



HAL
open science

The Deaf Musical Experience.

Sylvain Brétéché

► **To cite this version:**

Sylvain Brétéché. The Deaf Musical Experience.: Bodily And Visual Specificities: Corpaurality And Vusicality.. Richard Kronland-Martinet; Sølvi Ystad; Mitsuko Aramaki. Perception, Representations, Image, Sound, Music. 14th International Symposium, CMMR 2019, Marseille, France, October 14–18, 2019, Revised Selected Papers, 12631, Springer-Verlag, pp.422-448, 2021, Lecture Notes in Computer Science, 978-3-030-70209-0. 10.1007/978-3-030-70210-6_28 . halshs-03130971

HAL Id: halshs-03130971

<https://shs.hal.science/halshs-03130971>

Submitted on 10 Mar 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

The Deaf Musical Experience

Bodily and Visual Specificities: Corpaurality and Vusicality

Sylvain Brétéché

Aix Marseille Univ, CNRS, PRISM, Marseille, France
breteche@prism.cnrs.fr

Abstract. This paper focuses on the bodily and visual specificities of the Deaf musical experience, by first focusing on the investigation of a fundamental principle of the human experience, the *corpaurality*, that engages to consider the sono-sensitive bodily qualities and the natural hearing modalities of Deaf; and secondly considering the visual dimensions of music, based on the Deaf practices, that reveal a denormalized musical expression, namely the *vusicality*.

Keywords: Deaf people, Deaf musical experience, Deaf listening, Corpaurality, Somato-sensitivity, Vibratory sensation, Vusicality, Vusic, Sign-singing.

1 Introduction

The Deaf¹ relationships to music are often thought to be altered, deteriorated, or reduced because the ordinary consideration of deafness is that of the ‘alteration’. Nevertheless, far from presenting only themselves as ‘impaired beings’ in their capacities of perception and representation of the world, Deaf take on this latter a singular view and, even more singular, give him attentive ‘ear’ and ‘eye’, in tune with its sensitive manifestations.

A priori paradoxical, the ‘Deaf listening’ is yet very real and upset our ordinary conceptions, emphasizing that while deafness is a human condition, it does not reveal

¹ Following the Deaf revendications, I write ‘Deaf’ with a capital D which, as specified by Charles Gaucher, “announces a quest for identity which falls into very precise historicity and is stated in terms which seek to turn the deaf difference into a cultural particularity detached from the physical incapacity which stigmatizes it” [1, p. 17]. In this way, deafness proposes itself as a social and cultural group, where the constitutive dimensions of the community rely on Deaf specific features. In this article, I use the term Deaf to designate all the individuals who claim the Deaf identity and specificities – cultural, sensorial, social, linguistic,... – but also these specificities, which present themselves like particular qualities: “the attitudinal deafness” [2].

For information, around 466 million people worldwide have disabling hearing loss (over 5% of the world’s population – disabling hearing loss refers to hearing loss greater than 40 decibels (World Health Organization estimations). Also, and according to the SIL International census and estimates (2019), there are 144 Sign Languages around the world. However, the number of native speakers of these Sign Languages remains difficult to establish formally but can be estimated at around 10 million (information available via www.ethnologue.com).

‘alteration’ but more especially ‘otherness’ [3]. Perceptive otherness or representational otherness, in the face of a reality that phenomenologically is not altered. Because the Deaf listening does not concern another sound world, but quite the contrary brings another approach of the common world, of this shared world that we define and fix from a ‘normalized’ point of view, audio-centered and finally limited to what our ears endeavor to state.

Nevertheless, Deaf people culturally define themselves as ‘visual beings’ and the specificities of their condition necessarily imply that their capacities for perceiving the reality rest on particularly on its visual and dynamic aspects. But beyond to specify only a characteristically Deaf perceptive feature, the visible presents itself for the ‘People of the Eye’ - typical Deaf expression – as a founding principle for the development of artistic practices and, in this way, as the primary sense of all aesthetic experiences. Rather than simply content with the visible arts, Deaf also seize on practices that may initially seem inaccessible to them, unreachable or even ‘forbidden’, such as dance and more specifically music. With their cultural affiliation to a community rich to its specificities, Deaf produce an extra-ordinary music that goes beyond the ordinary conceptions of musical practices, developing what they call the *vusic* – contraction of visual and music. Music of the eye, for the eye, that gives itself to see abandoning the aural dimensions commonly established to define the musical experience. More culturally still, they develop a typically deaf practice of sung in sign language, the sign-singing, where the signifying gesture takes musical values, the words becoming a visual melody, silent and embodied.

In this article², I would like to consider the bodily and visual specificities of the Deaf musical experience, by first focusing on the Deaf listening and more specifically on the involvement of the body in the Deaf musical experience [4]; precisely, by the investigation of a fundamental principle of the human experience, the *corpaurality* [5]. It engages to consider the sono-sensitive bodily qualities and the natural hearing modalities of Deaf, modalities which, detached from the ordinary aural perceptions, position the body at the core of the musical experience. In a second part, I will mostly consider the visual dimensions of music, based on the Deaf practices represented by the *vusic* and the sign-singing, seeking to think how they can bring to a denormalized consideration of music, namely the *vusicality*.

2 Bodily Specificities: the *Corpaurality*

Essential base of sensoriality, the body presents itself as a sense vector and, faced with the sound reality, reveals a dimension inherent in the human condition, what I call the *corpaurality*. Convergence of ‘aurality’ (what is perceived by the ear) and ‘corporeality’ (what is experienced by the body), two sensory modalities revealing the

² This article is based on 2 papers pre-published in the 14th CMMR-proceeding (ed. by M. Aramaki, O. Derrien, R. Kronland-Martinet & S. Ystad, Marseille 2019): “The ‘Deaf listening’. Bodily qualities and modalities of musical perception for the Deaf” (p. 276-285) & “Visual-music? The Deaf experience. ‘Vusicality’ and Sign-singing” (p. 846-852)

perceptible world, corpaurality designated the fundamental connection of the individual and the sound world: the body is anchored in the sensory world and the audible takes shape through it, form part of corporeality and reveals itself in an embodied way.

The ‘hearing norm’ that determines the ordinary delineation of the musical experience focuses primarily on the aural aspect of music. Indeed, “we must admit that when we play an instrument or listen to a disc, we use the sense that is socially intended for this purpose - hearing - and we consider most of the time that only the ear has a role to play in the listening function” [6, p. 54].

However, corpaurality as an essential principle of sound perception reveals that the music listening is naturally multi-sensory and confirms what is already known, that it is not only and exclusively located in the aural sphere of the perceptible world. As a sensory reality, the sound phenomenon fundamentally produces a material diffusion of mechanical vibrations, and for that “hearing is only one aspect of vibratory sense. The ear is not the exclusive receptor of sound vibrations, this function involves the whole body” [6, p. 56].

2.1 The Vibratory Sensation

The vibratory sensation informs about the sensory data perceived by the sense organs [7]. The vibratory bodily sensitivity falls within *somesthesia*, that designates specificities of the body to perceive sensorial stimuli [8]. The somatosensory system - or somesthetic system - concerns the sensitivity to stimuli perceived to whole the body, in association or in addition to those directly concerning the sense organs. Somatic sensations can thus give or supplement information on the environment. Unlike the sense organs, which concentrate their receptors in localized parts of the body (ears, eyes,...), the somesthetic system has receptors distributed over the entire body and positioned in the various layers that compose it: skin, bones, and musculotendinous or visceral levels.

The somato-sensitivity is based on specific sensory neurons, the mechanoreceptors, which perceive the stimuli and are attentive to mechanical transformations or deformations of the sensitive environment [8]. Mechanoreceptors concern more specifically – and among others – the vibratory sensations; the human body is, in its entirety, sensitive to vibration frequencies, and this characteristically: “faced with the vibrations transmitted to the whole body, the human body behaves as a complex group [...]. At a given frequency, all or some parts of the body will react by amplifying the vibratory” [9, p. 45]. Thus, exposed to mechanical vibrations,

the human body can be considered like an adaptable mechanical system, consisting of different entities connected to each other by springs and dampers that are the ligaments, muscles, intervertebral discs. When the body is exposed to vibrations, not all organs react in the same way. Each part of the body having its own resonant frequency. [10, p. 6]

According to the work of Michael J. Griffin, the whole-body human vibration exploits a frequency field that ranges from about 0.5 to 1,250 Hz [11]. Studies conducted on the resonance frequencies of the human body determine two spaces of vibratory reception and precise notably:

Human exposure to vibration may be classified due to their peculiarities, in (1) Whole Body Vibrations (WBV): vibrations that, as the name suggests, affect the whole body, particularly in a frequency range 0.5 to 80 Hz [...]; (2) Hand-Arm vibration (HAV): vibrations that affect and are transmitted specifically to the hand-arm system, in a frequency range from 6.3 to 1,250 Hz (...). [12, p. 282]

With this specification, it is possible to identify a specific somato-sensitive organization mainly developed – for an overall threshold of perception around 80 dB – at the level of the head, arms, bust, legs, and spinal column, but several studies establish different results for the level distinctions of organ sensitivity. The table below reports 4 of these classifications of the human resonance frequencies (classifications resumed and summarized on figure 1):

Table 1. Classifications of the human resonance frequencies (in Hz).

<i>Skull</i>		50-70		
<i>Head</i>	25	1-2	20-40	25
<i>Shoulders</i>	4-5		4-8	4-5
<i>Maxilla</i>			100-200	
<i>Ocular Globe</i>	20-90	20- 25	60- 90	30- 80
<i>Spinal Column</i>	10-12		8	10-12
<i>Chest Wall</i>	50-100	4-8	60	60
<i>Abdominal</i>	4-8		4- 8	4-8
<i>Lungs</i>			4- 8	
<i>Hands</i>	150 a 200	30- 50	20-70	60
<i>Arms</i>	16-30	15-30		16 à 30
<i>Wrist</i>				50-200
<i>Legs</i>	2 (sit.)- 20 (sta.)	2 (sit.)- 20 (sta.)		2 (sit.)- 20 (sta.)
<i>Knees</i>		1-8		
<i>Feet</i>		16-31		

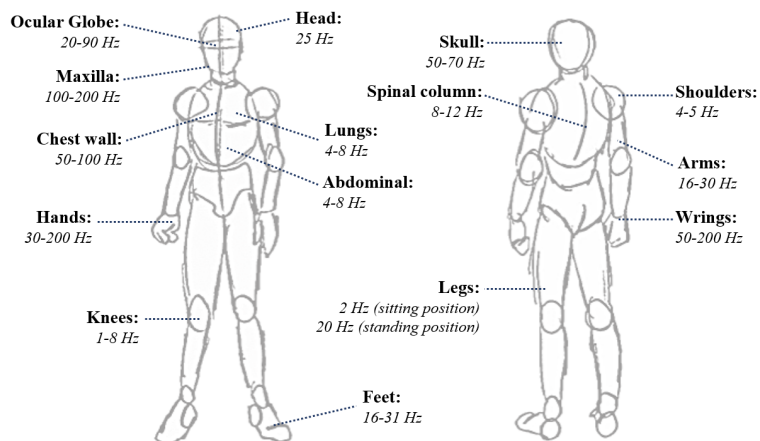


Fig. 1. Presentation of human resonance frequencies

2.2 Modalities of the Sono-Sensitive Body

Indeed, “the human body, despite its higher complexity, can be considered as a biomechanical system for analysis of vibration” [12, p. 282], and the modes of bodily reception of mechanical vibrations are integrated into the somesthetic system, which can be classified in several different ways. Depending on the Sherrington’s distinction [16], the sensory system can be categorized according to three distinct levels of sensitivity:

- 1) first, the exteroceptive sensation, which refers to the external perceptions – cutaneous – of mechanical variations. The body is directly in contact with the sensitive environment through the skin, which contains many sensory receptors – the exteroceptors – that react to air vibrations and oversee the vibrotactile perception. The cutaneous mechanoreceptors reveal the sensitivity of the skin and are associated with three stimuli: pressure, touch, and vibration. Among the exteroceptors, two are more specifically engaged in the perception of mechanical vibrations [8]: the Pacinian corpuscles (which are sensitive to vibrations in the 40 to 1,000 Hz frequency range with an optimal sensitivity around 300 Hz) and Meissner corpuscles (responsible for the ‘fine touch’ and particularly present in the dermis of hands, feet, lips, and tongue, which are more sensitive to vibrations from 10 to 400 Hz).
- 2) The second level of somatic receptivity is the proprioceptive sensations, which brings together muscular, bony and tendon perceptions. Considered as the ‘in-depth’ reception, in opposition to the ‘surface’ perception represented by the exteroceptive sensation, the proprioceptive sensation allows the reception and transmission of sound vibrations through the musculoskeletal receptors. The bony reception of vibrations also concerns a particular aspect of the transmission of sound to the inner part of the auditory system: the sound is not only transmitted by the sound waves to the middle ear, but also by bone conduction, the vibrations perceived by the body stimulating the inner ear via the cranium. Similarly, the auditory ossicles, which participate in the mechanical transformation of sound waves, can be stimulated by the cranium vibration.
- 3) The last level of the somatosensory system reveals the interoceptive sensation, which refers to “general visceral sensations that arise from the internal organs” [8, p. 549]. The organs contained in the thoracic and abdominal cavities also contain numerous mechanoreceptors and the transmission of vibratory waves is carried out by the soft tissues contained in the body.

This specific organization of the somatic sensory system reveals the possibilities of the body in the face of sound elements and materializes the corpaurality principle in its physiological reality. The somesthetic reception determines thus the faculty of the body to be sensitive to sound and concretizes the complexity of the corpaurality that formalizes the embodied qualities of listening.

2.3 The 'Deaf Listening'

Corpaurality states this fundamental dimension of music reception and disrupts somehow the ordinary considerations of the musical experience. However, as the Deaf percussionist Evelyn Glennie reminds us, “for some reason we tend to make a distinction between hearing a sound and feeling a vibration, in reality they are the same thing” [17]. Listening to music is feeling the mechanical vibrations of space, which concern the ear, but also and simultaneously the body. Within this context, Evelyn Glennie establishes a relevant connection with the Italian language, to highlight the fundamental link between listening and feeling:

It is interesting to note that in the Italian language this distinction does not exist. The verb *sentire* means to hear and the same verb in the reflexive form *sentirsi* means to feel. Deafness does not mean that you can't hear, only that there is something wrong with the ears. Even someone who is totally deaf can still hear/feel sounds. [17]

Fundamentally, the sound world is felt and the otherness of the Deaf musical experience thus rests on this reality of feeling. Given their specificities, deafness situations reveal a singular apprehension of music that is fundamentally related to ordinary practices, but changes and reconsiders it outside the aural sphere. To be deaf is to feel the music vibrate, and as Danièle Pistone points out, “the hearing-impaired people themselves perceive the sound vibrations” [18, p. 69].

This Deaf musical otherness unveils the peculiarities of deafness as a human condition which, beyond revealing a hearing problem, suggests more precisely another modality of listening, ‘denormed’ and ‘denormative’ because fundamentally based on the materiality of sound reality. As Evelyn Glennie once again emphasizes, “to understand the nature of deafness, first one has to understand the nature of hearing” [17], and this can be extended by saying that, in a way, it is through deafness that could be to find out the deep nature of the hearing. Because the corpaurality principle determines the sono-sensitive qualities of the body in its anatomical constitution and its sensory possibilities, even though, in the ordinary musical experience, the listening remains focused on the ear as the privileged sensory organ. The hearing experience cannot escape the aural primacy, essential and natural medium of the musical experience, and it turns out that “only the deaf know what this means not to hear” [6, p. 56]. Therefore, the Deaf musical experience seems capable to restore a hidden but essential facet of hearing, which is in the first instance and in essence “a specialized form of touch” [17]. Basically, the listening aims to be “acoustical prehension” [19, p. 236], namely the grasp of the sound materiality in its vibratory consistency, which touches the ear but also the body in its entirety. The deaf experiences of music appear able to reveal this essential nature of hearing as a grasping medium of audible reality. Listening to music is thus in the Deaf musical experience relocated from the ear to the body, which presents itself as the main base for understanding and expression of musicality.

In the Deaf musical experience, the listening is revealed therefore primarily embodied and the modalities of the Deaf listening refer more specifically to the three levels of somato-sensitivity.

Firstly, we find a cutaneous perception, and indeed “the skin, as a sensory system with all its aptitudes, is therefore an essential organ for the deaf” [6, p. 58], and according to the study conducted by Maïté Le Moël, the most sensitive areas are “the fingers and the palm of the hand, the toes and the soles of the feet” [6, p. 57] – where we find, in particular, Meissner's corpuscles. As outlined the music therapist Alain Carré, “very often, deaf people make music ‘bare ears’ and often barefoot to have a complete vibratory perception” [20, p. 15]. The sense of vibrations transmitted from the floor passes directly “by the soles of the feet on a massive scale” [6, p. 57], and the air perception of sounds is commonly experienced naturally, without hearing aids (“bare ears”) in order to give sustained attention to the vibratory qualities of the music.

Even if elements can be perceived aurally, the Deaf prefer to listen to the music naturally, without artificial deformations. The abandonment of hearing aids during the musical practice is in line with the will of a ‘natural practice’ (the perceived sounds are not transformed) but also with the desire to avoid the amplification of sounds that are often unpleasant to the ear. Deaf people prefer to live the experience of music in the most natural manner possible, to keep a sound experience not deformed; and as pointed out Alain Carré:

For the deaf person, the most pleasant perception will often be bare ears, natural since there is no deformation or discomfort of this amplification compared to the wearing of hearing aids, even if they are the best. But in terms of music, deaf musicians often prefer to work with their natural perception, especially since they rely heavily on the processing of vibratory information, even if it does not produce an aural sensation. This vibration becomes relevant for the profoundly deaf person. [20, p. 15]

It seems obvious that “the deaf are very sensitive to tactile perception” [6, p. 57] and pay specific attention to structure-born vibrations of the objects and materials that surround them. Claire Paolacci specifies that “the tactile listening is more immediate for the deaf” [21, p. 15] and that the aural perceptions are very often secondary, or less meaningful. The Deaf “know how subtle the answer given by the skin constantly caressed by the sound waves from various origins” [6, p. 57], and they are indeed able to identify a usual or everyday object from the vibrations it produces, without necessarily perceive their aural quality. As the Deaf musician Maati El Hachimi explains: “the Deaf person feels the vibrations in a car, knows if it is going faster or slower, if he/she is in a tractor or in a small car” [21, p. 49]. Hearing people are also endowed with this somato-sensitive capacity of identification of sound elements, but it is primarily their aural perceptions which are significant and meaning; by contrast, “for the people deprived of hearing, the sensory discrimination of the waves by the bodily perception can reach a subtlety that hearing people can hardly suspect” [22, p. 226].

In accordance with this, sono-sensitive experiences are essential in the daily life of Deaf, and as David Le Breton emphasizes,

vibration sensitivity allows deaf people to gather information about their environment: recognize the voices of relatives, detect footsteps, identify musical moments, the passage of a car, the fall of an object. [23, p. 171]

In the instrumental practice, the sonic variations of instruments are also perceived cutaneously, mainly through the hands (directly in contact with the object). This perception of sound vibrations by touch is often sought by the deaf person during the musical experience, and the use of specific objects which materially restore and amplifying the air vibrations (balloon, rigid pipe, wooden crate) is common. Similarly, the Deaf put their hands on the speakers to feel the air vibration produce the sound emission. Cutaneous reception is thus presented as a fundamental sensory modality in the Deaf musical experience,

the sense of touch can reach, through long learning and multiple experiences, a maximum sensitivity. It can give to hearing-impaired people the pleasure of feeling their skin receive every sound wave. [6, p. 58]

This cutaneous perception is associated with a bony reception of sound vibrations, which is based mainly on a structure-borne perception of the acoustic elements: “the bones are actively touched and precisely vibrated by the sound waves which they receive and transmit through the limbs and the whole body” [6, p. 58]. The vibrations of the floor are perceived on the feet and “by the knees where they produce a rotational movement on the kneecaps” [6, p. 57]. Bone perception develops initially by the contact of a body part with a material element, primarily through the legs, which are in contact with the floor; and as a young Deaf reports: “*when I try to listen to music (without hearing aids) I feel by the feet the vibrations. It taps through the body*” [24, p. 44]. The structure-borne reception of the musical vibratory movement seems to begin with the feet and invests in the rest of the body, and according to Maïté Le Moël, “the most sensitive bone areas are the spine, the pelvis (ilium, sacrum, coccyx), the shoulder girdle (clavicles and shoulder blades) and the thoracic cavity (sternum, ribs, vertebrae)” [6, p. 58].

During the instrumental practice, the body is vibrated by the instrument, primarily on the arms, and the bone perception of acoustic variations is also efficient by air conduction because “the head is a bone region frequently vibrating with the acoustic waves and in particular the cranium, the frontal area and the lower jaw” [6, p. 58].

More complex to describe, the internal sensations induce by sound vibrations make it possible “to hypothesize that soft tissues are also good receptors of sound waves” [6, p. 58]. These contain many mechanoreceptors, and the descriptions offered by the deaf [5] of ‘resonances’ and ‘vibrations’ on the torso or ‘bubbling’ in the stomach indicate that the transmission of the vibratory waves is also performed via visceral conduction, which mainly concerns the thoracic and abdominal cavities.

This consideration of the sono-sensitivity of the Deaf musical experience confirms the reality of a specific bodily musical experience. The Deaf perceive and feel the music in and through their body, the latter receiving the sounds according to different perception modalities and develops a truly fine approach to sounds. The music therapist and anthropologist Alain Cabéro specifies that the pitch is felt differently by the body:

when the sound was low, they located it in the stomach, but also on the face, when the sound was rather high-pitched, they located it along the arms and the head. We also had as answers for the low sounds: knee and hand. The high-pitched is not always very well perceived in its delicacy, it was more by a feeling of pain, in the ears. [25, p. 67-68]

These elements show the complexity of the Deaf musical experience which, as the ordinary musical experience, reveals as many facets as it implies of individuals. Each deafness is different, and each experience of the music reports a singular lived experience, deeply embodied, but conveying different meaning values. Evelyn Glennie's testimony shows this complexity of the relation to the sound and the possible diversity of the bodily experiences of the music that it induces:

I spent a lot of time in my youth (with the help of my school percussion teacher Ron Forbes) refining my ability to detect vibrations. I would stand with my hands against the classroom wall while Ron played notes on the timpani (timpani produce a lot of vibrations). Eventually, I managed to distinguish the rough pitch of notes by associating where on my body I felt the sound with the sense of perfect pitch I had before losing my hearing. The low sounds I feel mainly in my legs and feet and high sounds might be particular places on my face, neck, and chest. [17]

To make more concrete this somatic sensitivity of the Deaf, we can see the body areas stimulated during the musical experience (fig. 2), areas specified by the Deaf in a survey conducted in 2015 [5] and which precisely correspond to the human resonance frequencies (fig. 1):

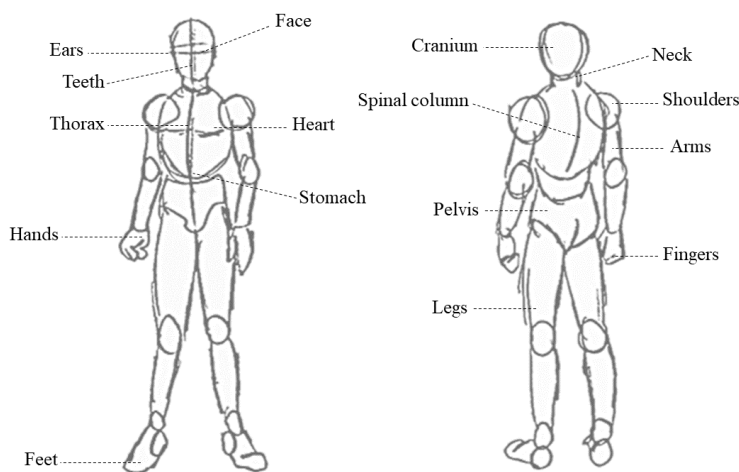


Fig. 2. Body perceptions of Deaf [5, p. 588]

Despite the diversity of their musical experiences, we note that, for the Deaf, the body proposes itself as the privileged place of the musical realization. In this way, “regarding the direct experience of music since it is vibration, deafness, including

profound, does not prevent sound contact, but displaces the privileged sense of the ear to the body” [22, p. 221]. The Deaf musical experience is fundamentally anchored in the corpaurality principle and thus affirms, in the words of a young Deaf, that “[we] can listen to music through the body and not through the ears. This is another way of listening. As if the body is the ear” [26, p. 247]. Music is, therefore, fundamentally lived by the body and flourishes to become a sensitive reality, revealing specific aesthetic values: “the whole body becomes ‘the organ’ of hearing [...]. By the vibrations that touch it, it replaces the ear” [26, p. 249-250].

*

Giving itself to feel, music imposes itself on the body; however, if “the link between the body and the music is complex and indissoluble” [27, p. 103], when the aural primacy is overcome, the musical experience finds within the body its space of realization. It seems that once sidelined the aural primacy, the musical experience reveals its natural embodiment. This is how to observe the Deaf musical practices makes it possible to pass beyond the a priori fundamental aurality of music by highlighting the primordial place of the body. In other words, the Deaf otherness restores an extraordinary experience of music, detached from the ordinary conventions dependent to the ear performances, and seems to be able to reveal an unknown aspect of music, the one doing the body the primordial listening support, affirming thus that “hearing is not prerequisite to appreciating music” [28, p. 441]. And as the Deaf percussionist Evelyn Glennie specified: “so far we have the hearing of sounds and the feeling of vibrations. There is one other element to the equation: sight” [17].

3 Visual Specificities: the *Vusicality*

Given the sensory specificities that characterize them, the Deaf develop a singular relationship to the world, putting aside the auditory realities and focusing primarily on visual and bodily qualities; because as Oliver Sacks specified, the Deaf community is “a community adapted to another sensory mode” [29, p. 251]. It is recognized today that the absence or the deterioration of a sensory modality can lead to the development of other sensory modalities, and recent studies emphasize this Deaf visual specificity [30; 31; 32; 33]

3.1 “Attitudinal Deafness”³: The Deaf Visual Specificity

Therefore, and in the words of Owen Wrigley, “deafness is primarily a visual experience” [34, p. 29], and the Deaf willingly take possession of this ‘visible’ specificity that represents their singular relationship to the world. As writes Yves Delaporte:

³ “The most basic factor determining who is a member of the deaf community seems to be what is called ‘attitudinal deafness’. This occurs when a person identifies him/herself as a member of the deaf community, and other members accept that person as part of the community” [2, p. 4].

Deaf culture is a visual culture. Because hearing people also have a sense of sight, it is not sure that there is not much in common in the use that each makes of their eyes. Their eye gaze is invested with language functions [...]. [35, p. 36]

The Deaf visual qualities are characteristic of the Deaf identity, because “if for hearing people, being Deaf is defined by not hearing, for the deaf, being deaf is defined by the fact that to be visual” [36, p. 29]. The eyesight is thus essential for the Deaf sensory modality of the world apprehension. In a paper devoted to the issue of the ‘Deaf eye gaze’ [37], Yves Delaporte is interested in this self-designation of the Deaf as ‘being-visual’ and states:

There is a specifically deaf way to permanently immerse yourself in all that the world can bring as visual information. The eye gaze is never passive or at rest, it is constantly attracted by everything in motion [...]. This extreme sensitivity to everything within the visual field reflects recurring behaviors in time and space that we must consider them for what they are: cultural characteristics. [37, p. 50]

For the Deaf, the visual plays a fundamental role in their experiences of the world, exceeding the simple function of sensitive expression becomes the main modality of understanding and realization of the real. In addition, the specificities of gestural languages, fundamentally embedded into a visual expression, emphasize the importance given to the visual field by the Deaf. Thus, in the words of Yves Delaporte, we approach “what it is for the deaf to be deaf: it is to have capacities that hearing people do not have” [35, p. 38]. Indeed, for the Deaf, their condition is not defined primarily from their 'losses' but their abilities. They do not primarily think itself like beings whose the auditory system is impaired, but rather as individuals whose visual system is particularly operative: “We are visuals: this is the self-definition of the deaf” [35, p. 50]. This first cultural representation leads to consider the 'Deaf world' as a visuo-centered universe opposing the audiocentrism characteristic of the hearing world.

Moreover, the Deaf are fundamentally ‘speech beings’. This is the main cultural feature of the Deaf identity, and the Sign Language formalizes the essential criterion of membership of the Deaf community. The latter is defined as a linguistic and cultural minority; Sign Language is the natural language of the Deaf, their language which “reflects the culture, the traditions and how the individuals who use it to communicate see the world” [38, p. 61]. More than a mere means of communication, the Sign Language represents for the Deaf the physical and ideological support of their identity representations. It is from their linguistic specificity that the Deaf have affirmed throughout History their identity and that they have elaborated their community gathering. Thus, the Deaf identity develops around another norm, visuo-centered and deeply embodied, which defines their relationship to the real, but also to music.

3.2 “Vusicality”: Seeing Music

Indeed, in the Deaf musical experiences, the visual occupies a fundamental place. The Deaf specificities making the sight the dominant reception to perceive the material realities, in the musical experience, the eye complements the impaired ear to give

meaning to sound phenomena. As Claire Paolacci points out, the Deaf “have a highly developed visual listening” [21, p. 55]; in this way, the music agrees with another sensitive dimension and takes on a specific value, singularly expressed in the ‘musical’ paintings by the deaf painter Chuck Baird which illustrate this *music for the eyes*.

However, the sounds are not materially seen and remain elements to hear and to feel; in the Deaf consideration of musical reality, certain elements involved in the creation of sounds become carriers of musical qualities. The deep sensitivity to vibrations that animate the body of the Deaf agrees also with the elements perceived by the eye [7], attentive to visible movements that animate - in music, for music or by music - the visual space. As Emmanuelle Laborit explains:

The concert show influences me too. The effects of light, the atmosphere, the many people in the concert hall, are also vibrations. I am conscious that we are all together for the same thing. The saxophone shining with golden flashes, it is fantastic. The trumpeters who inflate their cheeks. [39, p. 30]

Thus, the music exceeds its only sound dimension, the musician bodies and musical objects are invested with a profound significance for the realization of the musical experience. Separated from its ordinary nature, music is no longer simply an Art that ‘is listened’ but is primarily an Art that ‘is looked’. As an artistic activity, music is a living Art that is performed in live and the concert represents a fundamental dimension of musical reality both to the Deaf and to the hearing people. To attend a concert is to see music being performed and the visual dimension, which also concerns the hearing audience, assumes a deep musical signification for the Deaf audience; in the words of Pierre Schmitt, “When music becomes a show, it is also through an increased focus on the visual aspects of the live performance that the musical experience takes on a particular significance for the deaf” [22, p. 228].

Deaf musical listening is not only perception and feeling of sounds, but it is also and fundamentally visualization of dynamics and movements that participate in the creation of the sensitive environment. Thereby, in the Deaf musical experience “the sight is a sense that draws the sound” [40] and brings to sound reality a more concrete existence revealing another form of materiality. Because the eye is sensitive to movements and visual rhythms, and as the deaf musician Maati Hel Hachimi points out,

the deaf can understand the rhythm, to feel it without hearing, if only visually. For example, the train that passes with the wheels turning, the subway windows that scroll: we know very well if it goes more or less quickly and we feel the rhythm of what we see. [21, p. 49]

Thus, the movement and rhythm of the visual elements contribute to animate the Deaf musical experience. In this way, the movements of the musicians seem essential, both for their participation in the reception of sound (felt and seen) and for their fundamental involvement in the musical practice. The gesture produced by the instrumentalist participates in this way to realize the perception of the sound elements, by bringing them a concrete origin and by giving to the vibratory feeling a visual base. As Maïté Le Moël points out: “every gesture is the cause of a bodily perception of the sound vibrations transmitted by the musical instrument” [6, p. 52]. Thus, the

gestuality gives meaning to the Deaf music listening, but also contributes to the understanding of the dimensions and qualities peculiar to the musical practices.

Indeed, like for the hearing people, the musical practice for the Deaf requires a perfect command of specific technical gestures for producing the musical sounds with the instrument; however, in the Deaf practices, the gesture also presents itself as the fundamental understanding support of the musical elements, by participating to determine the sound differences and to define the notions of nuance, intensity or even rhythm. In fact, “it is by the meticulous control of the gesture and by the fine analysis of the bodily perceptions [that the Deaf] can discover the different variations of the sounds [...] and apprehend the notions of intensity, duration, and height” [6, p. 53], making musician gesture an essential element for the musical practice. For the perfect command of the gestuality leads in a first instance to a control of the body in the musical activity, but it also leads to an understanding of the bodily perception capacities of sounds. The gesture presents itself as “a preferred means to feeling sensations and integrating certain sensory data transmitted by a sound emission” [21, p. 36]. Therefore, the musical gesture makes it possible to realize the sound event based on visual and corporal elements.

But the gestuality is also for the Deaf the basis of their communication modality, and the Sign Language participates to define a singular facet of the Deaf musical reality revealing a specific practice, the sign-singing.

3.3 The Sign-Singing: the Body Sings Silently

Real musical practice from the Deaf world, the sign-singing proposes a soundless expression of a verbal text in the form of a signed song, where the body carries the melodic and rhythmic values by the exploitation of a “choreographed Sign Language, abstract and poetic” [22, p. 222]. Beyond presenting a simple translation of a vocal song into Sign Language, the sign-singing is deeply invested with musical dimensions that transform the common practice of Sign Language [41; 42]. Here, the musical experience accords with the Deaf specificities: the melodicity takes the body as the production space of the musical expression, whereas the rhythmicity of the gesture exploits the visual space as the realization place of the musical event. The signed song performances synthesize the specificities of the Deaf musical reality: the visual modality and the embodied practice of the musical experience. Affirming part of their musical identity with this singular practice, the Deaf distort the ordinary codes of the singing to produce a visual music that borrows the expressive values of the vocal to develop an exclusively bodily song [43; 44]. The sign-singing is, in a way, a silent musical expression, the silence of the Deaf expressed through the body like musical expressiveness support [45; 46].

Musical Criteria

The musical qualities of sign-singing are close to ordinary musical parameters, although using them in specific ways according to the Sign Language characteristics.

In this way, we can identify 6 criteria that allow us to consider the musical dimensions of a signed song performance:

Criterion 1. Rhythmicity

We find in the sign-singing a rhythmic transformation of the signs production; in a musical situation, these are indeed produced with a particular movement, which exploited the discourse energy with a specific dynamic more structured and orderly but less natural than the spoken communication.

The rhythm is also integrated into the whole body, which characterizes the global musical dynamics and animates the gestural production of lyrics. During the gestural communication, the body is not engaged in regular movements and is often adapted to the gestural specificities to the signs produce. In a musical situation, it is more specifically invested with structured movements, rhythmically organized, that bring to the gestural production a specific expressiveness and give it these aesthetic qualities.

Illustration 1.

In his song “October” (2015), Ian Sanborn rhythmically uses the manual alphabet (dactylogogy) to express the word [OCTOBER] as a chorus. It is possible to note the rhythmic dynamics of gestural expression, rhythmicity replicated identically every time the chorus even occurs. The figure below shows the gestural production (isolation of alphabetical signs) and the corresponding rhythmic formula.

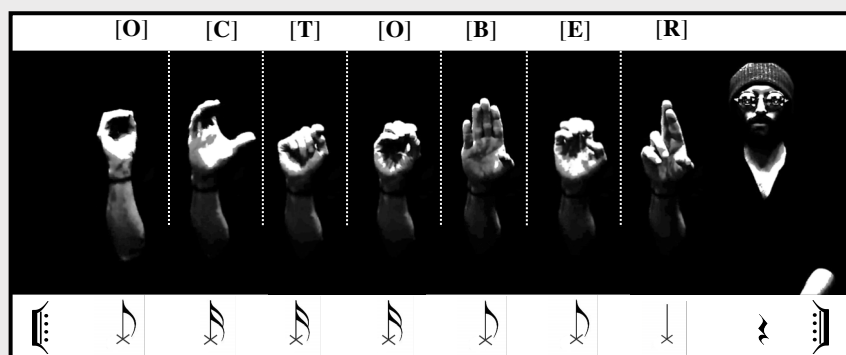


Fig. 3. Rhythmicity: [OCTOBER] [47]

Criterion 2 – Melodicity

The melodicity of a signed song rests on the development of the gestures in the communicational space and on the enlargement of signs production framework. In everyday gestural communication, Sign Language involves mostly the upper body – above the waist – in defined proportions; the ‘signing space’ designates the signs production sphere in the spoken communication, which defines

the space surrounding the signer and that is reachable by these two hands. The signing space is used to locate the entities or notions associated with certain signs, possibly to specify their shape and size properties and to establish the spatial relations between the entities. [48, p. 220]

The signing space (fig. 4) thus reports a specific area on the front of the signer's body, mainly between the shoulders and the waist. Forming “roughly a volume with a depth, a width and a height equal to the length of the speaker's arms” [49, p. 9], it defines the communicational framework of signs realization.

The sign-singing, in its musical exploitation of Sign Language parameters, broadens the communicational sign space proposing an enlargement in height, width, and depth of signs production. The amplitude of signed song performances thus distinguishes the spoken production from its musical expression, bringing to the discourse its melodic form. The melody of sign-singing stands out from ordinary conceptions of the melodicity, which associate it with a succession of notes and pitch producing a characteristic and identifiable sound movement. In a signed song, the melody is coming from a movement, not a sounding movement but a visual expression; the dynamics succession of signs produces a silent melody based on a specific usage of the sign place poetically.



Fig. 4. 'Signing space' [50]

Illustration 2.

Extracted from the song “Amoureux d'un ange” (2011) by the slam poet Lhomé [51], sign-singing in French Sign Language (LSF) by Linda Dupuis, the illustration below presents this embodied melodicity.

Here, the exemplary sung phrase – that says: “*Elle, qui m'inspire / She, who inspires me*” (<01:10-01:14>) – can be divided into 2 phases in its signing expression:

- 1st phase: the verbal expression [SHE + WHO+INSPIRES ME]:



Fig. 5a. Melodicity I. verbal expression: [SHE + WHO+INSPIRES ME] [51]

- 2nd phase: the expansion of the signing space, for aesthetic purposes:

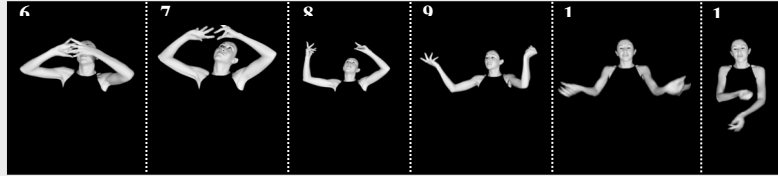


Fig. 5b. Melodicity II. sign expansion: [INSPIRE ME] [51]

Figure 5a: pictures 4 and 5 show the verb [TO INSPIRE/ TO IMAGINE] in LSF (fig. 6).

Figure 5b: pictures 6 to 11 show the extra-verbal exploitation that corresponds to an evocation of [INSPIRATION], visually materialized by the hands that extend above the head and then form a sphere coming down to the waist.

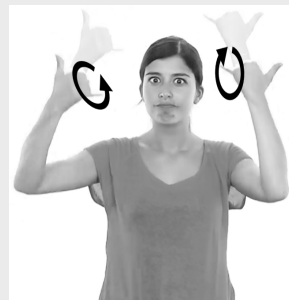


Fig. 6. [TO IMAGINE] in LSF [52]

Criterion 3 – Nuances & intensities

The sign-singing is based on nuances, which do not appear here as sound qualities but as dynamic intensities. Rhythmicity and melodicity of the gestures are associated with a diminution or an enlargement of the verbal signs, formal transformations that intensify the musicality of the performance defining its aesthetic qualities. In a musical context, the body extends or reduced giving to the sign's significant values, a phenomenon that is also found, to a lesser extent, in current gestural communication. Indeed, the sign-singing intensifies the expressive dimensions inherent in Sign Language, to requalify them into vusical elements.

Illustration 3.

The illustration below is a cover of Serge Gainsbourg's song "Chanson de Prévert", interpreted by the French duo Albaricate (2020) - Samuel Genin (voice) and Clémence Colin (sign) [53]. The extract used here is part of the chorus: "*Jours après jours, les amours mortes / Day after day, dead loves*" (<00:43-00:50>); it shows in different ways the visual nuances and the intensity of the musical expressiveness:

1. the expressiveness of Clémence Colin's face accompanies the musicality of gestures and intensifies the textual content.

2. the first expression “Day after day” is divided into 2 parts:
- pictures 1 to 4. [DAY], the first expression: the left arm describes a circular arc passing in front of the face, from left to right, from one end to each other of the right arm on a horizontal plane. This relatively rapid movement evokes the sun's path (left arm) on the horizon (right arm). (cf. *Criterion 6 - 'transposition'*).



Fig. 6a. Nuances I: [DAY] [53]

- Pictures 5 to 8. [DAY] is expressed this time with the right arm performing the same movement, left arm horizontally. The movement is slower, to signify the [SUCCESION] of the days, the word [AFTER] being omitted in the gestural expression because it is not necessary: the successive executions of [DAY] with a different dynamic (slower the second time) expresses the ‘succession of days’.



Fig. 6b. Nuances II: [AFTER+DAY] [53]

- Pictures 9 and 10. The [DAY] turns into [LOVE], the pictures 10 and 11 presenting its gestural expression in LSF (fig. 7).



Fig. 7.
[LOVE] in
LSF [54]



Fig. 6c. Nuances III: [LOVE] [53]

4. Pictures 13 and 14, [LOVE] is put in the plural, and loves [DIE] (expressed by the sign [DISAPPEAR]) (fig. 8), pictures 15 and 16).



Fig. 8. [TO DISAPPEAR] in LSF [55]



Fig. 6d. Nuances IV: [DEAD LOVES] [53]

Criterion 4 – Repetition

The repetition process is significantly used in the sign-singing, firstly to add an expressive effect, consistent with text content, but also to inject dynamism into the musical performance or accentuate its rhythmicity. It is common to find repeated signs sometimes several times in a row, in a purely visual aesthetic perspective that transforms the gestural expression into a vusical – melo-rhythmic – interpretation.

Illustration 4.

This process of repetition is explicitly exploited in the chorus from the sign-song “Watch these hands” (2012) by Sean Forbes [56], the text itself resting on a repetition: “*Watch, Watch, Watch these hands*”.

In its linguistic expression in American Sign Language (ASL), we find the sign [WATCH] (fig. 9) used 3 times successively in a different way, more or less in accordance with the initial configuration of the verbal sign: 2 fingers (evocation of the gaze) which indicate the direction “where to watch”.



Fig. 9. [WATCH] in ASL [57]

1. Firstly, the sign is proposed in a two-hand expression, with all the fingers (except the thumbs) oriented towards the song-signer's face. This first expression is a way to concern the audience members: "Watch!" (Several fingers express several "watchers").



Fig. 10a. Repetition I: [WATCH] 'all!' [56]

2. The repetition of the sign is a one-hand expression; it respects the initial configuration of the verbal sign (2 fingers) and is addressed individually to the audience member: "You, watch!" (2 fingers express one individual).



Fig. 10b. Repetition II: 'you', [WATCH]! [56]

3. The last evocation of the sign is again a one-hand expression, performed with the right hand directed towards the left hand, a gestural expression for: "you, watch this hand!"



Fig. 10c. Repetition III: 'You' [WATCH] 'this hand' [56]

Criterion 5 – Visual rhyme

The association of the criteria of rhythmicity, melodicy, and repetition reveals a new parameter⁴, more singular because distorting a principle usually associated with the language sonority, that of visual rhyme. Indeed, to add a vusical character to a gestural production, the sign-singing relies on elements sharing visual characteristics that produce an effect of recurrence or similarity and participate in the dynamic and aesthetic expressiveness of linguistic performance. These visual rhymes can be in the order of the formal resemblance (the configuration of the verbal sign or the shape of the hand. Cf. fig. 10a, b & c), in the range of the sign positions in relation to the song-singer's body, or also in the order of the recurring movements that participate to the discourse structuration.

Illustration 5.

Although revealing a fundamental parameter of the sign-singing's vusicality, the principle of visual rhyme remains complex to identify and isolate in a gestural production. We can nevertheless take as an example an excerpt from "Smells like victory" (2009) by Signmark [58]. In the second part of his chorus, we find vocal rhymes in the text: "What you're doing over there / There's a party over here / Winners over here / Losers over there". In the same way, we can identify visual rhymes:

1. the general rhythmicity used animates the gestural production regularly and synchronously
2. It may be noted several visual or rhythmic symmetry:
 - pictures 1, 4, and 6: repetition of the gesture (2 times) over the same rhythmic duration.
 - pictures 1, 4, 6, and 8: sign positioning on the upper of the body (beginning of verses)
 - pictures 5 and 7: identical gestures.
 - pictures 5, 7, and 9: directional parallelism (unidirectional movement of the 2 hands)
 - pictures 3, 5, and 7: sign positioning on the lower of the body (end of verses)

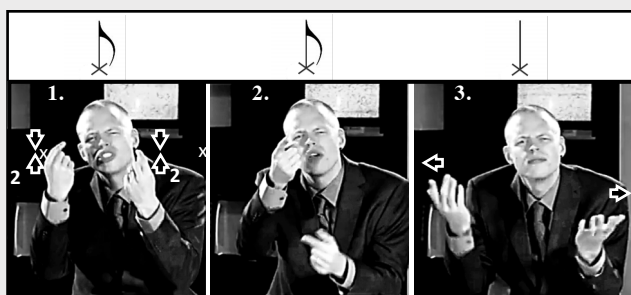
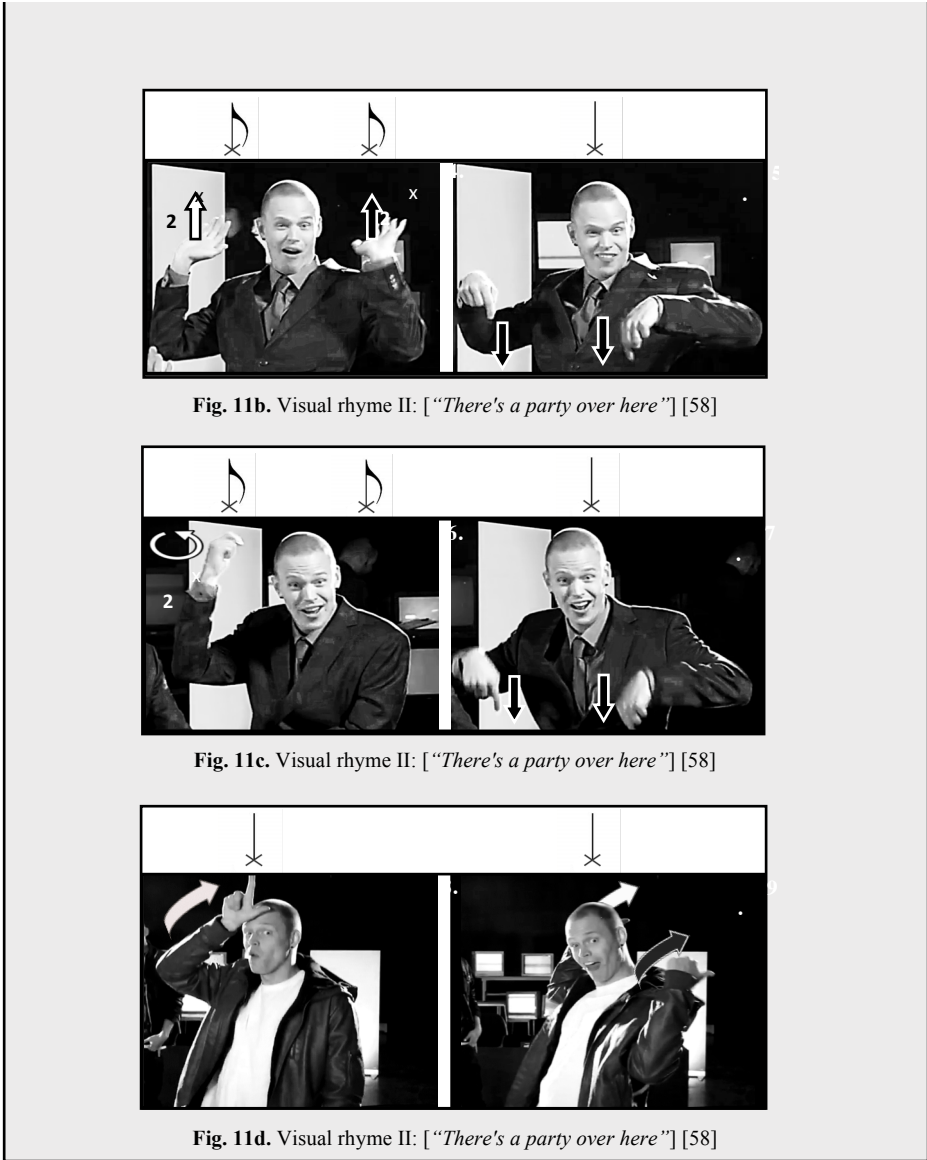


Fig. 11a. Visual rhyme I: ["What you're doing over there"] [58]

⁴ I develop here this new criterion to the other musical parameters of the sign-singing established since my doctoral research [5].



Criterion 6 – Transposition of signs

Finally, we find a transposition of the usual form of the verbal signs, which can sometimes be modified in their production (gestures enlargement or reduction; the speed of execution; production delocalized in the sign space) or totally transformed to perform the lyrics visually or poetically (close to mime).

Illustration 6.

In the sign-song “Against the Wall”, performed in ASL by Signmark, we can find a formal transposition of the sign [WALL], whose usual configuration in ASL (Fig. 12) is transformed into a mimetic expression in the sign-singing execution (Fig. 13).

We can see that the musical using of the verbal sign [WALL] (hands side by side on the front of the body, which separate laterally at the shoulder width) transforms its initial disposition (in Signmark’s performance, the hands are not side by side on the front of the body in the center of the torso, but at the shoulders close to the body) and its final resolution is extended (the hands do not stop at shoulders; the arms are outstretched). This transposition of the sign agrees with the expressive orientation of the lyrics: “against the wall”, words that the sign-singer performs physically.

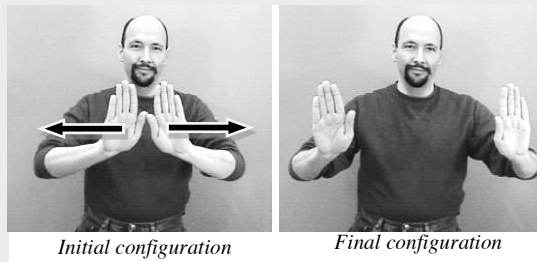


Fig. 12. [WALL] in ASL [57]

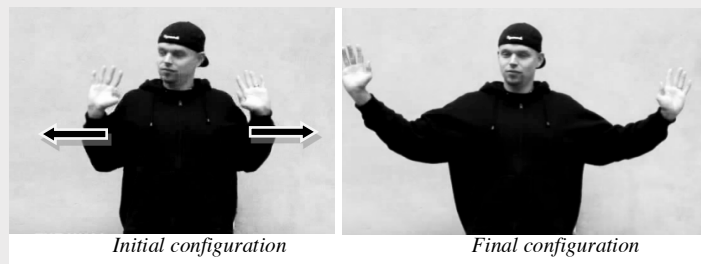


Fig. 13. Transposition I. [WALL] in Signmark’s performance [58]

We can take another example of musical transposition, more explicit this time. In the same Signmark’s song, the production of the verbal sign [WORLD] is totally detached from the usual sign to be closer to a formal expression of the World (Fig 14), formal expression that the linguistics of Sign Language calls the ‘highly iconicity’ [60], namely the insertion into the language of “structural indications of an illustrative representation of the sensory experience” [61, p. 23].

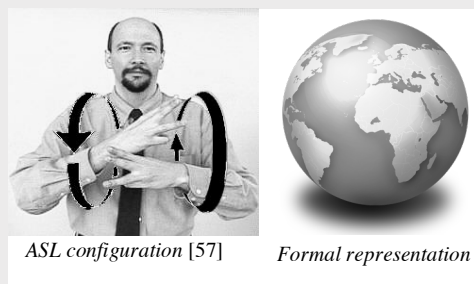


Fig. 14. [WORLD] [57]

In his signed song, Signmark uses two configurations to perform [WORLD], which stand out from the usual sign. The first (fig. 15a) is related to the round shape of the World and in no way to the verbal sign [WORLD]. In ASL, the sign [WORLD] is based on a configuration reflecting a low degree of iconicity (few illustrative values) and consists of two ‘W’ (the form of the hands into the manual alphabet), which rotate around each other to symbolize the Earth's rotation. In this, this sign has little iconic dimensions but refers more specifically to the word itself in its writing.

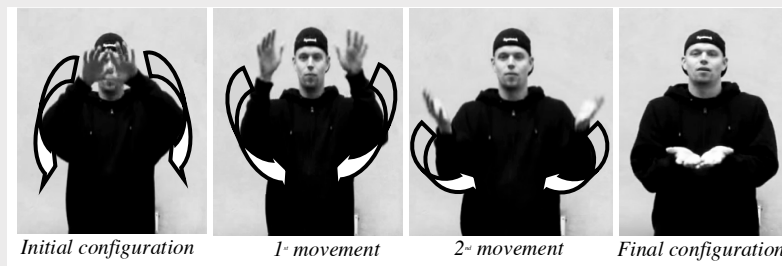


Fig. 15a. Transposition II. [WORLD] in Signmark's performance 1 [58]

In the second evocation of [WORLD], the round shape evoking the Earth is transformed into a new expression (Fig. 15b), which presents again the shape of the world without referring to the usual verbal sign. This second expression is again part of an expressive process; to musically produce the lyrics “*Even if the world comes crashing down*”, Signmark formalizes and choreographs the Sign Language to make visible his poetic and musical intentions. The WORLD is represented in its round shape (with the clenched fist) and this expression is used to express the lyrics in a mimetic way: the clenched fist ‘crashes on’ the hand. The expressiveness of the lyrics leads to transform the usual dimensions of Sign Language to bring a concrete and illustrative dimension to the sign-singing performance.

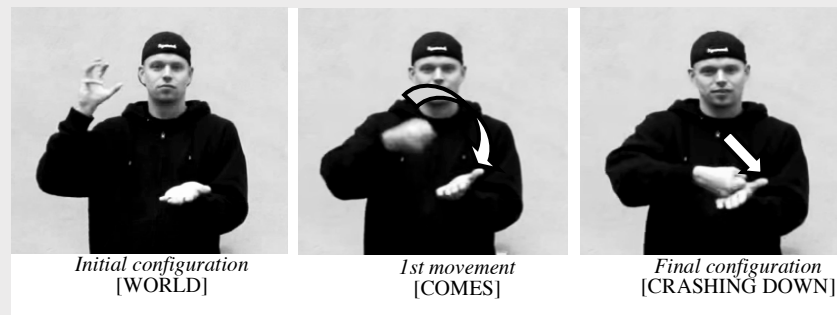


Fig. 15b. Transposition III. [WORLD] in Signmark's performance II [58]

The sign-singing thus reveals the silent appropriation of the musical codes of the ordinary song, adapting its expressive modalities to the Sign Language specificities. The music then becomes specifically Deaf and reveals the culture that defines the Deaf community, offering a singular way to claim a 'musical otherness'. The sign-singing involves the Sign Language in a musician practice that, transcending the ordinary norms of the song, revalorizes the notion of silence: *by the hands, for the eyes*, the sign-singing becomes a visual expression of music. So, we can consider with Pierre Schmitt that

the musical experience claimed by the deaf exceeds the only sound sphere. Its meeting with the Sign Language poses the visual dimension not as a further or an additional dimension, but as a constitutive value of a musical form whose conception is enlarged. [22, p. 229]

More than just a communication mode, the Sign Language unveils aesthetic qualities that lead to the realization of original Deaf music, revealing singular creative perspectives and a strong musical identity, embodied and integrating primarily visual dimensions. Thus, the Deaf practices, by revealing the 'corporeal dimensions' and the 'visual qualities' of the music, make it possible to relocate the current conceptions of the music and offer to think the musical in its multimodal dispositions: the ear, but also the eye and more broadly the body proposing to concretize, together and jointly, the musical experience.

References

1. Gaucher, C., Vibert, S. (ed.): *Les sourds : aux origines d'une identité plurielle*. Peter Lang, Bruxelles (2010).
2. Baker, C.; Padden, C.: *American Sign Language: a look at its history, structure and community*. T.J. Publishers, Silver Spring Md (1978).
3. Brétéché, S.: Through the prism of disability. For an experience of alterity: the being-Deaf as figure of world. In: Dario, M. (ed.): *The Role of Humanities in Contemporary Society: semiotics, culture, technologies*, pp. 25–35. Kaunas Univ. of Tech., Kaunas (2017).
4. Brétéché, S., Esclapez, C.: Music(s), Musicology and Science: Towards an Interscience Network. The Example of the Deaf Musical Experience. In: Aramaki, M., Davies, M, E.P.; Kronland-Martinet, R., Ystad, S. (eds.): *Music Technology with Swing*. 13th CMMR, pp. 637–657. Springer-Verlag, Heidelberg (2018).
5. Brétéché, S.: *L'incarnation musicale. L'expérience musicale sourde*. Thèse de doctorat en musicologie. Esclapez, C., & Vion-Dury, J., (dir.). Aix-Mars. Univ. (2015).
6. Le Moël, M.: L'univers musical de l'enfant sourd. In: *Marsyas* 39/40, 51–58 (1996).
7. Brétéché, S.: *Body Ways: the extra-ordinary music of the Deaf*. In: Hoppe, C. & Muller, A. (ed.): *Göttingen Studies in Musicology*. Olms-Verlag, Hildesheim (to be published).
8. Campbell, W., Barhon R.J.: *Dejong's. The neurologic examination*. Wolter Kluwer, Philadelphia (2020).
9. Cardinaels, J.: *Vibrations*. Wolter Kluwer, Waterloo (2009).
10. CNAC (ed.): *Bruit et vibrations*. Fascicule n°112. Carl Heyman, Bruxelles (2006).
11. Griffin, M.: *Handbook of human vibration*. Elsevier, London (1996).
12. Gomes, H.M., Savionek, D.: Measurement and evaluation of human exposure to vibration transmitted to hand-arm system during leisure cyclist activity. In: *Revista Brasileira de Engenharia Biomedica* 30(4), 291–300 (2014)

13. Rasmussen, G.: Human Body vibration exposure and its measure. In: Technical review, *Bruel & Kjaer* 1, 3–31 (1982)
14. Mandal B., Srivastava, A.K.: Risk from vibration in Indian mines. In: *Indian Journal of occupational and environmental medicine* **10**(2), 53–57 (2006).
15. Duarte, M.L., De Brito Pereira, M.: Vision influence on whole-body human vibration comfort levels. In: *Shock and Vibration*, **13**, 367–377 (2006).
16. Sherrington, C.S.: *The integrative action on the nervous system*. CTYale Univ. Press, New Haven (1906).
17. Glennie, E.: Hearing essay. [https://www.evelyn.co.uk/hearing essay/](https://www.evelyn.co.uk/hearing%20essay/)
18. Pistone, D.: Imaginaire et sens musical : des héritages aux réalisations. In : Grabócz, M. (ed.): *Sens et signification en musique*, pp. 35–49. Hermann éditeurs, Paris (2007).
19. Sayeux, A. S.: Le corps-oreille des musiques électroniques. Une approche anthropologique sensorielle. In: *Communications* **86**, 229–246 (2010).
20. Cité de la musique (ed.): *Rencontre Musique et surdit *. Cit  de la Musique, Paris (2003) <https://drop.philharmoniedeparis.fr/content/GPM/pdf/02Metiers04/Musique-et-surdite-cite-2003-06-24.pdf>
21. Cit  de la musique (ed.): *Journ e d’ tude professionnelle Musique et surdit *. Cit  de la Musique, Paris (2005) www.citedelamusique.fr/pdf/handicap/260305_musique-et-surdite.pdf
22. Schmitt, P.: De la musique et des sourds. Approche ethnographique du rapport   la musique de jeunes sourds europ ens. In: Bachir-Loopuyt, T., Iglesias, S., Langenbruch, A., & Zur Nieden, G. (eds.), *Musik – Kontext – Wissenschaft. Interdisziplin re Forschung zu Musik*. pp. 221-233. Peter Lang, Frankfurt am Main (2012).
23. Le Breton, D.: *La saveur du monde*. Anthropologie des sens. M tali , Paris (2006)
24. Cab ro, A.: *La musique du silence*,  d. du Non Verbal/A.M.Bx, Parempuyre (2006).
25. Cab ro, A.: *De l’ou e   l’audition*.  d. du Non Verbal/A.M.Bx, Parempuyre (1998)
26. Cab ro, A.: *Diff rent, diff rence et diff rends*. Essai anthropologique sur les dissonances de la surdit  mal-entendue. Doctoral Thesis, Traimond, B. (dir.), Univ. Bordeaux (2009).
27. Csepregi, G.: *La musique et le corps*. Vladimir Jank levitch sur l’art du piano. In: Csepregi, G. (dir.): *Sagesse du corps*, pp. 103–114.  d. du Scribe, Bruxelles (2001).
28. Loeffler, S.: Deaf music: embodying language and rhythm. In: Bauman, H-D.L., Murray, J. (ed.): *Deaf gain: raising the stakes for human diversity*, pp. 436–456. University of Minnesota Press, Minneapolis (2014).
29. Sacks, O.: *Des yeux pour entendre*. Voyage au pays des sourds. Seuil, Paris (1990).
30. Codina, C., Buckley, D., Port, M., Pascalis, O.: Deaf and hearing children : a comparison of peripheral vision development. In: *Developmental Science* **14**(4), 725–737 (2011).
31. Stivalet, P.; Moreno, Y.; Richard, J.; Barraud, P.-A.; Raphel, C.: Differences in visual search tasks between congenitally deaf and normally hearing adults. In: *Cogn. Brain Res.* **6**, 227–232 (1998).
32. Parasnis, I.; Samar, V.J.: Parafoveal attention in congenitally deaf and hearing young adults. In: *Brain Cogn.* **4**, 313–327 (1985).
33. Proksch, J., Bavelier, D.: Changes in the Spatial Distribution of Visual Attention after Early Deafness. In: *J. Cogn. Neurosci.* **14**, 687–701 (2006).
34. Wrigley, O.: *the politics of deafness*. Gallaudet University Press, Washington (1996).
35. Delaporte, Y.: *Les sourds, c’est comme  a : ethnologie de la surdit *.  d. de la Maison des sciences de l’homme, Paris (2002).
36. Lachance, N.: *Territoire, transmission et culture Sourde*. Perspectives historiques et r alit s contemporaines. Presses de l’Univ. de Laval, Qu bec (2007).

37. Delaporte, Y.: Le regard sourd. « Comme un fil tendu entre deux visages... ». In: Terrain, **30**, 49–66 (1998).
38. Dubuisson, C.: Signer ou le sort d'une culture. In: Nouvelles pratiques sociales **6**(1), 57–68 (1993).
39. Laborit, E.: Le cri de la mouette. Robert Laffont, Paris (1994).
40. Boyer, M.: La musique chez les enfants sourds. Mémoire du CAAPSAIS Option A (2001) <http://atelieroptiona.free.fr/accat/accate.htm>
41. Cripps, J., Rosenblum, E., Small, A.: Signed Music: An Emerging Inter-performative Art. In: Stringham, D., Jarashow, B., Eldredge, B.K.: Deaf Studies Today! **6**, 179–186 (2019)
42. Cripps, J., Rosenblum, E., Small, A., Supalla, S.: A Case Study on Signed Music: The Emergence of an Inter-performance Art. In: Liminalities: A Journal of Performance Studies **13**(2) (2017). <http://liminalities.net/13-2/signedmusic.pdf>
43. Maler, A.: Songs for Hands: Analyzing Interactions of Sign Language and Music. In: Music Theory Online, **13**(1) (2013), <https://mtosmt.org/issues/mto.13.19.1/mto.13.19.1.maler.html>
44. Maler, A.: Musical Expression among Deaf and Hearing Song Signers. In: Howe, B., Jensen-Moulton, S., Neil Lerner, N., & Straus, J. (eds.): The Oxford Handbook of Music and Disability Studies, pp. 73–91. Oxford Univ. Press, New-York (2015).
45. Holmes, J.A.: Singing beyond Hearing. In: Journal of the American Musicological Society **69**/2, 542–548 (2016).
46. Jones, J.: Imagined hearing: music-making in deaf culture. In: Howe, B., Jensen-Moulton, S., Neil Lerner, N., & Straus, J. (eds.): The Oxford Handbook of Music and Disability Studies, pp. 54–72. Oxford Univ. Press, New-York (2015).
47. Ian Sanborn, “October”: <https://www.youtube.com/watch?v=kF6UKQyrxA>
48. Ben Mlouka, M.: Analyse automatique de discours en langue des signes : Représentation et traitement de l'espace de signation. In: Actes de la conférence conjointe Jép-TalN-Recital, **3**, pp. 219–232. Grenoble (2012).
49. Segouat, J.: Modélisation de la coarticulation en Langue des Signes Française pour la diffusion automatique d'informations en gare ferroviaire à l'aide d'un signeur virtuel. Doctoral Thesis, Braffort, A. (dir.). Univ. Paris XI (2010).
50. Guitteny, P., Legouis, P., Verlaine, L.: La langue des signes. Centre d'Information sur la Surdit  d'Aquitaine (2004).
51. Lhom , “Amoureux d'un ange”. <https://www.youtube.com/watch?v=y3s39AKsmOE>
52. ‘Le Dico Elix’: <https://dico.elix-lsf.fr/dictionnaire/imaginer/v.-175026>
53. Cl mence Colin & Samuel Genin, “Chanson de Pr vert” (cover): https://www.youtube.com/watch?v=KrsmAiW_Cqw
54. ‘Le Dico Elix’: <https://dico.elix-lsf.fr/dictionnaire/amour/n.m.-129494>
55. ‘Le Dico Elix’: <https://dico.elix-lsf.fr/dictionnaire/dispara%C3%Aetre/v.-155650>
56. Sean Forbes, “Watch these hands”: <https://www.youtube.com/watch?v=7IQx1f5IEFo>
57. ‘American Sign Language University’ (ASLU): <http://www.lifeprint.com>
58. Signmark, “Smells like victory”: https://www.youtube.com/watch?v=oUtM8_DOVUI
59. Signmark, “Against the Wall”: <https://www.youtube.com/watch?v=JYOYvjhy84>
60. Sallandre, M-A.; Cuxac, C.: Iconicity in Sign Language: A Theoretical and Methodological Point of View. In: Wachsmuth, I.; Sowa, T. (ed.): Gesture and Sign Languages in Human-Computer Interaction, pp.173–180. Springer, Berlin-Heidelberg-New-York (2001).
61. Sallandre, M-A.: Va et vient de l'iconicit  en langue des signes fran aise. In: Acquisition et interaction en langue  trang re n 15, (2001) <http://aile.revues.org/1405>