a perceptive illusion, which accompanies the opening of a wing of the theatrical stage, which in turn opens the sound box of origin. In the first draft of the *Symphony*, this section was designed for two pairs of muted horns: in the final edition, however, the establishment of the double *piano* is entrusted to three clarinets, including bass clarinet, that play *pianissimo* in the lower register, resulting in an impressive softening of the attack (cf. Figure 1).

In this way, greater control of the sound is achieved, leading to a listener involvement that is both more powerful, and more gradual. The poetic intention

Fig. 1. Fragment of Gustav Mahler's *First Symphony* (1).

seems to truly manifest towards the depths of the musical space in which the awakening of nature is developing. If the fanfare refers solely to the human element – something that should be clearly demonstrated and of which we partly doubt – we should observe how it presents itself as far, far away, like an echo barely perceived on the level of the constitution of Nature, yet still necessary. Rather than the human element, the music seems to bring on stage the voice of *Remote*, that the clarinets draw in the depth of a musical space, which is moving backwards. The making of space in the stage implies that the scene begins to dig: it's a surprising effect, achieved by camouflaging the timbre of the horns and entrusting it to a different class of instruments.

Swallowing the listener

Even this theatricalization does not seem to satisfy Mahler, and the impossibility of saturation is intertwined with the emergence of the semantic ambiguity brought into play by meaning ambiguity of word *Laut*: the sound is distant, but already makes itself felt on the plane of the horizon. The figure looms, it has been recognized, but the graduality of the awakening of nature tries to regain the upper hand.

Immediately, following this closing gesture, the tempo accelerates: a second trumpet fanfare emerges, but this time the spatial arrangement is even more complex. It's not just about the movement of the performers; there is a deliberate consideration of the space in which the music is represented and its ability to transcend the traditional relationship with the audience. Here, in its most minimal form, we find an example that establishes a zero level of depth: Mahler's writing allows the scene to recede before the listener, drawing them inward.

The trumpets are all offstage, and dynamic is *pianissimo* (*pp*) for all three instruments, yet they have the task of suggesting the impression of a strong sound in the distance. This creates a stratification that alludes to spatial depth. The environments, the anthropological places, and the soundscapes must seem far away, beyond the edge of the horizon, while the traces of human presence emerge as shadows or echoes of voices.

From a musical point of view, this artifice is paradoxical. Imposing such an articulated timbre-spatial differentiation on the trumpet sound creates an additional perspective effect within the fanfare itself. Musically, the evocative effect of distance has now reached its most precise articulatory form: we observe at least three forms of departure from the sound plane maintained by the strings. In this retreat from the sound source, there arises the necessity for a rule of progression: only this allows the depth to become perceptible, gradually opening wide before us. This radicalization is surprising and even more astonishing in the

Fig. 2. Fragment of Gustav Mahler's *First Symphony* (2).

Fig. 3. Fragment of Gustav Mahler's *First Symphony* (3).

absence of explicit dramaturgy (cf. Figure 2 and Figure 3). It represents a transcendence, a vertigo¹, a play with the practices of the *Sublime*².

The biggest paradox lies in the fact that the trumpets must play slowly while evoking a strong sound in the distance. In other words, they must play loudly

¹ The interaction between the reference function of the orchestra's responses, which is in front of the listener, the mimetic pianissimos of the clarinets, and the retreat of the offstage trumpets, has many analogies with a visual effect used in cinema, the so-called Vertigo Effect, developed by Hitchcock in the film of the same name. The effect is achieved by zooming a zoom lens to adjust the angle of view (often referred to as field of view, or FOV) while the camera dollies (moves) toward or away from the subject in such a way as to keep the subject the same size in the frame throughout. The zoom shifts from a wide-angle view into a more tighter-packed angle. In its classic form, the camera angle is pulled away from a subject while the lens zooms in, or vice versa: https://en.wikipedia.org/wiki/Dolly_zoom

² For a phenomenological description, see Carlo Serra, 2020, pp. 75-78.

but from a distance, creating a depth effect, in an ambiguous interplay between coming closer and moving away. According to Piana's definitions, something is approaching from afar, while the sound cues of the orchestra, the part that remains on stage, still serve as a reference for the listener. In short, the scene, the window through which the listener hears the sounds, splits in two: the music seems to be simultaneously inside and outside the space of its occurrence. It moves by occupying distant places or, equivalently, by coming from a faraway point beyond the horizon. In this sense, we might say that the music takes on the character of the world, as seen in the example of *Tristan*. However, this world brings the listener to the stage as the protagonist, not the characters of a captivating mythological dramaturgy. The listener is projected into a scene facing a window, emphasizing the extreme form of depth perspective: it unbalances, shakes, and projects the listener into a far-off distance, seemingly engaging the very mechanism of detaching the background from the figure.

This retreat of the sound scene serves to create a field for the emergence of a figure that translates the sense of acoustic perception into a sound process: rather than unity, we should discuss the constitution of place notion.

The looming of depth in listening forms

The wedging of mahlerian space has its roots in the solid soil of experience. The phenomenological structures of listening incessantly engage with this theme as they open to the chiaroscuro world of sound presence. This world is crossed by dynamisms that continuously intertwine games between indices of intensity.

We live immersed in a sound sphere, from which prominent voices emerge. These voices rise from a murmuring silence, a myriad of small noises that contextualize each source like a theatrical backdrop, integrating and allowing its focus (Piana, 1991-2013, pp. 75-76). Without this contextualization, without the buzzing of micro-events and small background noises, our life would appear completely projected out of the world.

No sound experience would be possible without the small sound textures that surround it. The sounds of life are often hidden in the tiny hum of pipes, insects, distant cars, and scattered voices, which characterize continuous processes of emergence, departure, and return. From this granular turbulence, forms of coexistence between sound phenomena continuously emerge, maintaining a non-occlusive character, with surrounding sounds providing a return that constitutes spatiality. Consider the steps that move away or approach, or the acoustic arc formed when a car whizzes by under our windows,

initially faint, then growing louder and louder, almost looming, and then receding.

As proof of this, it is common for the concept of distant, deep space to be conveyed through modes of interference: this illustrates how many aspects of imaginative projection fail to integrate perceptive data. Consider what happens when a car approaches us, creating, with the noise of its engine, an almost total occlusion of the acoustic world in which it is immersed: as the car moves away, and the background begins to recover space and breath around the release of that noise that had flattened the entire acoustic horizon, we clearly feel how that sound is gradually swallowed up by a silence, in which it reverberates more and more weakly, surrounded by a thousand faint sounds that first confuse the profile, and then engulf it.

The penumbra allows the acoustic path of distance to create, as in Mahler, a real bending in the acoustic perception of space, an opening to the deep. We should understand it as the creation of a space, certainly not neutral, that truly conveys a sense of the distant.

These notions apply well to the soundscape of *Bosavi* rainforest, where sounds provide continuous information on the distance, depth, and height of the forest. As Feld explains, the Kaluli interpret these omnipresent sound figures as clocks of everyday reality, interacting with the soundscape through a continuous movement of tuning and detachment, and through an incessant change of perceptual focus. They use auditory zooms that vary from a microscopic perspective to a wide-angle lens, and even to a telephoto lens, following the constant changes in shape and field of the forest's sound textures during daily and seasonal cycles. Reflecting on the visual metaphor of the Vertigo effect, we might view these sonic phenomena as a thickening of the sound texture, or, using kaluli expressions, a spiralling, arching motion tumbling slightly forward thinning, and thickening back again.

Mahler opens the symphony to an acoustic character that unfolds, unbalancing the listener forward, deceiving them, as if the orchestra's acoustic chamber swallows them in an apparent three-dimensionality, putting the world to music. Feld observes (Feld, 1988, p. 80):

In this case, there is perhaps also a synesthetic factor that correlates aspects of sound, texture, space, and movement in a sensorially involuntary and culturally conventional way. In the tropical rainforest, the height and depth of sound are easily mixed. The lack of visual depth cues is combined with the ambiguities produced by different vegetative densities and ubiquitous sounds (such as the roar of water), often making depth feel like height

that moves outward, dissipating in the movement. The «sounding raised above» seems to encode this ambiguous feeling of «upward» perceived as «outward». (Feld, 1988, p. 80):

Here, the theme is proposed in an exceptional situation, but it touches on the grammatical basis of this perceptive problem: how to use depth, and how to distinguish it from pitch? And, above all, what lies behind this problem? For Feld, the sense of acoustic depth seems to lead to the identification of an acoustic sphere inhabited by relational presences, forms of widespread affectivity, which require a relational rereading of the same perimeters of sound: sound is not simply a narration, but it unfolds the breadth of a cultural world that touches the very essence of the human, the memories that sound preserves. «Dulugu ganalan» means, literally, «lift-up over sounding», and it is, among other things, an acoustic-visual metaphor which refers to (Feld, 1988 p. 79):

«Lift-up over sounding» feels like: continuous layers, sequential but not linear; non-gapped multiple presences and densities; overlapping chunks without internal breaks; a spiraling, arching motion tumbling slightly forward, thinning, and thickening back again [...]. «Lift-up-over sounding» is always interactive and relational. By calling attention to both the spatial («lift-up-over») and temporal («sounding») axes of experience, the term and process explicitly presuppose each sound to exist in fields of prior and contiguous sounds. The movement towards the depth of sound opens onto a world of thoughts, ideas, and shared forms in memory and feeling. (Feld, 1988 p. 79).

Feld emphasizes an essential aspect of listening: we move in a world with variable acoustic density, and this expression helps us understand the intricate workings of the acoustic occlusivity in which we find ourselves living, not by choice but by destiny. Certainly, the world of the forest is an exceptional place, but its depth pushes us to reconsider our concept of depth and acoustics. Is this not the essence of anthropological observations, beyond the risk of projection, which is certainly less detrimental than that of alienation?

Likewise, Millet's famous painting *L'Angelus* (1859) relates the visual and acoustic space-time of prayer and work with the salient character of the French rural community (cf. Figure 4). In his rendering of extreme depth, a muted and miniaturized church steeple is acoustically amplified outward, according to the looming spatial scale of an image dominated by peasants at the head of the field (Feld, 2016, p. 129-130):

At last, the acoustic spacetime of the *Angelus* chime and the silent or half-whispered prayer has as its background the visual space-time of the misty glow



Fig. 4. Jean-François Miller's painting *L'Angelus* (1859).

and the distance that separates the spheres of peasant work and domesticity³. (Feld, 2016, as above).

Under a phenomenological point of view, we meet an interpretation of acoustic depth based entirely on contrast and unification, where homogeneity and figure merge, seamlessly, together. This aspect touches on the idea of a relationship of transparency between the senses – not a synesthesia, but an interpretative analogy.

The motivational and cultural aspects that the perception of depth, and this oxymoronic intimacy with the distant, thus pass into the body and the way of understanding the structural aspects of perception, extending towards the plane

³ As is evident, in this revisitation of the acustemological theme, which would deserve a much more in-depth treatment, we arbitrarily make a series of cuts: in Feld, the acoustic theme, reflections on relationality, and conceptual aspects blend together with meticulous and absolute naturalness. We therefore undertake to arbitrarily strip his thought of very deep aspects, capable of constructing a grammar of the philosophy of music, of the perception of the environment in motion, and of the human. The process of synthesis contrasts with the need to adequately address such multifaceted themes. Thus, we can only refer to his texts, or to his archive: <http://www.stevenfeld.net/> Cues present in these notes cannot provide an overview, even a tentative one, of the richness of methodologic and theoretical themes in this passionate work. Here, we are only interested in highlighting the beginning of an issue, capable of fertile developments, under the intercultural and interspecies studies of listening form in depth.

of linguistic expressions, which still convey the powerful impact of this dialectic of emotion and distance.

Hearing Aids and *Resound* System

Let's start with a quote:

The differences and similarities between the incoming sounds to each ear, can be used to increase or suppress ambient sounds at will and allow us to easily shift our attention, between them. Depending on the sound of interest at a particular time, we use inherently different listening strategies, and we can unconsciously switch from one strategy that relies on environmental perception to another, that relies on the ear with the best representation of the sound of interest. Binaural Directionality III offers the most balanced solution to assist natural hearing: an improvement in the signal-to-noise ratio similar to bilateral directional microphones and a significant benefit in ease of listening compared to other directional microphone strategies (Groth, 2020, p. 5).

These words introduce us to a significant catalyst of uncertainty, particularly relevant in media theory and linked to hearing aids: algorithms in prostheses are utilized for predictions, but these predictions can be inaccurate. The crux of the issue lies here: listening involves turbulence, and perceptual focus cannot simply erase the surroundings like in a controlled recording studio environment. Instead, it must accommodate unexpected events, as this is the auditory model to which the deaf community may have limited access.

Incorrect predictions can hinder hearing aid users from hearing what they intend to hear. That's why *Resound* has been focusing for a decade on leveraging technology to enhance the hearing experience in noisy environments while preserving awareness of surrounding sounds, similar to how a person with normal hearing perceives them, according to Jennifer Groth. Groth discusses the unpredictable nature of this challenge, aiming to explore the field of auditory dynamics rather than imposing it on a predetermined model:

In normal listening, a different direction from the front is used in more than 30% of the time. In this study participants also indicated that in certain listening situations the direction of the sound sources was "multiple", to indicate that the sound of interest moved or that there were more reference sounds, or both. Therefore a system that automatically switches in noisy situations to directionality on both ears – although the system includes a mode of speech detection, but can't reduce the audibility of desired sound sources. Though people turn their heads all the time and naturally towards the sound of interest, the environments of the real world are unpredictable and the salient sounds at any given time can come from all directions. [...] To keep up such behaviour requires the attention of

listeners. A person's working memory is limited and, if you spend resources on research and guidance behaviors, less is available for actual listening and the understanding. In view of this, the use of directionality may also be disadvantageous, since it cannot provide the same audibility and the same perception of the surrounding sounds of which have of course experience with normoudenti. (Groth, 2020, p. 7).

In essence, the concept aims to differentiate the omnidirectional microphones that capture environmental sounds from the narrow directionality focused on specific sources, akin to how a stereo system operates. This divides the auditory workload across both ears, alternating between background ambiance and targeted sound sources. The underlying idea, simple yet often overlooked, suggests that omnidirectionality essentially represents a form of broad directionality. The use of four microphones in this system creates a spatialized listening experience, a technical achievement valued by *Resound's* acoustic engineers.

This illustrates how, in the realm of formalization, there is a subtle need for visual integration and metaphorical representation that transcends mere perception. It underscores the synthesis of perceptual imagination as more than a literary device but as a crucial layer of the user experience that the medium must address. So, spatialized hearing indicates the listener's ability to separate the flow of incoming sounds into listening objects, with the result an internal representation of the auditory scene, including the aspect of spatiality.

A listening object is a perceptual estimate sensory inputs from a physical object particular of the external world. For example, among the objects of listening in a kitchen auditory scene there may be sound opening of the refrigerator door, the sound of water flowing into the sink and the sound of an onion being sliced:

The ability to understand these listening objects and place them in space, allows the listener to make choices in quickly and smoothly and shift the attention between such objects. The auditory apparatus must construct such spatial representation putting together multiple information from by ambient sound signals. Among these are the differences in the time of arrival of the sounds to each ear (differences interaural time – ITD), the differences in the sound level in arrival at each ear (interaural level differences – ILD), and spectral information due to the auricle. (Groth, 2020, p. 7).

Head movements, as described in Gibson's theory, make important contributions as the auditory apparatus quickly analyzes how they change the relationship between pieces of information. The interruption of any such information interferes with the perception of space, and it is known that hearing aids can partially or totally distort them. At first sight, an algorithmic approach might seem different from Piana's and Feld's perspectives, but looking forward, it aligns closely with

their seminal idea: auditory space takes shape in the force field drawn by perceptions form.

The work with acoustic prostheses has aspects of extreme interest, particularly for the analysis of a phenomenology of depth. It is remarkable that a qualitative parameter of a perceptual nature engages with the relationships that connect the dynamism of sound textures to the emergence they sustain. This is an important image, even before it is a concept. Sound appears in the perceptual scene fused with the background. This original intertwining, and the perceptual dynamics that inhabit it, are the true object of the algorithm, not the statistical calculation of possibilities.

Conclusion: qualitative and affective gradients in acoustic depth

The disruption of homogeneity and the emergence from the fabric of differences that sustains it is a theme dear to both Husserl's work on the unilateral style of perceptual syntheses and Koffka's classic research. That they present themselves to the modern world of media with such intensity prompts us to close this text with the words of Husserl himself, words that embody a philosophical project yet to be completed:

Affection presupposes prominence (*Abgehobenheit*), above all else, and within the impressional sphere it presupposes that prominence which we could find in it alone, namely, when as before we left out of play every consideration of the distant horizon of forgetfulness and likewise, of course, the realm of rememberings. Thus, prominence was for us a prominence that takes place through fusion under contrast with respect to content. In a certain way, affection is now a function of contrast, although not of contrast alone. Insofar as the most original affection is to be seen as the affection generated in the impressional present, contrast is then to be characterized as the most original condition of affection. Connected to the gradation of contrast is a gradation of affection, but also already a tendency toward affection. The same contrast can, for instance, actually exercise an allure on the ego, another time it can be that the ego will not be reached by the affective tendency. Extremes of contrast are so strong, make such a forcefully efficacious prominence that they drown out, so to speak, all competing contrasts...For example, particular colored figures becoming quite prominent affect us; affecting us at the same time are noises like the sound of a passing car, the notes of a song, prominent odors, etc. All of this takes place at the same time, and insofar as we turn to it alone, listening to it, the song wins out. But the rest still exercises an allure. (Husserl, 2002, p. 185).

Melody calls us in contrast with all that is moving around it. Is allure the object of the algorithm? Of course, but the algorithm works on the perceptive model

of prominence and emergence, because prominence, contrast, and unification all converge in the same moment. We live within a hierarchy of perceptive calls, but they move in a flux.

So, when melody sings *sotto voce*, it is the affective component that comes to the fore. The melody is recognized, and this is a sentimental factor that shapes the sense of perception. It is this factor that organizes the force field of perception toward a weaker stimulus: after all, the interplay of the melodic spectrum in Mahler, and not only in his work, relies on the strength of these connections, not only on the power of the stimulus. Feld's acoustemology, and his interpretation of *dulugu ganalan*, runs in the same direction. The theme of acoustic depth is a vector in these force fields and, at the same time, a descriptive structure that still awaits full interpretation.

I would like to recall that these themes deeply inhabit *Fisica Ingenua*, the seminal book by Paolo Bozzi: this small text aims to remember the beautiful discussions about Gestalt and passive synthesis that he had in front of us, still students, with Giovanni Piana. Those ideas remain fruitful.

Summary

Acoustic depth is an elusive indicator that touches the world of emergencies, or perceptual focus, in a peculiar way. The realm in which these forms of recognition operate indeed links media theory to perception theory and aesthetic reflection. Expressions such as acoustic scene, sound depth or sharpness, or acoustic image when discussing the receptive forms of various microphone models, are just a few cases where imaginative synthesis translates the sense of phenomena arising from the resistance of sensory properties to the structures of linguistic formalization. The language of media is full of these references, which seem to refer to a common sense that emerges in the differentiation of perceptual channels, but is rarely made explicit in a clear manner. To understand acoustic depth's nature, we can use the concept of emergence: every time we hear a sound, that acoustic process is always surrounded by a myriad of small sounds that interact with it.

The notion of emergence can be applied to anything present in the surrounding environment. It can be applied to any configuration that breaks the homogeneity of a perceptual field. So, we can analyze the complexity of this synthetic formation by tracing it back to increasingly simpler synthetic planes. When talking about composition, synthesis, and association, it has already the results of compositional operations and which provided the ultimate or primary material – either term suffices, depending on the direction we choose to take.

These are essential factors in spatial orientation processes, but they are structurally opaque: we'll work on three examples taken from classical music, ethnomusicology, and hearing aids.

Keywords: Acoustic depth, Steven Feld, Passive synthesis, Phenomenology of Music, Resound, Acoustic Dynamics, Listening Forms, Gustav Mahler, Musical Analysis.

Zusammenfassung

Die akustische Tiefe ist ein schwer fassbarer Indikator, der die Welt der Notfälle oder der Wahrnehmungsfokussierung auf eine eigentümliche Weise berührt. Das Reich, in dem diese Formen der Anerkennung operieren, verbindet in der Tat Medientheorie mit Wahrnehmungstheorie und ästhetischer Reflexion. Ausdrücke wie akustische Szene, Klangtiefe oder Schärfe, oder akustisches Bild, wenn über die Empfangsformen verschiedener Mikrofonmodelle gesprochen wird, sind nur einige Beispiele, bei denen imaginative Synthese das Verständnis von Phänomenen übersetzt, die aus dem Widerstand der sensorischen Eigenschaften gegenüber den Strukturen der sprachlichen Formalisierung entstehen. Die Sprache der Medien ist voll von diesen Verweisen, die anscheinend auf einen gemeinsamen Sinn verweisen, der in der Differenzierung der Wahrnehmungskanäle entsteht, aber selten auf klare Weise explizit gemacht wird. Um die Natur der akustischen Tiefe zu verstehen, können wir das Konzept des Auftauchens (Emergenz) verwenden: Jedes Mal, wenn wir einen Klang hören, wird dieser akustische Prozess immer von einer Vielzahl kleiner Geräusche umgeben, die mit ihm interagieren. Der Begriff der Emergenz (Abgehobenheit) kann auf alles angewendet werden, was in der Umgebung vorhanden ist. Er kann auf jede Konfiguration angewendet werden, die die Homogenität eines Wahrnehmungsfeldes durchbricht. So können wir die Komplexität dieser synthetischen Formation analysieren, indem wir sie auf zunehmend einfachere synthetische Ebenen zurückführen. Wenn wir über Komposition, Synthese und Assoziation sprechen, haben wir bereits die Ergebnisse der kompositorischen Operationen und die ultimative oder primäre Materie bereitgestellt – je nachdem, welche Richtung wir einschlagen möchten.

Dies sind wesentliche Faktoren in Prozessen der räumlichen Orientierung, aber sie sind strukturell undurchsichtig: Wir werden an drei Beispielen aus der klassischen Musik, der Ethnomusikologie und den Hörgeräten arbeiten.

Schlüsselwörter: Akustische Tiefe, Steven Feld, Passive Synthese, Phänomenologie der Musik, Resound Systems, Akustische Dynamik, Hörformen, Gustav Mahler, Musikanalyse.

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