Instrumental Gesture in StreicherKreis Florence Baschet

This article deals with the concept of instrumental gesture, specifically the gestures of bowed string instruments. These reflections are an extension of my compositional and research work at Institute for Research and Coordination in Acoustics and Music (IRCAM). The idea of gesture will be explored from many angles, from the simple gesture of a performer bowing a violin to produce a sound, to the notion of compositional gesture in writing for a string quartet. I will invoke certain areas of our recent work: first the creation of gestural models based on different playing techniques, followed by the construction of a 'gesture follower', and finally a discussion of the different applications of the notion of instrumental gesture in my string quartet StreicherKreis. Since the main virtue of instrumental gesture outside of its natural function is, for me, that which reveals the performer's interpretation, I will explain how I endeavour to highlight these interpretive dimensions, so that the performers' gestures themselves trigger and guide electroacoustic transformations.

Keywords: Gesture; String Quartet; Augmented Violin; Florence Baschet; IRCAM

1. Prologue

Before turning to the concept of gesture, I would like to address two questions crucial for a thorough understanding of my approach, questions that echo the issues I aim to engage each time I write an electroacoustic work¹—the musical motivations behind my research. There are compositional issues on one hand, and issues of interpretation on the other—the compositional question of interaction between performer and electronics, and the interpretive question of how the performer's gestures dictate transformations.

For over 20 years, I have been working on electroacoustic pieces that mainly involve real-time interaction. I will refer to a few of my chamber works, including *Electrics*, a set of pieces from 2004 for solo players and electronics, *BogenLied* for violin from 2005, and also *StreicherKreis* for string quartet from 2008. The core idea is always the same: an attempt to create a blend where the soloist and the electronics share a close interaction, both sensitive and reactive² ... in line with the chamber music tradition of a

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duo between two attentive musicians—here the soloist and the computer. The central compositional question thus becomes *how to compose this interaction*.

On the other hand, if the instrumentalist is the interpreter of the musical text, it strikes me as important that he also be allowed to be an interpreter/actor in the transformations of his own sound by the electronics; that he also be allowed to *play* the electronic part that we hear in the speakers. The question thus becomes *how to respect the player's role in interpreting the electronics*.

With these two preoccupations in mind, I began researching instrumental gesture in 2005, and more specifically the gesture of the bow used on stringed instruments. As this article progresses, it will become clear that the notion of gesture changed throughout my work, but at the outset I focused on the gesture of the bow as a means of producing sound. The bow's gestures seemed to offer an intelligent and flexible musical solution to both questions: a performer's movements could become the vector of interaction between score and electronics. This possibility seemed even more promising since the gestures of the bow represent a common musical element for both composer and performer, with both an intended sound and a symbolic written representation. In our culture's musical tradition, specific bow techniques are written into string parts: ponticello, staccato, legato, or al talone. For the composer, the playing style is an instrumental gesture that is heard and specified-a tradition stretching back to generations. The attack of the bow is thus an entirely independent compositional parameter.³ For a violinist, the bow's gestural phrasing is the expression of instrumental technique, since the style of attack creates the sound, fashions a timbre through the speed, energy, position, and angle of attack. This bowing technique has been developed through years of careful study, as thorough and important as developing the left-hand technique; a cellist friend describes his bowing technique as the most personal facet of his own playing style.

What fascinates me as a composer is to reconsider the act of listening and compositional intention through the constrained perspective of the bow, and to create, through gestural phrases, a new type of interactive system between the computer and the musician. Since the position of the bow synchronizes the electronics with the performer, this movement adjusts and defines the parameters of synthesis in real time. Interactivity in *BogenLied* and *StreicherKreis* is thus defined not by following pitches but by following gestures.

2. From Playing Technique to a Gestural Model

In 2005, I composed *BogenLied*, then worked for a year at Institute for Research and Coordination in Acoustics and Music (IRCAM) (2006–2007) with a research team on the notion of instrumental gesture, composing the string quartet *StreicherKreis* which was premiered in November 2008. These three years were entirely consecrated to my work on instrumental gesture, aiming to pinpoint specific dimensions of performance interpretation that could be used to control electronic transformations.



Figure 1 From Gesture Analysis Data to Musical Material.

BogenLied—the 'song of the bow'—is a piece for augmented violin and electronics.⁴ What makes the violin 'augmented' is the miniature gestural sensor attached to the bow. Capturing and transmitting position data to the computer, this system allows the performer to control sonic transformations in real time through bowing gestures. The piece is written to highlight the research conducted by Rasamimanana (2008) and Frédéric Bevilacqua detailed in the schema below (Figure 1). This diagram shows the statistical data associated with various gestures performed by the violinist with an acceleration sensor in the x direction attached to the bow. We can see the amount of energy (from light to heavy) contained in the articulation of three distinct playing techniques: détaché, martelé, and spiccato. Using the data pertaining to these three playing styles, I constructed the basic compositional material of the piece (Figure 2). What interested me in particular was the possibility of tracking gestural shapes (three very different playing techniques), the attention to specific points of articulation within these gestures (minute differences between several instances of the same technique), and the recognition of common or contrasting points between these techniques—hybrid gestures moving from one playing style to another.⁵

In *BogenLied*, these playing techniques are tracked by the computer, and the movement of the bow controls the electronic transformation of the live violin sound in real time. The player can actively alter and subtly vary the response of the electronics. The link with the performer's instrumental training offers an intuitive and powerful means of control. Furthermore, in three of the piece's eight sections (and for all three playing techniques), I chose—after careful observation—not to specify the dynamics in the score, allowing the player to interpret freely. The soloist can thus vary his movement and gestures in response to the electronic transformations he hears, actively reinterpreting both the acoustic and electronic dimensions of the piece with each performance. With *BogenLied*, I worked within the confines of the research discoveries I had



Figure 2 8 Playing Techniques, 8 Gestural Models.

been invited to explore, and the resulting piece successfully embodied these findings about interactivity and interpretation. The violinist transforms the sound through his own gestures! The idea of instrumental gesture, however, remained limited to the exploration of just three playing techniques, and for a single performer.

For the string quartet which would further explore these notions, I wanted a greater degree of freedom in the 'gestural composition' of the piece, along with a computerized system of gestural following capable of tracking the performers in real time, in order to create new modes of communication and interaction based on instrumental gestures. To achieve this ambitious goal, we needed time. A year of research at IRCAM was organized, with multiple layers of interaction between several research teams. A crucial component for me was the idea that the Danel Quartet⁶ participates in occasional real time tests of our tools as they were being developed. The quartet came to IRCAM a total of 11 times throughout the year, nearly once a month (either in duos or with all four players). The engineers developed tools for tracking gestures through a process of experimentation and interaction with the quartet. The software developers honed their system of recognition and analysis, creating a gesture-following tool with a high degree of complexity, capable of following the gestures of four separate players. I wrote sketches each month for a solo instrument, a duo or the entire quartet -short studies that were adapted according to our research needs. Finally, the Analysis of Musical Practices team at IRCAM, led by the musicologist Nicolas Donin, documented and analysed these sessions, videotaping both our work and post-session debriefings with the participants.⁷

Our method of putting this research into practice necessitated a two-pronged approach, combining research and artistic creation. I found it particularly rich and invigorating to exchange ideas throughout the unique and ambitious process that led—over two years—to the creation of *StreicherKreis*, involving all the participants in the project from the outset: the musical assistant, researchers, developers, the four members of the Danel Quartet, musicologists, and myself.⁸

The first question we asked ourselves was whether the knowledge and experience of the violinist's instrumental gestures in *BogenLien* could also be applied, on similar musical phrases, to the gestures of a violist or cellist. I started by transposing the score of *BogenLied* for the four players of the quartet. This confirmed first of all that the players seemed very interested in taking control of the electronics with their bow movements, and did so naturally and idiomatically. The second revelation was that the violist's gestures, thoroughly comparable to a violinist's, were noticeably different from the cellist's, whose gestural behaviour, however, remained nevertheless coherent with those of the quartet's other two instruments.

The second phase of our research was based on the idea of elaborating our gestural models; I felt that we should continue to work with the idea of bow gestures, considered for methodological reasons as the underlying means of sound production and constructed from various playing techniques. Each of these had its unique characteristics and was immediately recognizable to the ear. It became important to be able to describe their characteristics gesturally as well. We needed to be able to show that a certain number of distinct playing styles⁹ could be differentiated and characterized through gestural data; we called these 'gestural models'. If we were capable of outlining the gestural profiles of each of these playing techniques and to say that these were characteristic features, we would be capable of creating a model of any type of gesture. I wrote eight musical phrases which covered and combined a wide range of possible playing styles. We recorded the four string players separately and compared the gestural data derived from their performances.¹⁰ After a few weeks of work, the results were provocative: in our analysis, we found the same characteristic profile for given playing styles from each of the four instrumentalists, and could thus conclude that the gestural profiles associated with these techniques were in fact *typical*, and that we would be able to create reliable models for describing and detecting these playing techniques.

The third challenge was to create a 'gesture follower'¹¹ capable of recognizing each of these eight gestural phrases in several different contexts: alone and unaccompanied, as solo lines with accompaniment, performed by a single player with slight variations, or played on other instruments. We learned quite a bit from this endeavour by comparing the difference in gesture between two musicians playing the same phrase, allowing us to appreciate the subtle variations in interpretation that could prove a rich territory for further exploration in the near future: a study of how these small differences in execution are interpreted by the electronics.

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The fourth step in this year of research was extremely interesting. I had heard that the musicians of the quartet felt extremely satisfied with their ability to control electronic transformations naturally and musically through their own gestures. These players were easily able to control several parameters at the same time, such as the pressure and acceleration of the bow on the string. I suggested to the cellist, for example, that his gestures could control the transformed sound of the other members of the quartet. They were very motivated by these interactive experiments, especially, given the well-known bonds between the members of a string quartet.¹² The experience was so positively received that the other passive members of the quartet suggested that they also have the opportunity to react to the electronic transformations imposed by the cellist!

At the end of this year of research into instrumental gesture, we created a system of motion sensors and a gesture-following application, both of which are robust, flexible, and reliable. Our setup for tracking bow movement is particular light, in the sense that the bows are equipped with a sensor that weighs only a few grams, and the players can pick up these dedicated bows just before playing *StreicherKreis*, turn on the sensors with a small switch, then begin the piece. We are now able to follow any kind of gesture; the data stream from the sensors positioned on the bows is mapped very satisfactorily to electronic transformations, and we were especially pleased that the quartet felt comfortable rehearsing alone with our electronic setup. We then entered the rehearsal and production phase, leading up to the premiere of *StreicherKreis* in November 2008.¹³

Throughout this year of research, our concept of instrumental gesture evolved considerably—from the simple gesture of a bow as a means of producing sound, to a more complex notion integrating constituent playing techniques and also the idea of 'gesture-timbre': a gesture unique to each instrumentalist that identifies and colours his playing style.

3. Instrumental Gesture, from One Gesture to Another

In *StreicherKreis*, the concept of gesture is wide-ranging—from the analysis of a gesture based on a particular playing technique, to the collective musical gesture, or even compositional gesture. Here is a rough ten-point schema of various stages:

- the silent gesture,
- the frozen gesture,
- the nearly non-existent gesture,
- the micro-gesture,
- the articulation of various combinations of playing techniques,
- the timbral gesture,
- the compositional gesture,
- the collective musical gesture of the quartet,
- transitions from one gesture to another,
- the incidental gesture.

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The silent gesture is employed when the cellist transforms the sound of the three other players through his movements. He goes through the motions of different playing techniques, but without producing any sound, and this silent movement determines the pitches heard in the electronics (Figure 3). The *frozen gesture* (even if that is an oxymoron) is often indicated in my score as the musical expectation of a contrasting gestural event. A *nearly non-existent gesture* (Figure 4) on the other hand is defined at the atomic (as opposed to global) level of gesture, in the sense that it is hardly identifiable as a gesture. Next are the *micro-gestures* which are already composed of various playing techniques, such as an up-bow that can be identified as *flautando*, or an up-bow followed by a down-bow, signalling a *détaché*¹⁴ (Figure 5). The *articulation of various combinations of playing techniques* denotes a complex superposition of gestures which should be considered as its own entity—not as a group of gestures, but a larger-scale gesture itself. Measure 81 in the score uses this type of gesture, where a smooth harmonic field is set in opposition to a passage composed of several playing techniques, perceived as a single sonic object (Figure 6).

The *timbral gesture* is a non-identifiable gesture that colours the pitch, with a different execution for each instrument to obtain the timbre specified in the score. This gesture is unique to each player, so that two violinists never share the same timbre; consequently, if a composer asks for the same timbre from two players, they will never execute identical gestures to obtain the same result. Finally, the *collective*



Figure 3 Silent Gesture.



Figure 4 Nearly Non-existent Gesture.

musical gesture, along with *compositional gesture* is the considered result: a series of pitches, timbres, durations, and other musical parameters (Figure 7).

Working with the string quartet, another question about the potential for unity amongst these four instruments arose: Can one speak of a 'quartet gesture'? I would respond by saying that in a chamber music context, the interpretation of any musical work relies on the musical intelligence of each player and on his capacity for reciprocal listening and interacting with the other players. The four members of the quartet fuse into a single body whose gestural components can be either limited to each performer or common to all. What interests me is hearing the gestural language of several individuals coalesce into a single shared body of sound. Here is an example:



Figure 5 Micro-gesture.



Figure 6 Articulation of Various Combinations of Playing Techniques.

we now have new tools for analysing the gestures of the quartet, and so at several points in *StreicherKreis*, I composed passages where a single sonic object is passed between the four instruments in succession. We examined the gesture-following data of the first violin, for instance, to compare the gestures of the three other players with this model and deduce an interpretative parameter that would form the basis for electronic transformations (Figure 8). We were intrigued to discover, after a discussion with the instrumentalists, that as a quartet they deliberately chose to play up the small differences in their individual performing styles in order to create their own distinctive sound as an ensemble.

I would like to add further that instrumental gesture is often presented—wrongly, I believe—as an entity whose primary function is to denote a corresponding musical phrase. I believe that *StreicherKreis* proves the opposite, as has been outlined throughout this article. What strikes me as particularly pertinent and interesting are the transitions *from one gesture to another* or the gestural hybrids created by stringing several gestural phrases together: those fragile moments where one can identify neither where the music has just come from nor where it is headed, which cannot be notated in a score even if they can be heard, for they depend entirely on a performer's interpretation.

The final question that arises concerns the visibility of gesture. If the gesture is a simple reflection of what we hear, there is no need to see it. Listening to Bartok's sixth quartet at home, I lose the magic of the concert and a bit of sound quality, but I hear the instrumental gestures, the gestural phrases, the weight of the bow on the string or the breadth of a *legato*. I do not need to see these gestures to feel the sense they embody; I can hear it perfectly well. On the other, if I hear this quartet in concert, I might be surprised to see gestures that I cannot hear, those—and here is my final definition of categories of instrumental gestures—which are *incidental*



Figure 7 Compositional Gesture.

gestures, interpretative gestures, and signs of anticipation. These are not silent gestures, in the sense that they are an active component of sound production: the way a player prepares by placing the bow on the string a tenth of a second before an attack, or lets the bow breathe at the end of a virtuosic phrase as if its continued movements were part of the same musical gesture. I am reminded of Brendel's interpretations of Schubert, where he repeatedly pushes down on an already depressed key in an attempt to create a vibrato effect.

4. Epilogue

StreicherKreis thus embodies a panoply of definitions and incarnations of instrumental gesture, a compilation of more or less disparate events whose primary function is to highlight the interpretive details underneath. This is the chief quality of instrumental gesture, to provide a platform that highlights a player's interpretation—personal gestures that in turn influence and transform the interactive electronics. This is the precisely the quality of interpretive instrumental gesture that allows me to compose an interaction between the performer and computer that gives the player an opportunity to *play* the electronics.

In *StreicherKreis*, it is the gestural interpretation of the text that validates the instrumental score and the electronics, a fundamental component of the piece since its conception. The electronics depend on an extrapolation that is written into the score itself. Its goal is not to make visible the interpreter's gestures but to integrate them into the electronic transformations, so that acoustic and electronic sounds are inextricably entwined.



Figure 8 The Quartet's Gesture.

Notes

- [1] An instrumental work with an electronic component.
- [2] A concept vastly different from electronic parts synchronized to live musicians with a click track, or from MIDI pedals and unwieldy cables on stage.
- [3] It is interesting to recall how thoroughly the idea of bow articulation permeates the keyboard music writing of the seventeenth and eighteenth centuries.
- [4] Premiered November 26, 2005 at the Parvis Saint Jean, Dijon, festival Why Note. Anne Mercier, violinist of the Ensemble L'Itinéraire. Concert co-produced with IRCAM. Musical assistant (IRCAM): Serge Lemouton. Augmented violin technology (IRCAM): Nicolas Rasamimanana, Frédéric Bevilacqua, Emmanuel Fléty.
- [5] I will further this argument in the section entitled 'From One Gesture to Another.'
- [6] Marc Danel, Gilles Millet, Vlad Bogdanas et Guy Danel ; the Quatuor Danel premiered *StreicherKreis* in November 2008.
- [7] Nicolas Donin : Suivi de la conception collective d'un "Quatuor augmenté", http://apm.ircam.fr/.
- [8] Serge Lemouton as musical assistant, Frédéric Bevilacqua for the gesture analysis and recognition tools, along with Emmanuel Fléty, Nicolas Leroy et Matthias Demoucron for the gesture tracking system, Nicolas Donin et Samuel Goldszmidt, musicologists.

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- [9] gettato, spiccato, détaché, flautando, scratch tone, marcato, tremolo, bow-turn. 8 main playing techniques including pizzicato, col legno, finger tap, legno tratto, attacks with harmonics, etc.
- [10] Decoded with the application Plot.
- [11] The « pitch tracking » system recognizes the pitches played by each performer during the concert; The « gesture follower » recognizes gestures in a similar way, tracking the players' movements in concert.
- [12] I deliberately integrated this type of interactivity into my score. The bow pressure and the acceleration of the gyroscope in the cello part control the spatialization, the transposition, and the filters on the three other instruments.
- [13] Premiered November 8, 2008 by the Danel Quartet. Commissioned by IRCAM, electronics realized at IRCAM's studios in collaboration with Serge Lemouton as musical assistant, Frédéric Bevilacqua for the gesture analysis and recognition tools, along with Emmanuel Fléty, Nicolas Leroy et Matthias Demoucron for the gesture tracking system.
- [14] We will encounter micro-gestures composed of all the various playing techniques mentioned earlier: gettato, spiccato, détaché, flautendo, scratch tone, marcato, tremolo, bow-turn, pizzicato, col legno, finger tap, legno tratto, attacks with harmonics, etc.

Reference

Rasamimanana, N. (March 2008). Geste instrumental du violoniste en situation de jeu : analyse et modélisation (Doctoral thesis, Université Paris 6, 2008).