SOUND | From silent knowledge to sounding representations

1. Knowledge has been made silent

In the previous chapter, it has been argued that the so-called *bifurcation of nature*, as defined by Alfred North Whitehead, (nature in itself/nature apprehended by us) led to what Didier Debaise defines as the territorialisation of scientific practices (Debaise, 2015a). As I have proposed, the bifurcation is also responsible for what I call an alienation of knowledge from its materiality, or from matters of concern. This alienation can be posited as follows: by understanding knowledge production as the process of how human beings gather information about the world that is apparently »outside and apart from them«, knowledge itself is being separated from nature and located, imprisoned in a separated conscious mind. A conscious and silent mind, which actually denies its own materiality. This will indeed come as no shock to state that knowledge production has been widely understood as a silent endeavour. The library is not only a place where one has to remain silent but what it gathers and contains also rarely troubles it. Silent knowledge is thus already leading to and becoming a product of alienation: the pursuit of truth through Reason by the platonic and kantian philosopher lies outside the possible experience, in an ideal void denying the material world. Moreover, this alienation is not only an expression of some philosophical debate between the dualities idea/thing, but has consequences on the practices of production of knowledge themselves. A knowledge kept silent is inevitably secret, only accessible to the literate. The pro-

duction and possession of knowledge thus separates, it *distinguishes* in the sense of Bourdieu (1979), it is embedded in relations of power, rendered in the separation between »science« and »civil society«, as already presented in the first chapter. Furthermore, a silent knowledge is also a knowledge silencing, reducing other discourses, other modes of its production, to silence. Another distinction, this time made on the basis of how it is being generated and by whom, in turn alienating the ones not allowed to speak. Discussing the controversy posited earlier, the question to ask is therefore if a sounding knowledge — rather than silent — is also challenging alienation? Was knowledge always silent? Does it always remain silent? In what follows, I will therefore propose and discuss that knowledge indeed *has been made silent* and ask if its »alienation from materiality« derives from neglecting its ability to »sound«.

Now, one could very well object that those considerations do not say much about how the bifurcation of nature and its resulting »silencing« indeed was implemented inside scientific practices, or inside thought altogether. Immanuel Kant was presented as the arch enemy, the original nemesis that started it all and most of the authors quoted in the last chapter indeed place the origin of the bifurcation of nature in his *Aufklärung*. However, this demonization might give Kant too much importance. Ideas and theories are surely powerful, but they do not sneak over humanity »just like that«, they ought to be written, read, repeated, transmitted — a very visual and textual practice, as I will later discuss. Tarde's laws of imitation (Tarde, 1993) show precisely how the practice of »convincing« is process-oriented. Kant's *Aufklärung* is never only Kant's *Aufklärung* but is embedded in larger networks. Furthermore, there is never only one »origin-story«, there are rather several sources or focals. Stengers and Montebello add for example Descartes, Newton and Hume to their pantheon of »bifurcators«. But they also invoke other figures that can be thought as bridges, like Galileo and how he relied on *common sense* (over the judgement of the scientific community) to prove his theories and in a desperate attempt to keep his life (Stengers, 2017).

Still, those storytellings do not help much further to understand what is really meant by »the alienation of knowledge from its materiality« and how it is being acted out. Therefore, a slight change of focus

is required, a detour of sorts. A shift from the thinkers to what is being thought and how it is being thought. Or better said: how thought is being presented, how practices of knowledge-making are being performed. By stating that knowledge production has been bound to Reason since the Moderns — which I did following new materialists — and by adding that is was only one mode amongst others, one could rightfully ask what would those other ones look like? Is knowledge entirely a venture of the silent mind? In opposition to the body (the dualisms come back creeping in…)? How important are sensory experiences to knowledge-making? And finally, did the silencing of knowledge alienate it from materiality and can sound re-invest it at all? This chapter is therefore not conceived as an attempt to dive deep in the metaphysics of thought, or in delivering an exhaustive history of knowledge. It rather intents to ask to which extent the materiality of knowledge is tied to the way it is being produced. A reformulation of the original controversy, through the lens of the visual versus the acoustic.

2. The hegemony of the visual space

> »We, who live in the world of reflected light, in visual space, may also be said to be in a state of hypnosis. Ever since the collapse of the oral tradition in early Greece, before the age of Parmenides, Western civilization has been mesmerized by a picture of the universe as a limited container in which all things are arranged according to the vanishing point, in linear geometric order. The intensity of this conception is such that it actually leads to the abnormal suppression of hearing and touch in some individuals. (We like to call them ›bookworms.‹) Most of the information we rely upon comes through our eyes; our technology is arranged to heighten that effect. Such is the power of Euclidean or visual space that we can't live with a circle unless we square it.« (McLuhan & Powers, 1992, p. 36).

Marshall McLuhan's conceptual dichotomy of the acoustic vs. the visual space dates back to the 1950s, first appearing in a publication co-au-

thored with Edmund Carpenter[1], and further developed later on in the *Global Village*, from which the quotation above has been taken (Carpenter & McLuhan, 1970; Ouzounian, 2008). Through this model, McLuhan proposes a reading of perception, communication and information that are not part of a homogeneous human disposition, but rather are co-created by the »culture« in which they unfold and by the technologies that are developed within that culture (Cox & Warner, 2017). However, more than a decisive and groundbreaking account on media and information technologies, McLuhan also offers an important reflection about how knowledge is being conceived and produced. In that manner, the last part of the said quote makes it quite clear: most of the gathered and produced knowledge is treated and rendered through the visual. Knowledge is visual and silent. In his formulation of the visual/acoustic split, McLuhan's perspective, although very phenomenological in its understanding of perception and lived experience[2], thus shows an unexpected closeness to the idea of a bifurcated nature encountered in the previous chapter, mostly in relation to its consequences on knowledge production. This proximity needs nonetheless to be put in perspective. McLuhan does not address the idea of a bifurcation of nature *per se*, nor can his theory be brought together with Whitehead's philosophy, apart from some references in *The Medium is the Massage* (McLuhan & Fiore, 2001) and in *The Global Village* (McLuhan & Powers, 1992). It would thus be quite a stretch to see him as being another precursor of new materialism. Still, his concepts and ideas seem to bear a certain resonance with the proposition made a few paragraphs earlier, based on the previous chapter. The alienation of knowledge would then have something to do with the visual character of its production and presentation.

1 Re-printed in an anthology in the 1970s, still with Carpenter.

2 In McLuhan's writings, there are no explicit references indicating his relation to phenomenology, (except very shortly in *The Global Village*), although he himself grants that his work *Understanding Media* is indeed a phenomenology of the media, according to a talk given in 1978, found online: https://www.youtube.com/watch?v=b9fKhsZuKO4.

I argued indeed that the bifurcation of nature led to understanding the practice of knowledge as bound to Reason and as if Reason was constituting an autonomous realm, separated from the material. Only that particular mode of knowledge, upon which modern science is constructed, can (presumably) truly depict the reality we are living in. Other modes of knowledge production — like the practice of magic for instance but also a certain form of (mostly seen as archaic) common sense — were more and more discarded, hunted down even, burned at the stake. Irrationality became dangerous and illegitimate. Scientific knowledge and common sense were fatally split apart (Stengers, 2017). McLuhan is proving a similar point, somehow rejoining Montebello's argumentation, that this particular »intellectualised« mode of knowledge production is related — if not reduced — to a Reason made independent from materiality. However, for him, this bond is not necessarily linked to the evolution of Western philosophy in itself or for itself, it is rather a more or less direct consequence of the technological developments in ways of gathering and presenting knowledge. »All Western scientific models of communication are — like the Shannon-Weaver model — linear, sequential, and logical as a reflection of the late medieval emphasis on the Greek notion of efficient causality. Modern scientific theories abstract the figure from the ground.« (McLuhan & Powers, 1992, p. 3). For McLuhan, those elements, which constitute the core of modern science, result from a very particular evolution in communication, going all the way back to Ancient Greece:

> »The Greeks gave a new birth to the alphabet as a mode of representation having neither a visual nor semantic meaning. Egyptian ideographs, for instance, were directly related to particular sensuous sounds and actions, with unique graphic signs. On the other hand, the matrix of the Greek alphabet could be used to translate alien languages back and forth without changing the form and number (twenty-four) of the original alphabetic characters. It became the first means of translation of knowledge from one culture to the another. The reader in the process became separated from the original speaker and the particular sensuous event.« (McLuhan & Powers, 1992, p. 45).

This event is crucial at many levels, but McLuhan draws one consequence that is particularly interesting here: it sets the basis for how the so-called *visual space* was gradually credited more importance than the *acoustic space*. As he then continues, the tendency starts with the Greek alphabet, but continues through the evolution of pictorial representation in the Middle Ages, or the invention and diffusion of print with Gutenberg. The eye drives the experience and, so it seems, the process of thinking as well. »The reader […] became separated from the original speaker and the particular sensuous event« (McLuhan & Powers, 1992, p. 45). Printed text, following the linguistic technology of the alphabet, takes away materiality from knowledge. It takes away the sensuous from the experience, only leaving an abstraction that waits to be deciphered by Reason, as if Reason itself was extracted from material reality. Consequently, for McLuhan comes what he calls an overload of visual stimuli, that forms Western logic: a logic which lost contact with the sensuous event. Like the eye perceiving an object, everything is explained through the line, the sequence, the causality, the either/or:

> »[The visual space] is a space perceived by the eyes when separated or abstracted from all other senses. As a construct of the mind, it is continuous, which is to say that it is infinite, divisible, extensible, and featureless – what the early Greek geometers referred to as *physis*. It is also connected (abstract figures with fixed boundaries, linked logically and sequentially but having no visible grounds), homogeneous (uniform everywhere), and static (qualitatively unchangeable). It is like the"mind's eye« or visual imagination which dominates the thinking of literate Western people, some of whom demand ocular proof for existence itself.« (McLuhan & Powers, 1992, p. 45).

But McLuhan's duality does not stop at the distinction between the visual and the acoustic space, they also meet in the human brain where the same distinction is operated: a right-brain thinking, dedicated to the acoustic space and a left-brain thinking, or »angelism«, corresponding to the visual space, analytical, logical, sequential. What this »psychologisation« shows is the link between experience and knowledge and their relation to materiality. It is not the ethereal mind, it is the fleshy

hard-jelly brain. And within it, knowledge is not reduced to its »left-side« treatment, the logical and the sequential. It rather expands, and is part of a much broader understanding of what experience is, which could lead to think that there is a »right-brain knowledge«. In addition, and this is decisive, it shows that even logical thinking, Reason, that »angelism«, being in the brain as well, is as much part of materiality as sensible experience is, even if it is characterised as »the mind's eye«[3]. Unfortunately, by relying only (or mostly) on the visual, this multiplicity of experiencing, of producing knowledge has been »forgotten«, one side dominating the other. For McLuhan, this is the core of the problem: the issue does not lie in the inherent properties of the visual and therefore of the alphabet or print or other »visual technologies« in themselves. Instead, the problem is rather in the hegemonic character the visual space has taken. As a result, a lack of balance between senses, between thought and feeling occurs. This hegemony is for McLuhan even pathological, and referring to Cicero's *sensus communis*, he notes: »In any cultural arrangement, trouble always occurs when only one sense is subjected to a barrage of energy and receives more stimulus than all the others. For modern Western man that would be the visual state.« (McLuhan & Powers, 1992, p. 37). The diagnosis becomes irrevocable: »By neglecting ear culture, which is too diffuse for the categorical hierarchies of the left side of the brain, he [the Modern man] has locked himself into a position where only linear conceptualization is acceptable.« (McLuhan & Powers, 1992, p. 38). I mentioned that the separation between scientific knowledge and common sense is for Stengers one of the greatest problems philosophy and science has to deal with. In the first chapter as well, one could see how for Latour, hegemonies in modes of existence/experience, in the making of truths, become an issue. Or how for Montebello, only intellectualised modes of knowledge production are being deemed acceptable, thus neglecting others. The overload/overkill of the visual space described by McLuhan produces exactly that: a deeper territorialisation and a hierarchisation of knowledge practices, a bifurcated nature. Now, it is hardly an exact

3 This reminds Lyotard's perspective on thought and experience.

transcription of the bifurcation (as already said, it is hard to know to which extent McLuhan has been influenced by Whitehead's work), it can nonetheless be understood as one of its consequences.

3. The issue with text

More than a global critique of the visual, however, it seems that mostly one particular aspect of it — a particular tool — is deemed responsible for the lack of balance within experience: text. As already seen, its establishment as the »driving« visual force is concentrated in the invention of the alphabet in Ancient Greece, but more like a prologue. It is its systematisation, its broad diffusion, its combination with other inventions like mass print, that will achieve the apparent alienating aspect of text, producing a reader separated from the »sensuous event«. However, this would still be a severe reduction. The hegemony comes through practice. In order to understand the particular role that *text* has to play in relation to knowledge and experience, a closer look at Walter Ong's *Orality and Literacy* (2002) might prove useful. Not only does Ong's work resonate well with McLuhan's, the author also delivers a thorough historical study of the link between both »realms« as well as a sometimes-needed moderation. Moreover, even if Ong tends to describe the evolution of orality and literacy in a certain ethnocentric manner and even though he even subscribes to binary oppositions similar to McLuhan's, his analysis certainly remains relevant today[4].

First of all, Ong notes that the *status* of knowledge is not a priori reducible to the mode in which it appears. Oral cultures did/do produce a certain form of knowledge that is/was/still is important, of value. But this mode of knowledge production is not the same as the mode related to literacy, which he calls »study«, and which like McLuhan, he links to analytical, sequential, logical thought. A categorical difference without

4 See for instance the preface and postface written by John Hartley, which can be found in the French translation of Ong's book (Ong et al., 2014).

a power relation? Not quite, as Ong himself grants, all modes of producing knowledge are not equal, the qualitative differentiation is also a certain form of hierarchisation, a difference in status that appears, but it does so over time, over repeated practice. For him as well, the visual becomes hegemonic, like in linguistics, where a »relentless domination of textuality in the scholarly mind« is palpable (Ong, 2002, p. 10). From there, it is almost too easy to backup Ong's assessment by adding a lot of other (almost all?) scientific fields to linguistics, in which knowledge is solely presented in textual formats.

Secondly, Ong even goes further and by echoing McLuhan again, explains how *writing* as a technology, and thus literacy in general, changed ways of thinking and consequently of producing knowledge:

> »Our complacency in thinking of words as signs is due to the tendency, perhaps incipient in oral cultures but clearly marked in chirographic cultures and far more marked in typographic and electronic cultures, to reduce all sensation and indeed all human experience to visual analogues.« (Ong, 2002, p. 74)[5].

It is indeed a very important aspect, when one is looking at literacy through Ong: thinking of writing as a technology. In effect, it comes quite close to McLuhan's »probe« *the medium is the message*: McLuhan himself understood media as an extension of the human sensible capabilities (McLuhan, 2015). This implies that not only does it matter which *thoughts think thoughts*, as I argued with Haraway in the previous chapter, but that it also matters how those thoughts think. In other words, the technologies one uses in the production of knowledge have an impact, they act (in Latour's sense), they co-produce, co-create that very

5 This quote somehow echoes how Ludwig Wittgenstein considers propositions and thoughts: as pictures of reality, of facts. Even sounds are reduced to depictions: »A gramophone record, the musical idea, the written notes, and the sound-waves, all stand to one another in the same internal relation of depicting that holds between language and the world.« (Wittgenstein & Ogden, 1999, pp. 23, 24). It is hard to say however, if Ong engaged with Wittgenstein's work at all (there is no apparent references in *Orality and Literacy*).

knowledge. The everlasting opposition between a thinking subject and a passive object shows in that case its limitation. It is not the greatness of the human mind alone, gifted by Reason, that produces universal truths, through a perfectly transparent tool one can rule out of the equation, but a mind formed by the technologies of textuality in an entanglement of matter-energy-information.

> »Without writing, the literate mind would not and could not think as it does, not only when engaged in writing but normally even when it is composing its thoughts in oral form. More than any other single invention, writing has transformed human consciousness.« (Ong, 2002, p. 77).

By analysing the impact of writing on human consciousness, Ong actually demonstrates the materiality of knowledge and links it to back to its technologies of production. In that case, one might add, what does the text do? Does it really alienates knowledge from materiality, as I have posited earlier, or does it do quite the opposite? As often in the staged formulation of such questions, the answer is without much surprise: both. Text alienates because it abstracts from its subject matter and states without possibilities of refutation or change: »A text stating what the whole world knows is false will state falsehood forever, so long as the text exists. Texts are inherently contumacious.« (Ong, 2002, p. 78). Which also constitutes its paradox: its fixity, its apparent coldness, its abstraction from experience gives text the potential of unlimited actualisations and of a sort of re-activation of knowledge's materiality (Ong, 2002 also p.78). Coming back to new materialism, in particular through Haraway, this might also explain why text in the form of »speculative fabulation« — for instance in the mode of science fiction — remains a way of engaging with the multiplicity of modes of experience. Textuality does not alienate knowledge in itself. Rather, it depends on how text is used to produce that knowledge. This is the possible agency of text that is here determining, switching positions between subject and object, or better said, modulating the intensities between practices of subjectivation and objectivation, as van Loon shows in his article *The Agency of Ethical Objects* (2012). Indeed, the text and that is what Ong

tells us, fixates, it produces actualities. This fixation on paper actualises (objectifies) thought and knowledge[6]. However, those agencies are not fixed forever. Reading/re-reading a book, engaging with it, re-writing it maybe, thinking with it, shows that the fixated text also subjectifies the one reading it, as well as what's being read, it creates new virtualities.

Nevertheless, and this echoes what I have presented earlier, the issue lies in the hegemonic character one mode can take over the others[7]. Intellectualised modes of producing knowledge, apparently *de facto* textual, still bear the »truth stamp« of their forms of production. »The text states«. It is not only knowledge that is being produced. It is a question of truth and power. The power of the word. A scientist must publish her work to gain credit, to establish herself, to be a scientist. The good and true parole is only worthy when printed. Only published knowledge (also *de facto* textual) is deemed enough value to be seen as scientific, a value that of course also strongly depends on the prestige of the publication itself. Again, this is problematic because of the resulting categorisation and territorialisation of knowledge production that is being normalised and may lead to a circular, if not fully tautological, rendering of knowledge[8]. More importantly, through normalisation, those modes of producing knowledge also inherently tend to erase their situatedness (mostly white western older men, let's be honest) and at the same time neglect other forms of knowledge: at »best«, becoming an object of study, like in Levi-Strauss‹ structuralist analysis, at worst, common sense only good for the plebs (»Isabelle Stengers, de La Science à La Sorcellerie,« 2020). This is how text alienates. The hierarchy and power relations within knowledge production are reproduced. The question

6 This perspective somewhat resonates with the tropes of the relationship between the author/creator and her work. As soon as the work is done, fixated, it escapes the agency of the creator to become something else, with its own subjectifying–objectifying properties, itself able to change.

7 Orality being one particular mode including forms of language, within the »acoustic space«, but not the only one, as I will see discuss.

8 A common paradox for younger researchers: to gain credit, one has to publish in prestigious publications, but those publications only accepts contributions from scientists with credit.

that follows, therefore, is not if a comeback to an original orality is possible. This would be absurd, just as absurd as the question of rewinding the bifurcation of nature. No, the question is rather to which extent the inclusion of other modes of knowledge production in scientific practices might challenge the still ongoing hegemony (of practices, but also of practitioners) and deliver something different. Again, it is not only a question of replacement of old alienating habits (they still have to change, this is undeniable), but it is also a question of experimentation. In order to change. To which extent can those very specific textual practices, commonly understood as scientific, in combination with others, really engage with materiality and the plurality of experience? To which extent can one engage with and open themselves towards the plurality of modes of knowledge production to which the »acoustic space« belongs? Can that acoustic space be included in those practices, not only in the gathering of information, but also in its production, even in sociology[9]?

4. Re-investing the acoustic space?

In McLuhan's dichotomy, the acoustic space is the space of the sensible. Space of simultaneity, it is multidimensional, multi-centred, unbound and immediate, discontinuous and non-homogeneous. It is inclusive. It is where »*the center is everywhere and the margins nowhere*« (Findlay-White & Logan, 2016). It is not only the space of sound, but sound does play a particular role in it, due to its immediacy and multidimensionality. It has often been reduced to the space of the archaic, the pre-literate, the pre-modern (McLuhan, 2017). It is also the world of nature, even

9 In his book on conviviality, Ivan Illich proposes to look at tools quite differently: working with them rather than having them working for us. Other politics of the tool, even in knowledge-making? »Tools are intrinsic to social relationships. An individual relates himself in action to his society through the use of tools that he actively masters, or by which he is passively acted upon.« (Illich, 1973, p. 21).

maybe of an »unbifurcated nature«, not yet divided in a »nature for itself« and a »nature to be apprehended«. It was the sensible world that has not been subjected by Reason. It was the world of primary oral cultures (Ong, 2002). But it is now a world unattainable. As I argued, an undoing of the bifurcation is neither what is wished for, nor even really possible. Instead, I rather aim to follow Haraway's attitude and *stay with the trouble*. But then, why still intend to bring in the acoustic space? Why still propose to experiment on those modes of producing knowledge? Isn't it a subscription to the dichotomy, an either/or possibility, once again? Well, not quite and in what follows, I will attempt to show why in four steps: 1) the acoustic space was never gone, its importance for experience has »simply« been forgotten, which shows that 2) we live in a world of sound. 3) Actually, one never even stopped listening, their »sonic skills« were always already in use, even in modern science. 4) Through particular practices like »sonification«, one can see the acoustic/visual opposition is far from enough to understand the multiplicity of practices, within which sound indeed bears a particular importance, as I will later further underline.

We forgot how to listen

To understand this idea of an acoustic space that was actually »never gone«, which would then partly go against too stiff dualisms, McLuhan and Ong already propose some answers. First of all, McLuhan, as I argued, did tend to psychologise his definition of spaces of experience and locate them within the human brain. Left-brain thinking confined to logic and the visual, right-brain thinking, to the sensible. However, he does not see those differences as two entirely separated realms that function independently from one another. Instead, McLuhan seems to acknowledge the possibility for communication between both sides, a possibility for conjunct action. This is what he calls the *resonating interval*. It is what links, or rather what »defines the relation between figure and ground and structures the configuration of ground« (McLuhan & Powers, 1992, p. 3), where the ground is the medium, from which the figure as content might arise. In other words, the *resonating interval* is

an »interface« connecting two worlds, a space between spaces, already implying that *the medium is the message*.

In the case of right-brain and left-brain thinking, it is a liminality where thought and feeling are entangled as well as the acceptance of the plurality of modes of knowledge production, the acceptance of »both worlds«. This is not just the apparent resolution of a dualism — and the consequent preference of one side over the other — it is an opening. The resonating interval does not simply reconcile two modes of thinking, but through this process of coordination, makes apparent the singularities, the multiplicity of modes of knowing and experiencing. McLuhan gives several examples of what a *resonating interval* can be: a border, which, when acknowledged implies the other side, but also the 1968 Apollo mission, where through the camera, one was on the moon and on earth at the same time (McLuhan & Powers, 1992). For McLuhan, the resonating interval is not only an acknowledgement of »the other side«, but becomes a necessity to fully grasp the effects of technology, which he sees as extensions of experiences and actions. To a certain extent, one could argue that it brings the matters of concern back to technology and how it is being used. In all cases, the resonating interval is never silent. So seems to be the acoustic space, which, in modern, overly visual practices, has apparently been neglected. Indeed, both McLuhan (already in the 1950s) and Ong (in his 1982 *Orality and Literacy*) argue that new technologies might have a very important role to play in the revalorisation of the acoustic space. The establishment of radio, later on television are for McLuhan already enough proof that the acoustic is »back« into everyday practices. He even prophesies about the importance of the computer, in what nowadays sounds like classical science fiction:

> »By the twenty-first century, most printed matter will have been transferred to something like an ideographic microfiche as only part of a number of data sources available in acoustic and visual modes. This new interplay between word and image can be understood if we realize that our skulls really contain two brains straining to be psychically united.« (McLuhan, 2017, p. 72).

Retrospectively, McLuhan's prophecy is not far from being true. Even printed matter, which still extensively exists, was code at some point (a very visual-driven logical »ideographic microfiche« (McLuhan, 2017, p. 72) of sorts). Data sources, from sounds to images, are, in daily practices, being encoded, decoded. The question then arises if the code, which translates, is a new Greek and cryptic alphabet, taking away the sensuous event, or a facilitator, a creator of the resonating interval. For Ong, both literacy and orality are being electronically enhanced. On the one hand, the translated word becomes even more spatial and sequential, although gaining in immediacy. On the other hand, new technologies produce a kind of »secondary orality«:

> »This new orality has striking resemblances to the old in its participatory mystique, its fostering of a communal sense, its concentration on the present moment, and even its use of formulas (Ong 1971, pp. 284-303; 1977, pp. 16-49, 305-41). But it is essentially a more deliberate and self-conscious orality, based permanently on the use of writing and print, which are essential for the manufacture and operation of the equipment and for its use as well.« (Ong, 2002, p. 133).

Here again, one can already find in those words the importance of the code, of the binary language of computers, that translates »data sources«, but also necessarily rely on technologies of writing[10]. Rather than a »coming back« to old oralities, those dated but still somehow relevant accounts show the greater entanglement of practices of knowledge production, which for instance within modern science, will sooner or later go through an electronic-based translation process. What the authors show is finally that there is no separation between sensible realms, there is no *a priori* categorisation of experience, no natural hierarchy. Rather, there are specific practices that categorise and hierarchize those experiences and modes of knowing. The apparent neglect of the acoustic over the visual, which I only sketched through McLuhan and Ong, is thus an ensemble of processes, with particular historicities and particular relations of power. One could even argue,

10 Of literacy altogether. Codes have languages, syntax.

following Haraway's feminist epistemology, that the neglect of the acoustic space, i.e. the predominance of the eye is the dominance of a certain eye, a certain I, a certain position, infused in technology and science. A particular male and white gaze, posited as objectivity, that reinforces the hierarchisation of knowledges and thus, the alienation of those denied their production (Haraway, 1988).

A world of sound

To expand on this idea of an ever-present acoustic space, the work of Raymond Murray Schafer, in which one finds bits of McLuhanian theoretical inspirations, delivers some insight. In his fundamental book *The Soundscape: Our Sonic Environment and the Tuning of the World* (1993), Schafer shows how the acoustic environment and its related practices drastically evolved throughout History. Sound is, so to say, more present than ever and the amount of academic work dedicated to it shows an undeniable interest (it was true for Schafer in the late 1970s, it is still today). However, for Schafer, if one lives in an acoustic world, this does not mean that they know how to do so. It is for him one of the many dramatic consequences of Modernity: the increase of noise as a disturbance that is a result of an inability to listen »with care« — what he calls the *Clearaudience*, in contrast to clairvoyance. In turn, the amount of »noise pollution« also further deteriorates that ability to hear and listen (Schafer, 1993). Schafer even goes further by stating that even if the study of sound might have made huge progress, which could denote a regained importance of the acoustic space, it only happened through the visual. Basing himself on Helmholtz' account, who argues that science often requires visual methods to make sense of an event, Schafer writes:

> »This strikes the pattern to be followed, and while the science of acoustics has advanced greatly since the nineteenth century, the listening abilities of average mortals have not shown corresponding improvement. In fact, they may have deteriorated in inverse proportion to the pictorialization of sound. Today, many specialists engaged in

> sonic studies — acousticians, psychologists, audiologists etc. — have *no* proficiency with sound in any dimension other than the visual. They merely read sound from sight. From my acquaintance with such specialists I am inclined to say that the first rule for getting into the sonics business has been to learn how to exchange an ear for an eye.« (Schafer, 1993, p. 128).

The same issue then remains, even in academic fields specialised in the study of sound — the hegemony of the visual. Schafer's point makes sense in the light of what was proposed above: the visual, linked to logical processes, seems necessary to give a scientific account of how sound works. Only that kind of visual (re)presentation seems to be what »counts« as acceptable knowledge production. Consequently, not only the visual representations themselves, for example the graphical representation of a sound's frequency response, but also the vocabulary, the processes of categorisation, tend to diminish the importance of the acoustic, and reduce it to visual tropes. A visual representation of sound remains a diminished account, it abstracts and renders on flat surfaces a multidimensional, sometimes multi-centred event. It objectifies the sonic event. In that fashion, one could of course even catch Schafer at his own critique. His account, like every book about sound, is a visual rendering and fatally, a reduction, an abstraction. In Schafer's case, however, it is not simply a writing *about* sound: the categorisation he operates one chapter after the quoted piece[11] also falls into what he himself seems to criticise: the territorialisation of knowledges about sound (acoustics, psychoacoustics, aesthetics etc.), which limits and reduces what sound might be(come). This reduction, if not necessarily a symptom of the visual *per se*, might be one of the bifurcation of nature, once again. It is a limitation inherent to every writing dealing with sound, including Schafer, but also including this PhD thesis, because they rely on visual media, either in their production, i.e. in the process of writing itself, or in their reception: the book, printed or not, remains a visual representation of thoughts.

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11 Chapter 9 – Classification, the quote being from Chapter 8 – Notation.

That being said, this small and quite gratuitous attack was not meant to disqualify Schafer's work, it was not even meant to diminish the importance it has in academia. Instead, it shows how strong the bifurcation really is, how deeply practices, within science or not, within sound studies or not, are impacted by it. This can only make Haraway's call to »stay with the trouble«, even stronger. Nonetheless, Schafer, maybe acknowledging the limitations of his field of inquiry, hopes for a change, based on McLuhan's previsions about the »coming back« of the acoustic space: »If McLuhan is right, we may expect to move away from our dependence on visual representation of sound just as we are leaving print culture.« (Schafer, 1993, p. 128). Without giving at this point an exhaustive account, one can still reflect on those predictions. It is true that the evolution of computers led to the diffusion and omnipresence of auditory technologies — almost everyone carries a record player/tape recorder in their pocket. However, this omnipresence does not mean that the visual, or even print in a broad sense, gave any ground. Most listening applications have very visually-driven and textual user interfaces, even if they do implement touch and sound. In specialised fields, like in recording studios, digital tools often work on sound as if it was a visual medium. The user modifies a waveform that is apparent on a screen and expects that the changes on that screen have an effect on the actual sound. While these small examples show how persistent the visual is, the mentioned new technologies might still have the potential to change the practices of knowledge production. Nevertheless, even though the Greek musicologist Makis Solomos might be right when he states that we live in a »civilisation of sound« (Solomos, 2013), it does not mean that its balance with the visual in fact deeply evolved and that *sensus communis* has been reached. Some might even say, like Christoph Cox in his last book, that our current times even reinforced the impact of the visual: »This fascination with imaging, the desire and ability to present all information visually, and the epistemological priority of the visual are intensified in digital culture, in which the image has become currency and seeing (›eyeballs‹, in Internet advertising parlance) is pervasively monetized.« (Cox, 2018, p. 184).

Sonic Skills – we never stopped listening

Remaining within this »turf« — the visual/acoustic dichotomy — still eclipses much of what is actually going on, either in sound studies, or in the practices of science altogether[12]. It reduces sensory modalities to separate domains that are constantly fighting for hegemony or acknowledgement. Or better said, their »defenders« are. The modalities are not fighting, the materiality of experience is not exclusive. But here again, remaining in this »acoustic vs. visual« would only dramatize the practices I intend to understand and would insert them in a grandiloquent dialectical narrative. That is an overly simplified take on a much more complex and diverse landscape constituted by research and everyday practices. The acoustic/visual opposition shows its limitation in unpacking the primary controversy presented earlier. »We« actually never stopped listening. On the contrary, listening and sounding practices have been continuously implemented in research. The acoustic space is still active, and very much so. This is exactly what Karin Bijsterveld intends to show in her research, which »aims to understand the ambiguous and at times contested position of listening for knowledge in the sciences […] by tracking the shifting status of sonic skills in science, medicine, and engineering across the long twentieth century« (Bijsterveld, 2019, pp. 3, 4). Not only do listening and sounding practices play a role in science, even in engineering, but they seem to do so for quite some time, despite the deafening noise leaving people unable to »clearly hear«, according to Schafer. Still, as Bijsterveld explains, it does not mean that the issue of hegemony disappears as quickly as takes time to … sound. Looking closer at those practices, and how they are presented, one can still remark a certain hierarchisation in how knowledge is being received and understood as such. Commenting on a talk show where scientists shared their results gained through listening practices, she writes:

12 As well as in the definition of media, as Kittler shows in *Gramophone, Film, Typewriter* (1999).

> »Apparently, she [the interviewer] had trouble believing the geologists‹ ears. Their findings had not yet been *proven*, because the phenomenon had not been *seen*. By suggesting that hearing something is not sufficient to prove its existence, whereas seeing it would actually establish the fact, the interviewer posited a direct link between seeing and true science or ultimate knowledge.« (Bijsterveld, 2019, p. 2).

What is important here in Bijsterveld's introductory example is not the debate between both sides, which, as she later argues, is tackled very pragmatically by scientists. It is rather the apparent normality in which knowledge production is understood as visually-driven. This normality, however, as the geologist prove in their methods, or as Bijsterveld shows throughout her book, never truly exist. In challenging what is being considered as »normal« knowledge production, Bijsterveld is therefore not intending to re-establish sound practices or criticise visual ones, but to clarify how even within science, there is a disparity between the claims (acoustic vs. visual) and the actual practices. Auditory practices were not *hunted down*, but presenting knowledge through graphs and texts became a habit. She quotes Latour's article on writing to show that »inscriptions« — what can be broadly understood as the visual, written or drawn — were for instance the easiest way to distribute results, and that visually presented arguments appeared to be more convincing (which Latour sums up in the »you don't believe me, I'll show you« motto). As Latour further writes in this article: »We are so used to this world of print and images, that we can hardly think of what it is to know something without indexes, bibliographies, dictionaries, papers with references, tables, columns, photographs, peaks, spots, bands.« (Latour, 1986, p. 13). This easily convincing format might be linked to the strong objectifying potential of text that I described earlier with Ong's help. But departing from this standpoint and the apparent normal overload of one sensory modality over the other, Bijsterveld argues and empirically shows throughout her book that within science, sonic skills are as important as visual ones, in the production as well as in the distribution of knowledge. She states it from the beginning and the statement

remains true in her work, through and through: »[…] scientists do listen for knowledge« (Bijsterveld, 2019, p. 2). The sonar, the stethoscope, but also the set of skills doctors or nurses learn to react to alarms (within the body or not), and how they implement those skills in their work are based on very precise and complex listening practices that produce knowledge. And acknowledged as such. As knowledge production practices.

Sonification – the sonic representation of knowledge

All those practices can be understood as forms of »sonification«, of a sonic rendering or magnifying of an event, of information. For example, the stethoscope or the percussion technique (Bijsterveld, 2019), followed by a diagnosis, both help to determine the health state of a patient. They signify bodily functions or malfunctions. The sonar maps and signifies underwater landscapes and objects. Those techniques are tuned to the event they intend to understand, they produce knowledge — and they are not only practices of listening but of sounding as well — they are built to gain »insight« where the eye cannot go (Supper & Bijsterveld, 2015). In the last few decades however, another sets of techniques, which are now commonly referred to as »sonification« have emerged. First of all, their particularity emerges from what they are »sonifying«, namely *data* in the modern »big« sense of the word. More or less large amounts of gathered data about a topic, an object of inquiry that is not primarily sonic, are being translated into sound, like for instance EEG or particle physics measurements (Bjørnsten, 2015). Secondly, their purpose is not necessarily the gained insight or the knowledge content in itself, but the *value of representation*. This »value of representation« is itself not very new, as Latour already explained with Pasteur, for whom a successful demonstration needed to »show« the activity of microbes (Latour, 2001). Similarly, with data sonification and sonic skills in general, the *demonstration* plays a major role (Harris & Van Drie, 2015). This demonstration — showing of(f) data — not only serves the presentation of findings for science's sake, but is also used to convince peers and/or investors, to teach new recruits, to make available the findings for an

audience with seeing disabilities, to spark the interest of younger generations or a non-academic audience, and also to become accountable towards »civil society« (Bijsterveld, 2019; Supper, 2016).

Moreover, those practices rely on and confirm the importance of aesthetics — as sensory experience — in the construction of scientific knowledge. These sensory experiences are never only visual, or acoustic, or both, they also imply touch and movement (Supper, 2016). They all suggest a multiplicity of modes of knowledge construction and as Bjørnsten describes, the practices of listening become »knowledge-generating« (Bjørnsten, 2015). A multiplicity that has two indisputable consequences in the making of knowledge. In the first place, it strongly affirms its materiality, through the sensible, the bodily experience, the mediating technologies becoming objects with strong agency (Bruyninckx & Supper, 2016; Pinch, 2016). Besides, and in order to account for this materiality, it also needs a strong interdisciplinarity, both within the scientific community, as well as outside of it, the tools and techniques used lying beyond the classical methodologies (Bijsterveld, 2019).

Nevertheless, the practices of sonification present one major limitation in their knowledge production: they remain focused on the *representation* of data. This might become problematic when the ways of showing — a kind of indexicality which seems very visual — also denotes the apparent necessity of sense-making that the practices of sonification bring with them (Bjørnsten, 2015). One could also argue in addition that the *representation* of data, which is a reduction and abstraction, is another objectivation of what remains an »object of inquiry«. The example of the *MIDI Sprout*, which I already presented in the introduction and will resurface later on, can help to clarify this question. It is a sonification device that »makes plants sound«. It is made of electrodes that sense biofeedback (small electrical current differences between two poles of a living organism) and translate it into Musical Instrument Digital Interface or MIDI data, a communication protocol used to carry musical information between devices. The MIDI data corresponds to musical notes and control information that are originally coming from the plant in the form of biofeedback. This data can be

sent in real-time to musical instruments (hardware or software) with MIDI support, giving the impression that the plant plays music. The device represents biofeedback. Where sonification might be an issue, is in the user's practice, listening to the notes being played and attaching meaning to them. The interpretation of those sounds, the projection of feelings or musical taste onto the plant is only its personification[13]. Indeed, the sounds themselves do not come from the plant, but from the software/hardware dealing with the MIDI information. The same data can become either an ethereal organ sound or abrasive percussions, depending on the user's intent/inspiration and the pieces of gear used to »decode« the data. However, the practices of sonification also produce an undeniable awareness towards what is being depicted. In the case of the *MIDI Sprout*, changes in the intensity of the MIDI data can be traced back to the experience of the plant itself. Biofeedback values depend on closeness, temperature, humidity, light, and so on. Those have therefore an impact of the delivered data. In other words, the device magnifies the liveliness of a plant, through sound. By doing that, it restores the materiality of the experience, and the importance of the sensible. It intensifies the ways of interacting with the plant. In that manner, the *MIDI Sprout* only partially objectifies the plant. Or better said, it seems that it tends to even subjectify (not personify) it to a certain extent. Through re-inforcing its liveliness, it charges it with a certain agency. Thus, to go with Bijsteverld, it does not remain solely in the »sonification paradigm« (against the visual) but multiply the modes of experience altogether. Or rather, as Vallee (2020) shows with Sterne and Akiyama's (2012) article, it allows to propose a different understanding of sonification altogether that goes beyond the classical dichotomies that have been presented earlier. However, for Vallee, Sterne and Akiyama's promise is to be taken with caution: »They ultimately return to sound as something that is intended to be listened to: even in the face of a dismissal of the listener, they constitute the listener as the *sine qua non* of a sounding event.« (Vallee, 2020, p. 15).

13 For similar examples, see Bjørnsten (2015); quoting Connor (2013)

5. Perception and the reification of sound

It should be clear that scientific practices never were truly void of sound (and/or silence) and that, within those practices, more often than not, the sensory experience was playing a major role. Consequently, those practices were never performed in a visual–acoustic dichotomy, but embraced the entirety of sensory capabilities. However, in the case of sonification practices, it has been proposed that they are too often bound to the human listener. A set of questions thus remains: to what extent those sonic skills indeed included the materiality of knowledge and thus the multiplicity of modes of knowledge production? Can sonic skills be understood beyond human perception? In Bijsterveld's *Sonic Skills* as well as in the other articles analysing sonification practices, the use of sound »in the laboratory« was not so much different than the use of any other tool. Bijsterveld was very clear on that matter — scientists were very pragmatic in choosing their methods. Sound became the tool, which also was the aim of *Sonic Skills*: »The project was primarily interested in sound and listening as a way of acquiring knowledge about human bodies, animals, machines, or other research objects, and thus in sound and listening as a *means* rather than an *object* of research.«(Bijsterveld, 2019, p. 4). If sound was not so much the object of study, it certainly became the object allowing to study. It became the mediation tool that needed to be perceived and made sense of, itself »making sense« of what was not sound. In reaffirming the materiality of knowledge production through the importance of the sensory experience mediated through sound, sound itself underwent a reification.

This process of reification of sound happens as an effect of the qualification of sounding as needing a listener to even exist, as seen with Vallee (2020). But it also goes beyond the practices of listening themselves. Bijsterveld notes that sonic skills are not only listening skills, but also the »ability to design, record, store, mimic, and retrieve sound« (Bijsterveld, 2019, p. 81). The issue thus rather lies within the practices of sensing/perceiving that are attached to those skills and seen as the outcome for sense-making. This echoes the theoretical discussion that

happened in the 1960s when Pierre Schaeffer was conceiving his *musique conrète* and created the notion of the *objet sonore*. As Makis Solomos explains, Schaeffer's *Traité des objets musicaux* was first and foremost a treatise on listening (Solomos, 2013). What Schaeffer did was to shift the focus on how to listen and granted it a very human intentionality directed towards the »sounding object«. In other words, the human faculty of perception was for him the central element, not only of his music, but his research. Schaeffer is interesting here, because his phenomenological standpoint towards hearing/listening shows the key role that *perception* — as intentional and particularly human — plays. Remembering the use of van Loon's (2012) agency of ethical objects, in that manner, the practice of listening indeed objectifies not only the represented data, but sound as well. It actualises it. Of course, this is quite clear when sounds are »the object of study«. It becomes a bit more difficult when sounds are the *means* for study. But in that case as well, it seems that the faculty of *perception*, in the phenomenological sense, is what is central not only for understanding but also for knowledge-making. The sensory remains a product of cognition and »perception is thus elevated to the unique status of being the portal between the world of ›things as such‹ that we cannot know and the world of sense-making and reflection, that is, the world of consciousness.« (van Loon, 2012, p. 198). Here again, one can only repeat Vallee's critique quoted above: sound becomes intended to be listened to… by humans.

Coming back to the question asked at the beginning of this part, can one understand a making of knowledge through sound beyond human perception? By adopting a »new materialist approach« and by reflecting on how practices of sounding are understood, indeed, such a venture would appear possible. The question of »sounding« will be tackled next chapter in greater detail, but for now a shift can be proposed, from the phenomenological notion of perception — too much imprisoned in Cartesian thought — to the concept of *prehension*, which has already presented in the previous chapter. For Vallee, the link between sound and prehension can be found in Steve Goodman's *Sonic Warfare* (2012). In that book, Goodman refers more than once to Whitehead's philosophy, but it is the passage quoted by Vallee that best sums up the

possible link between sounding and prehension: »a nonanthropocentric concept of feeling. This notion of prehension exceeds the phenomenological demarcation of the human body as the center of experience and at the same time adds a new inflection to an understanding of the feelings, sensuous and nonsensuous, concrete and abstract, of such entities.« (Goodman, 2012, p. 95). The multi-directional, multi-centred and intensive character of sound, through its propagation, its reflections, absorptions and reverberations in space makes it quite clear how prehension is at the core of perception altogether. This would then allow to consider sounding, not as a process needing a human ear to even exist, as Vallee argues, but as »part of the configuration in a network or infrastructure« (Vallee, 2020, p. 16). What is important at this point, is the consideration that the sensory experience cannot be reduced to human subjectivity and that sound does not »need« to be listened to. Experience is not proprietary.

Prehension would then allow to escape the anthropocentrism of phenomenological perception. Prehension is a capture, the making of singularities out of plurality. It is the process that individualises, or rather individuates entities, not by separating them from »objects«, but by letting those »objects« be part of the (not yet finally constituted) »subject«, which thus can change through them. It is an appropriation of others that at once forms the »subject«, but also a sense of association, prehension never being only one-sided. This idea of appropriation comes close to Gabriel Tarde's own perspective, as Didier Debaise underlines in *Un empirisme spéculatif* (2006). Entities — or monads for Tarde — appropriate one another. What differs is not the inherent qualities of those entities, hence their being, but the degree and the mode of appropriation performed, a movement on the subjectivation-objectivation continuum.

6. What is sounding?

One can see now that the premises of this chapter are slowly moving. If the question of the materiality of knowledge remains vivid, its treat-

ment through the visual and acoustic became quickly limited, mostly because it has been too often posited in terms of human perception/human activity. Arguing that knowledge has been alienated from materiality because of visual practices only repeats the primacy of human perception. However, through new materialism, one can also see a way out of the dualism which appeared through a certain understanding of perception. The problem is not the visual, or any sensory experience in itself. The importance of visually-driven practices became a norm mostly through the force of habit — which did not mean that sounding/listening did not happen.

The problem either lies in how those experiences were qualified and made sense of, or how they kept coming back to human perception and how they were built as hegemonic and exclusive. To re-enter the realm of *musique concrète*, it is not unlike what Schaeffer did by locating the practices of sounding and listening within human subjectivity and perception: sound and knowledge are being extracted from materiality and only read through the conscious mind, as if it was separated from that very materiality. In sonification practices, they became representations. Prehension however might come closer to what François Bonnet qualifies as being »underneath listening«, not reduced to a »making sense of« (Bonnet, 2019). To a certain extent, it also comes closer to the practices of composing and »listening differently« pursued by John Cage, refusing to intellectualise sounds, practices themselves echoing the Deleuzian understanding of listening and composing music: the slicing and sampling of the sonic flux (Cage & Charles, 2009; Cox, 2018; Solomos, 2013). However, such an understanding of sound not only changes how music composition works, but also how music is being performed, and even goes beyond musical practices. The materiality of sound has an impact on how »order« is being (re)shaped. Goodman (2012) demonstrated it quite clearly with sonic bombs. A sudden burst of sound (a siren, a detonation, a lightning bolt, or even that sonic bomb) bears an extreme violence, even when it lies beyond what the human ear perceives. Its impact is irrefutable. Its actuality, inescapable. It interrupts the situation, leaving for only possibility a recalibration, with the knowledge of what happened. This can be translated into a prepa-

ration, an apprehension, a fear of the next impact. After the bomb is before the bomb. In those cases, the apparent silence in-between is as defining and violent (Bocquillon & van Loon, 2016). In any case, sound changes what was, it becomes a matter of concern.

Moreover, the issue does not entirely lie within the definition of sound, but within the practices themselves and the technologies used in those practices. The title of this part asks what sounding is, but by proxy, it asks what techniques, what technologies allow this sounding. For instance, I noted earlier that practices of data sonification are mostly *representing* data, which was linked to issues of objectivation and reification of sound or said sonified data. However, as Sha proposes in *Poiesis and Enchantment in Topological Matter* (2013), a shift is possible, if not necessary, in how technologies are conceived, in order to experiment with a *thinking-with sounds*. Sha sums up his proposition regarding »technologies for making images and sounds and texts and things« (Sha, 2013, p. 20) as follows:

> »What I propose in this chapter is simply to shift how we regard these technologies, to see how they can be used not to represent facts and knowledge but instead to create events. In short, I propose to shift the perspective from *representation* to *performance*. By *technologies of representation* I mean those technologies for creating media that are later perceived by a spectator in an edited form that does not vary according to what the spectator or environment is doing during the playback of the recorded media, whereas by *technologies of performance* I mean technologies that vary media by design according to contingent conditions and activity.« (Sha, 2013, p. 20).

Sha's perspective is interesting on several levels. First of all, focusing on performance rather than representation allows for practices of sounding and listening that are *prehensive*, and which expand the definition of agency. The subject/object dualism becomes a movement between practices of subjectivation and objectivation. Then, by allowing this change in agency, for instance through »responsive environments«, the practices of sounding also produce a shift in how knowledge production and experience are being shaped, opening onto a multiplicity of modes, re-

volving around the materiality of those practices. As he mentions, it is a departure from the composer (as the mastermind creating and directing) to the performer (a prehending body). Including technologies of performance in sociological research would therefore allow redefining what the researcher is actually doing in regard to other actors in a given situation.

Those questions and reflections necessarily imply to re-think practices, or rather, again in echo to Haraway's trouble-making, to »think-with« differently in order to propose new ethical sociological practices that include humans, non-humans, more-than-humans. The linking dash thus at once acknowledging a certain situatedness and accountability as well as implying a step aside, not only a thinking about something, but through it, with it. To escape intellectualised modes of knowledge production, the problem needs a deeper reshaping of what is being done. For instance, it means that the question of sound needs to be asked differently. In sonification, sound objectifies data. An already objectified sound, one might add. If one intents to account for the multiplicity of modes of existence and experience, one would also need to extend how agency is being »distributed«. Can practices of sounding, through *technologies of performance* help doing so, by subjectifying, by intensifying the importance of what is being encountered? Asking this question is repeating the initial proposal of this work, namely that sound, through its immediacy and vibrational quality, may help to intensify the materiality of knowledge and diversify its modes of production and that in turn — within sociology — to develop a *thinking-with sound*. This *thinking-with sound* becomes an ethical practice: a thinking-with accounting for a horizontal doing together, which then would avoid to reify sound — or whatever/whoever is there — too quickly.