

# Gestures, Diagrams, and the Craft of Musical Composition

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**Abstract.** Based on recent developments in the mathematical theory of music, philosophy of mathematics, and gesture studies, this paper builds a pragmaticist (Peirce) philosophical framework within which musical composition can be analyzed without reducing it to “abstract formulas” or “inspiration”. At least two widespread types of *artifacts* that mediate the compositional process rely on *gestural* techniques, namely, musical instruments and notations. Notwithstanding, the creative dialectics between gestures and sounds, mediated by artifacts, became the target of in-depth investigation in musicology only in recent decades (Mazzola). And the creative potentialities of musical notations still nowadays tend to be tackled by considering only the strategies of visualization that they afford (Krämer), leaving aside the *manu*-facture and *manu*-tension of the diagrammatic (Alunni) — already identified, however, in the philosophy of science and mathematics (Châtelet). We will show how a diachronic perspective on those gestural techniques can reveal an interesting *role of the body in the opening up of musical “programs” to dissonances and noises*. Far from being the outcome of “intellectual” decisions, new musical continents have been (re-)searched and cultivated through specific modalities of gestures, that we will try to uncover and systematize.

**Keywords:** Musical Composition, Musical Gestures, Musical Diagrams, Musical Pragmatism, Musical Artifacts.

*Now, divine air! now is his soul ravished! Is it not strange that sheep’s guts should hale souls out of men’s bodies?*<sup>1</sup>

## 1. Introduction

In a passage from *Das Glasperlenspiel*, Herman Hesse calls our attention to the fact that the sensuous, concrete, and bodily dimensions of musical phenomena tend to be neglected in favor of intellectual abstractions. The novel’s main character and master of the highly formal Glass Bead Game argues that without sensuous contact with music, without making music with one’s fingers, hands, mouth, and lungs, without

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<sup>1</sup> Shakespeare (*Much Ado About Nothing*, II/3) on the strangeness of music: sheep’s guts stretched over a piece of wood (e.g. violin) can sound divine air and move one’s soul.

experiencing the “outpouring of breath” and the “beating of time” it is not possible to grasp music’s deepest spiritual layers.

Indeed, beyond Hesse’s fictional world, if we look at how the *compositional process* has been described since the Pythagoreans, it becomes clear the predominance of approaches that focus solely on disembodied strategies (such as logical and abstract reasonings) that, after formed in the composer’s mind, are codified in notations and then “translated” through gestures in musical performances. Let us remember, for instance, that from Ancient Greece through Early Modernity music existed in a great deal under the legislation of philosophical and mathematical speculations that would then “set the tone”, that is to say, provide the sets of rules (*tékhnē*) and ratios (*lógoi*), such as intervals, scales, forms, etc., for the composer to operate, as in Hesse’s game.

Hand in hand with this abstract rationalization of composition, another influential approach to music that also ignores bodies and materialities became particularly influential in the philosophical debate on musical composition at least since the 18th century. According to this line of thought, composition must be explained in terms of *inspiration*, a gift to be found in the *genius*. In Kant’s third critique (1987, §46-§50), we learn that indeed music is guided by mathematical relations, but that they are not enough to explain how a musical composition is put-forward, how it comes to be. Learning and blindly operating with abstract mathematical rules will not, believes Kant, bring-forth anything relevant in music. It is nature itself that must speak through the artist; nature must whistle, in the ears of the composer, the secrets of creativity that exist beyond (and cannot be derived from) all sorts of rules, concepts, and available conventions.

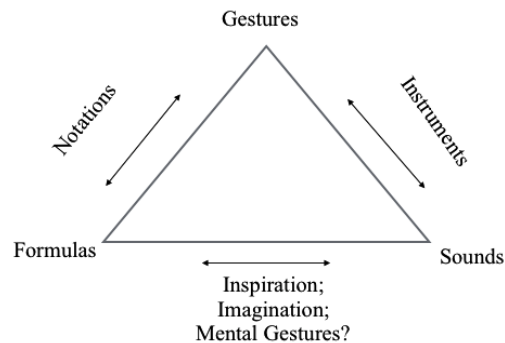
So what about the breathing, beating, touching, plucking, and other embodied aspects of music-making that Hesse’s character calls our attention to? What to say about the materiality of musical artifacts such as instruments and notations? *Is it possible to understand musical composition without referring to bodies, tools, and their manipulation? Are musical bodies and artifacts completely subordinated to a mathematical and disembodied operativity?*

It is interesting to notice that the philosopher and mathematician Gilles Châtelet (2000) was struck by a similar scenario while re-thinking the ancient and problematic relation between mathematics and physics. Following the Aristotelian distinction, we learn that the most abstract of the sciences has to do with what is *necessary* while the latter is concerned with *mobility*. However, Châtelet asks: can one really abstract necessary relations from mobile objects or apply mathematics to physics without making reference to the hand that traces the diagram? Historically, he continues, the mysterious transits between mathematics and physics have been overlooked. It is important, therefore, to throw some light in this intermediary field of gestures and diagrams that seems to be responsible for the constitution of the *physico-mathematics*. Indeed, Châtelet shows how the interplay between *gestures* and *diagrams* is at the *core* mathematical inventiveness. They are what Châtelet calls *techniques of allusion*. They are responsible for keeping mathematics from being buckled up in an abstract “grammar”. They preserve its *potentiality* to grow and differentiate.

A similar experience is reported by the musicologist and mathematician Guerino Mazzola (2007), but now concerning what we could call the possibility of a *musico-mathematics*. After building an extraordinary mathematical framework to study music (Mazzola, 2012), Mazzola was struck, before a piano improvisation, by the fact that his music had less to do with an *application* of the abstract formulas than with a *gestural performance* (Mazzola, 2007). This insight has led Mazzola to initiate a new project of mathematical formalization of musical gestures.

Bearing in mind the seminal contributions of Châtelet and Mazzola, we would like to introduce some further distinctions towards a concept of *gesture as a principle of musical composition* (see **Fig. 1**). While Mazzola proposes a new continent of formalizations of *performer's gestures*, reaching layers inaccessible in the realm of formulas and scores, we would like to distinguish *three modalities* of gestures that unfold in the *history of musical composition*. These modalities situate the gestures in relation to what we could call musical programs (e.g. schemas, models, formulas). Following C. S. Peirce's terminology, we can name these modalities symbolic, indexical, and iconic. First, there are gestures that merely play what the program has prescribed (pre-inscribe = pro-gram) as a possibility. Second, there are gestures that introduce some dissonant notes not predicted by the program. A third modality consists of *gestures of (musical) (re-)search* outside the programs. Using Peirce's terminology<sup>2</sup>, we can also name them *gestural habit*, *gestural occurrence*, and *gestural idea/potentiality*.

By analyzing how composers *manipulate their artifacts* and trying to grasp the *pragmatics* of this manipulation, we believe we can shed some light on music's capacity of always going beyond mathematical formalizations towards the unknown, albeit not arbitrary, musical sites.



**Fig. 1.** Map of musical composition, based on Mazzola's schema (2007, p. 147). Most of the approaches consider only the dialectics between formulas and sounds, with no bodily gestures. It is often considered that inspiration or imagination, whatever they

<sup>2</sup> This terminology appears, for instance, in Peirce's letters to Lady Welby, between 1906-8. See Peirce (1998, pp. 477-91).

might be, must be the mediators of that transit. If we follow Châtelet (2000), maybe we could talk of mental gestures of musical composition. We focus, however, on the composer's *embodied gestures*. The dialects between gestures and sounds, mediated by instruments, is present in Mazzola's theory when he discusses the case of musical improvisation. We will show that this is valid for musical composition in general. The other dialectics, between gestures and formulas via notations, is **fully not** analyzed by Mazzola. However, we think it plays a crucial role in the history of musical composition. In both sides of the triangle, as we will demonstrate, gestures manipulate the artifact more or less pre-informed by formulas. These formulas might be present in the composer's habits or "installed" in the notational systems, in the instruments, as well as in musical material (e.g. tonal system). It will be shown that gestures are often escaping the formulaic pre-determinations. When it happens, new musical virtualities are mobilized.

## 2 A pragmati(ci)st Conception of Gesture

### 2.1 General Remarks

In the past couple of decades, we have seen a growing participation of this term — *gesture* — in researches about music. Its use, however, is not at all unified. The same *word* has been *conceptualized* in different senses, referring, therefore, to different objects or phenomena<sup>3</sup>.

In Mazzola *et al* (2017), this multiplicity of conceptions is present and summarized, forming an interesting constellation that precedes the mathematical definitions added by the authors. We shall continue from the clues they gathered towards our distinction between three modalities of gestures of composing music and their related artifacts.

The well-known definition of Hugues de Saint-Victor — translated by Valero (2018, p. 140) — is a good start: "Gesture is the movement and configuration of the body's limbs, towards an action and having a modality". Now, how does that apply to composition? That definition already distinguishes bodily movement and configuration towards actions from those that are not set within the scope of an action. As Zalamea (2017) reads it, this gesture definition implies that the body configuration and movement must have an *aim* in order to actually be gestural.

Extending Mazzola's and Zalamea's reading of this gesture conception, Valero (2018) highlights that what is at stake in this concept is a *possible* configuration of the body achieved through continuous movement. And that means that gesture should not be reduced to movement, for it encompasses this triadic relation between a first state from which movement starts growing and amplifying (as says Châtelet (2000)) itself until it achieves, let us say, a pose — which can foster another aim (pose) and with that trigger off another movement, and so on. And of course, the final pose, if any in

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<sup>3</sup> See, for instance, de two volumes on music and gestures edited by Gritten and King (2006, 2011).

the strict sense, is less of an aim than the action itself, the forming through movement, the *configuring*. Moreover, since this triadic dance is understood in a pragmatist sense, it is embedded in continuity, which means that (i) the potentiality that fosters or aims at (ii) a certain pose or configuration as well as the (iii) movement that provides the mediation between the potentiality and the actualization of the form are not discretely localized but exist in blurry contact zones. Putting together Mazzola's mathematical definition of gesture as a morphism in which the arrow is a real movement and not a discrete-symbolic state and Peirce's categories of *firstness* (potentiality), *secondness* (concreteness), and *thirdness* (mediation), Valero (2018, p. 143) summarizes this conception of gesture as follows:  $f : A \rightarrow B$ , in which  $A$  is the first state or potentiality,  $B$  is the aimed configuration, and the arrow is a movement/mediation.

## 2.2 Towards a Triadic Conception of Musical Gesture

We would now like to distinguish three modalities of gestures within this pragmatic conception outlined by Mazzola *et al* (2017), Zalamea (2017), and Valero (2018). The modalities we will propose on the one hand rely on the constellation of gesture studies that Mazzola *et al* (2017) mobilize — from medieval “semantic gestures” all the way up to the pre-semiotic definition — and, on the other, might help us to navigate with more consistency and diachronically through that multiplicity of definitions.

We could say that, if a gesture is a mediation between a starting point towards an aim, it is possible to distinguish at least three modalities of gestures depending on the relation that takes place between those two moments. In definitions that Mazzola *et al* (2017) classify as semantic<sup>4</sup>, the aim is not a vague potentiality, but rather a clear message that one intends to convey *by means of* certain bodily movements. The so-called pre-semiotic approach<sup>5</sup>, on its turn, is characterized by an unknown aim; the bodily movements might only become significative *a posteriori*. Then, it is not difficult to envisage here an intermediary case, namely the gestures whose aims are only partially determined, and therefore only partially semantic.

These three modalities can be further explained in relation to Peirce's phaneroscopic and semiotic categories<sup>6</sup>. In the “semantic” definitions of gestures, one can find all sorts of *symbolic* bodily movements, such as “socially tamed” gestures. What is important here is that the gesture is pre-inscribed from its beginning, that is to say, it is programmed, codified by the very aim or message it intends to achieve, express, communicate. It conforms to a general law or habit. However, a bodily movement can *make sense* without being symbolically regulated (i.e., without being

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<sup>4</sup> For instance, Jean-Claude Schmitt, Adam Kendon, and David McNeil.

<sup>5</sup> For instance, Gilles Châtelet, Gilles Deleuze, and Charles Alunni.

<sup>6</sup> We are referring here to the known categories of *firstness*, *secondness*, and *thirdness* with their equivalent typology of signs, divided in *icons*, *indexes*, and *symbols*. Mittelberg (2014) has already proposed some interesting classifications of gestures based on Peirce's semiotics that can also serve as an introduction to this topic. See also Mittelberg and Evola (2014).

“semantic”). Any general gestural habit might be slightly adjusted in each of its singular manifestations<sup>7</sup>; and the specificity of a *certain* use of a symbolic gesture might be extremely meaningful in that context, even though the message (aim) it conveyed was not completely clear and available beforehand. This singular manifestation of a bodily movement containing specificities that *make sense* without being pre-inscribed in any symbolic gesture is what we could call an *indexical gesture*, or what Peirce once called a sign of *occurrence*. Moreover, the spontaneity of bodily movements that are not aimed at a pre-established meaning, the gesture as “an action and attitude, not more and not less” (Mazzola *et al*, 2017, p. 848), is precisely the gesture as a movement towards a *potential* meaning. To be more precise and differentiate this potentiality from a possibility programmed in the message to be conveyed, we could call it a *virtual* meaning (as Châtelet does). This is the modality of the *iconic gestures* — or, more specifically, *diagrammatic gestures*, since they are nothing but “the embodiment of a skeleton in a space” (Valero, 2018, p. 2) with a potential or virtual meaning.

While the pragmatics of the symbolic gesture is a straightforward case of accommodation or “domestication” of the singular bodily movement in relation to a general schema, the singularity of the indexical gesture and the openness of the iconic or diagrammatic gesture need some clarification. And to do so in a concise way, we would like to merely highlight that the “pre-semiotic approach” (Deleuze, Châtelet, Alunni) evoked by Mazzola *et al* (2017) as well as Peirce’s *pragmati(c)ism* are concerned precisely with this topic: the passage from the singular event to the general meaning without the aid of a given rule of thumb (i.e., Kant’s transcendental schema). As those authors show, the dichotomy between singularities and concepts (meaning) must be bridged by acknowledging that the particular extends itself in a generality that is not yet completely fixed and given *a priori*. That explains why the gestures that escape the given generality of the symbol need not be irrational, pure chance, meaningless: rather they are somehow attracted by and move towards other symbols that for the moment remain vague and imprecise. Leibniz (1900, §25-6) saw it very well in the analogy, quoted also by Châtelet, of the of veined marble: knowledge is not concerned only with what is actual, but also with the virtual, just like the sculptor finds out figures in the marble *guided* by subtle veins that at first seemed meaningless.

We will now show how this triadic conception allows us to grasp the historical unfoldings of gestures in musical composition. If at first gestures are much more composed than composers, we will notice that they slowly shift towards the center of a modernist compositional heuristics. With gestures, music grows not in *rationality*, but in *reasonability* (Peirce).

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<sup>7</sup> According to Colapietro (2013), this capacity of transcending pre-established habits is what makes human communication through utterances and gestures so creative. In that sense, according to Colapietro, human interactions always take the form of a jazz improvisation, in which the very habits of the past are interrogated.

## 3 Gestures and Instruments

### 3.1 *The Victory of Symbolic Gestures*

There is an interesting Greek myth about the satyr Marsyas, that is said to have challenged Apollo to a musical competition. In one of the versions, the myth says that Marsyas lost the contest since he played his aulos in such a virtuosistic manner that no one could listen to it without feeling excessively excited, while Apollo, playing his lyre with precision and control, would make everybody stand still and quietly rejoice. In other words: Marsyas is seen as ridiculous for improvising in such a frenetic style; Apollo is applauded for the rational use of his instrument.

The victory of Apollo set the tone of long lineage, from Pythagoras to J. S. Bach through Boethius. This affiliation is characterized by the privilege of abstract music of mathematics over acoustic and embodied music. Very early in the history of music, the sounds of artifacts as well as the bodies that make them (re-)sound were sent up to the spheres of the rational (ratio = logos) forms, and since then *practical* music was put into a lower category, allowed to be exercised only under the legislation of the mathematical forms<sup>8</sup>. According to Szendy (2016), *performer's* body starts to appear in musical treatises only in the 16th century — but still in relation to symbols (tablature) that should inform (i.e. give form) to it.

Even in part of J. S. Bach's music, one can still listen to this hierarchy. In some pieces (e.g. *The Musical Offering*) the composer plays the keyboard as if it were a computer keyboard: the fingers only type (mathematically) well-formed codes. This is the perfect example of a programmed or symbolic gesture. It is as if the musical rules, schemas, or habits were so crystallized that they already contained *a priori* the *possible* (meaningful) gestures. The composer's gestures might combine and recombine the codes, but they do not push it over its limits towards new continents of non-formalized sonorities.

### 3.2 *Gestural Indices of a New Musical Continent*

However, already in the 16th century, the Apollonian-Pythagorean agenda started being questioned, challenged, we would argue, by the *occurrence* of non-symbolic gestures. The advances in polyphonic music and specifically in the *practical* music could not hide anymore the fact that one can *make (musical) sense* beyond the pre-established (mathematical) schemas inherited from the tradition. The debate between Gioseffo Zarlino and Vincenzo Galilei during the Italian Renaissance is emblematic. Zarlino, as a neo-Pythagorean, tried to adapt the greek master's theory to include the music of his time in an expanded symbolic mathematical model. Galilei, however, accepts the limitation of the Pythagorean approach and seeks in the materialities of the instruments clues that would explain the origins of consonances and dissonances *heard* in the practical music of his time. There was a shift from the paradigm of the *sounding number* to that of the *sounding body*.

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<sup>8</sup> See Lydias Goehr's study on the concept of *musical work* (Goehr, 1992).

Now, if the old symbolic system is not anymore considered the all-encompassing program of music, and if it is acknowledged that *beyond it* or *beside it* one can still *find music*, one can expect also a shift in the *type of gestures* in music-making. Indeed, the 16th century Italian Renaissance reveals a new type of gesture in the style of the *toccatas*. In musicological studies, pieces of *toccatas* are often described in terms of their improvisational traits as well as regarding their “dreamy” or loose treatment of musical conventions and their “extravagant” harmonies (Burkholder, Grout, Palisca, 2014, pp. 279, 343-4). As we see it, the anticipation of dissonances that would become a commonplace only centuries later can only be explained by the fact that intervals considered distant in theoretical terms are nonetheless one finger away when one plays the organ. We are dealing here, therefore, with kind of improvisatory music that has its basis in the musical program socially codified at the period but that nonetheless evades it with unexpected shifts and combinations propelled by the performance, and *not* due to new calculations.

We say these gestures are indexes in the sense that they are singular, contingent, fortuitous reactions of the players’ body in relation to his/her instrument. In that sense, they are also *gestural occurrences* inside a musical program. They make the instrument *sound* different for they press the keys in unheard of sequences and combinations, synthesizing unheard-of sonic-blocs. They are singular occurrences, but *not* arbitrary. It just means that instead of the music symbolically pre-inscribed, now we can listen to the music (re-)searched and found by the fingers in movement, rhythms, and sensations of the body.

Probably the tonal system was one of the last attempts to save a programmed musicality. Throughout almost three centuries, all musical notes had a pre-established function within a new all-encompassing schema. But the indexical gestures grew so much inside this modern musical apparatus that their frequent (re-)occurrences challenged the very core of the tonal program. With time, it becomes evident how much *sonic space was conquered by gestures that explored, here and there, the borders of the tonal prescriptions*. It would soon reach the moment of collapse of the tonal web; a moment in which musical matters would float in a fragmented space — like in the Wagnerian never-resolving tensions.

### ***3.3 Gestures in the (Re-)Search of (the Virtual) Music***

In the midst of the loosening of the tonal ties, a *new type of gesture emerges as the principle of unheard-of ways of organizing the acoustic spectrum into music*. A fresh heuristics of composition seeks in the radicalization of the gesture over and through the artifacts *means* of connecting sounds with consistency but without falling back to older symbolic programs. In fact, the *iconic* or *diagrammatic gesture* appears first precisely in those composers that accepted the lack of orientation as the starting point of their music and then turned to their instruments and played with their bodies, more than with their minds. The paradigmatic example here is the tradition of the *piano études*.

It is true that already J. S. Bach composed music with the aim of training the pianist’s fingers. However, what starts to change in the second half of the XIX century

is that fingers are now mobilized to *search for new acoustic combinations*, instead of being in-formed by stylistic habits given *a priori*. One of most clear examples is, without a doubt, Claude Debussy — composer *and* pianist. As is well known amongst pianists and musicologists, Debussy's *études* presuppose a well-trained pianist body and *move on* from it, towards swinging blocs, and whispers, and colors that were never calculated, but rather touched and set to motion. Each of the 12 *études*, composed in 1915, has as its theme a specific *gestural configuration* that is then *manually unfolded* over the keyboard. In the dark, eyes shut, the composer gropes the piano's keys, but *not* randomly — rather guided by a gestural diagram, the veins of his acoustic marble, that establishes a field of proximities and distances, and, above all, establishes a horizon of sonorities that the ears shall follow closely<sup>9</sup>.

One of the last monumental pieces of music to result from a gestural diagrammatics is György Ligeti's piano *études*. Divided between 18 independent *études*, Ligeti's music is a paradigmatic example of a composition born out of *gestures of potentiality*. Besides using the hands and arms as *organs of the listening* (instead of the mind), as already did Debussy, a recurrent strategy or device of composition in this series is the use of gestures *imported from percussionists*, in particular those of non-European cultures. Ligeti disarms western musical programs and their traditional pianistic gestural habits by playing the piano through diagrammatic gestures imported from foreign instruments and repertoire<sup>10</sup>. It is in that sense that his piano music, as stated by the composer himself, was born out of the fingers touching and pressing the keys, and not from any mathematical calculation (cf. Floros, 2014, p. 156).

Finally, we could not end this session without mentioning the music of Luciano Berio. Beyond the piano repertoire, in the XX century, Berio occupies a special place when one is concerned with the role of gestures in musical composition. The monumental cycle of pieces for solo instruments entitled *Sequenza* is enough to attest to it. Each of the 14 pieces explores several technical problems of their correspondent instrument; and from this thorough (re-)search through the embodied possibilities of each instrument the music is created. Moreover, not only the individual pieces follow unheard-of musical continents guided by *fragments* of gestures common to that instrument, but also, like Ligeti, Berio's *Sequenza* relies on the transference and modulation of "foreign" gestures — like in *Sequenza XIV*, for cello, in which Berio re-invents this artifact by making use of percussive gestures imported from the drum music of Sri Lanka.

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<sup>9</sup> About Debussy's *études* and his method of composition, see Boucourechliev (1998) and Gautier (1997, pp. 119-32).

<sup>10</sup> About Ligeti's *études* and his method of composition, see Ligeti (2013, pp. 287-92), Steinitz (2003, pp. 277- 92), and Floros (2014, pp. 156-79).

## 4 Gestures and Notations

In this section, we would like to introduce a gestural variable that is fundamental to musical composition and that is not developed in Mazzola's writings nor in Zalamea's and Valero's extensions: the back-and-forth dialectics between gestures and notations or diagrams *from the perspective of the composer*. As we briefly mentioned, notations appear in Mazzola's map as a space in which the *performer's gestures* are to be found *frozen*, that is to say, programmed, pre-inscribed. However, we will argue that visual artifacts can have more uses in music — compositional uses, for instance — other than pre-inscribing gestures for the musician. We will show that one can identify a *triadic unfolding of gestures* also throughout the history of *musical notations*.

### 4.1 Symbolic Notations, or the Artifact for Storing Music

Already in Ancient Greece, notations were used as an instrument to store music. Even though not much is known about the music of that period, one thing is evident: sounds were represented by conventional *symbols* on top of the written text. There seems to be no *analogical* relation between music and notation at this point. Like the letter of the alphabet, musical sounds were represented by more or less arbitrary signs<sup>11</sup>. Being conventionally determined, the ancient greek notation was also considerably *detached from the gestures of those that graphed the signs*. Indeed, musicians gesturally played *beyond* the indications conventionally symbolized. Hence the difficulty in trying to understand how that music sounded back then.

This type of symbolic notation continues at least until the period known as *ars antiqua*, around the XII century. Notations changed, of course. First, the neumatic system, used to write plainchants. Then, the staff system, formed by four lines, as invented by Guido d'Arezzo. The common ground is that notations basically did not participate in the *making* of music; notations merely indicated some patterns or other general musical structures. Composers exercised their craft with the aid of memory and by singing and playing, only afterward noting down symbolically the instructions for other musicians<sup>12</sup>. Composer's gestures followed the symbols, and not the other way around.

### 4.2 An Artifact to be Manipulated, or The Manufacture of Music

Towards and throughout *ars nova* — that is, the music practiced in the XIV century — significant changes occur. Musical style *and* notational system change together, in a relationship of mutual affection, so to speak. In fact, *ars nova* also meant *ars nova notandi*. This rich music that followed the *ars antiqua* period was clearly more **mobile** in terms of rhythm and complex in terms of polyphony. It is not a coincidence,

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<sup>11</sup> For a general introduction, see West (1992).

<sup>12</sup> Berger (2005) and Owens (1998), for instance, have shown that in medieval music memory still played an important role in the compositional process, even though composers already had a refined notation system available.

therefore, that this music was supported by the new art of *mensural notation*<sup>13</sup>. As Oresme's diagrams (Châtelet, 2000, pp. 38-44) and Descartes' analytic geometry (Krämer, 2016, pp. 197-203), the (new) musical notation raises above the status of a mere code or representation: it becomes a technology for visualizing and *manually composing* music. While drawing the music, the *hands conduct the eyes*, as Henri Focillon (1992, pp. 157-184) helps us understand in the essay *In Praise of Hands*.

On the one hand, the growing complexity and mobility of voices singing together "enchanted" the virtual lines of rhythmic notation not yet present in the *ars antiqua* system; on the other, the actualization of this new signs (pre-)conditioned a whole new continent of virtual sonorities that could not have been explored before, since a proper tool for its development was still lacking. Now, more than ever before, the composer becomes associated with the writing of the music. The invention of fine symbols to note pitch and duration — in the period of *quadrivium*, gothic cathedrals, and scholastic philosophy, we must add —, and the whole horizon of combinatorics that it opens, *transform the "score" into a (manual) laboratory of musical composition*.

It is true that formal schemas imported from mathematics still guided most of the *use* of this mensural notation. And, in that sense, the gesture of manipulating the score is still pretty much a symbolic gesture. Notwithstanding, for the first time in history, *composition is dependent on the exercise of manipulating musical diagrams*, even if under the legislation of mathematical rules. Far from mentally conceiving sound combinations with the aid of mathematics and only noting them *a posteriori*, we are now facing a *manual technique*, a kind of *gestural combinatorics* that puts together symbols representing acoustic patterns as the architect draws the blueprint of the cathedral. This means that *gestural occurrences* start to manifest and, with them, compositional possibilities unavailable otherwise.

The (indexical) gestural latency of this refined notational artifact becomes even more evident in the style that follows *ars nova*, known as *ars subtilior*. Between the XIV and XV centuries, composers began to explore combinations of geometrical forms and colors on top of the mensural notation. Indeed one cannot deny the strong mathematical (pre-)orientation in this school of composers. However, the proof that the *musical result* was not immune to this *gestural* modality of thinking can be attested by listening to the surprisingly modern use of rhythm, chromaticism, and overall form of their music. It is as if the *manu-facture* of the music during the *ars subtilior* added a special flavor that cannot be reduced to a disembodied mathematical thinking. In sum, the combinations of sounds became more audacious since the composer would find patterns *through the manipulation* of this artifact, and not by merely imagining or visualizing it.

#### **4.3 Notation as an Allusive Device**

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<sup>13</sup> It is worth noticing here that with a richer notational system, composers find themselves in the position of the architect that gesturally draws the construction's blueprint. At the same time, however, the performer's freedom to improvise and create diminishes, since the composition can be notated with more details.

A new function of the musical notation will appear only in the XX century with the graphic notations. This third modality is a kind of notation that *does not* exist prior to the gesture (ancient notations). It is also *not* a notation guided by mathematics that, nonetheless, is gesturally manipulated by the composer (*ars nova* and *ars subtilior*). In fact, various of the *graphic notations* that emerge in the avant-guard music function *against all sorts of a priori determinations of the composition*. These new graphic artifacts<sup>14</sup> are *gesturally manufactured* as a strategy for demobilizing and disarming pre-established compositional habits. It is in that sense that they are *diagrammatic*<sup>15</sup>: they are gestural configurations that do not only analyze, but also and mostly explore, test, invent, abduce (Peirce).

It is important here to distinguish the *gestural* graphic notations from those of, let us say, Iannis Xenakis. The greek composer conceived his music in terms of scientific graphs, which means that the *gesture* of notating his music is more symbolic than iconic<sup>16</sup>. The hand is not free to compose. When we turn to some examples of Villa-Lobos or Cage, however, we observe in their diagrams the musical equivalent of what Châtelet called *allusive devices*<sup>17</sup>. Their graphic notations are artifacts that deliberately produce ambiguities which mobilize gestures that *determine* acoustic fields through the diagram, instead of applying pre-determined schemas. Indeed, such a type of device mobilizes gestures that unfold acoustic lines on the paper; and they do so by evoking the ear as well. It is what Magnus (2016) calls *aural latency*. In short: those properties at the hand of the composer make the notational space an artifact in which visual, gestural, and acoustic modalities intertwine *outside music's crystallized schemas*.

#### 4 Concluding Remarks

With the goal of developing a concept to understand the process of musical composition without reducing it to transcendental schemas or inspiration, we have tried to distinguish in the history of composition three modalities of gestures that characterize different practices of music-making. The first modality consists in the mere embodiment of abstract formulas that contain frozen gestures (Mazzola). The second — the result of the embodied manipulation of formulas — is the singular occurrences that tend to go beyond what was programmed by the formulas. The third

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<sup>14</sup> See, for example, Villa-Lobo's technique of millimetrization as well as sketches from John Cage, Luigi Nono, and Salvatore Sciarrino. This idea of musical diagrams in relation to graphic notations is developed in De Aguiar (2020/forthcoming).

<sup>15</sup> As Mazzola *et al* (2017, pp. 861-2) put it, based on Alunni's conception of diagram: "[g]estures not only make communication, but they 'make sense'".

<sup>16</sup> There are exceptions, of course, such as Xenakis's *preliminary sketches* for the piece *Metastasis*.

<sup>17</sup> This point is developed in De Aguiar (2020/forthcoming).

is a kind of radicalized occurrence, in the sense that it turns away from the schemas and gesturally “draws” new fields of musicality.

These three modalities can be identified in compositional practices in relation to two types of artifacts: notations and musical instruments. In fact, these modalities of gestures are programmed by and/or re-program those artifacts.

Now, we believe that such a triadic conception of gesture might be relevant also in the debate regarding other types of creative practices and technologies. We could think, for instance, on the modalities of gestures that operate digital artifacts, such as smartphones and computers, and how these gestures relate to “digital compositions”, such as programs and synthetic images. Are technology users subjected to a programmed gesturality? Do (or can) digital artifacts respond to user’s occurrence gestures, that is, gestures that the technology was not programmed to detect? Can one create digitally (for instance, images) through diagrammatic gestures? Are commands a type of symbolic gesture? Can one command digital technologies without symbolic gestures, that is, by means of indexical or iconic gestures? Is there a parallel between our current digital culture and the situation of composers in times of heavily mathematical (pre-)formalization of their art? And if so, can we draw any lessons from the history of musical composition in order to understand possible unfoldings of the history of digital technologies?

These are questions that, we believe, are entangled with (and might continue) the debate on gestures and artifacts in the history of music.

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