Title
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Vagues / Fenêtres
for String Trio and Electronic Sounds

By
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requirements for the degree of
Doctor of Philosophy

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Graduate Division

of the
University of California, Berkeley

Committee in charge:
Professor Edmund Campion, Chair
Professor Cindy Cox
Professor Ken Ueno

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Abstract

Vagues / Fenêtres for String Trio and Electronic Sounds

by

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This research begins with close listening: ‘close’ being an attitude of intense focus, directed both outwards to sounds in the real world and inwards to the imagination. ‘Close’ also being an apt description of technologically assisted listening, through ‘close miking’ techniques in the recording process; ‘close’ listening being the opportunity, thanks to recording, of being able to listen repeatedly to the same sound; ‘close’ being the property of analysis to which sounds can be subjected by digital means.

The initial listening phase results in the gathering of material, both recorded sounds and imagined sounds (these latter are sketched out in graphic or traditional musical notation.) The material then develops through the application of opposing forces, a set of dualities which form an interlocking
network of structuring forces and possible cross mappings: movement/stasis, line/mass, live/fixed, instability/stability, acoustic/electronic, linear development/fragmentation, expansion/compression, macro/micro, material/metaphor.

The ‘live/fixed’ duality has its most obvious working out in the relationship between the acoustic parts and the sound files, but that is not its sole expression. The score is also a ‘fixed’ object which must be interpreted by the performers, and some of the graphic notation allows for more freedom and spontaneity than is traditional. Similarly the sound files, though pre-recorded and pre-mixed, are brought to life by a sound engineer in a given space on equipment which may vary from venue to venue, each time in a new acoustic; so, they may be ‘fixed’ in one sense, but they are mutable.

All the sound files have their origin in recordings made with a violin, viola and cello, which have been reworked in the studio using a variety of processes: editing, filtering, multi-tracking, stretching, delay, reverberation, et cetera. The recorded aspects of the piece behave at times like distorted or transformed memories of past events, at other times like an alter ego or ‘other’ to the live players. In certain passages the sound worlds are so closely linked that it may be hard to tell what is ‘live’ and what is ‘electronic’ or ‘fixed.’ This raises questions for the listener: what are we hearing? Where is it coming from? During the first long acoustic section, there is a point where the players become so quiet that they are, eventually, just miming: the first instance of a disconnect between action and sound. This in turn links up to later sections where they are actually playing but you may not hear or be able to distinguish what sounds are being made. Certain sounds from the electronic part are clearly sourced from identifiable string playing gestures, now eerily disembodied. The amplification of the strings, providing a bridge between acoustic and electronic sound sources, is another interpretive variable that ‘liven[s] the scene. In addition, as there is no click track, the relationship between ‘live’ acoustic sounds and ‘fixed’ electronic sounds will never be identical but will shift
subtly from performance to performance, allowing the performers and the sound engineer to listen and ‘play’ within a given framework. Thus the lines between ‘fixed’ and ‘live’ are continually blurred.

Of the dualities listed above, the ‘material/metaphor’ pair is the strongest structuring force. The initial ‘sound idea’ (in this case, the movement of water, the ‘waves’ of the title) generates material which, in working through certain dualities, distorts the metaphor or produces new ones (for example, ‘windows’). That particular shift was prompted by a consideration of ‘movement/stasis’, ‘linear development/fragmentation’ and ‘macro/micro’. If the motion of water is captured in a still image, how can that be expressed in sound? I began isolating moments from a long linear passage in earlier sketches, framing them in boxes, which I called ‘windows.’ A window might contain an extreme compression of longer material, or an extension of a tiny moment. A window can be open or shut, it is both a barrier and a connection; a window can reflect; it can also be broken. The exploration of a metaphor forces a reassessment of material, and vice versa, in a recursive process that generates a shifting whole, whose shifting is fixed into objects (score, sound files) and ultimately brought back to life – and to listening – through performance.
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Score 1
Performance and Technical Notes

Equipment:

- ‘Mike set-up A’ = 3 individual microphones, one for each player, fairly close, for detailed sound amplification.
- ‘Mike set-up B’ = 2 microphones; a stereo pair, for more general amplification of the players, to be placed centrally above the players. (NB it is possible, though less desirable, to do the piece with just the stereo pair, depending on the resources available for a given concert.) Please note that the placement of sound from the stereo pair should not reverse the visual image of the players (e.g. if you use a cross mike set-up, you will need to swap the panning of the relevant mixer channels to keep the cello on audience right and the violin on audience left.)
- Mixer (10 Channels or more.)
- Laptop/Computer (with Max/MSP Runtime, or other preferred software program) for playback of stereo sound files.
- To route sound from computer to mixer, appropriate sound interface or stereo out.
- Speakers: 4 is the preferred minimum: two behind players and two at front of stage. The two behind may need to be placed at a wide angle or at the edges of the stage to avoid feedback from mikes. (Additional speakers to the sides and behind the audience could also be used.) The piece could also be done with only 2 speakers, in which case the speakers should be to the sides, as close to the players as possible without creating feedback. At the other end of the spectrum, the piece has also been effectively performed within a multi-speaker acousmonium. See notes below.
- In a very dry hall, the sound from the strings may benefit from any standard reverberation unit.
- Appropriate cabling, speaker stands, microphone stands, etc.
Mixing Notes:

Please note that the person at the mixing desk is one of the performers and should rehearse with the players. Mixing is a highly site-specific art, and the experienced mixer should always use his or her own ears over any instructions herein. These instructions, and to a certain extent, even the mixer’s ‘part’ in the score regarding the mixing of the live microphones, are advisory only.

The use of three close mikes and a stereo pair exactly mimics the microphone technique used for recording the original string sound sources which provided the raw material for the electronic part of the piece.

The principal behind the mike set-up in performance is that there are three general possibilities of amplification; an individual close mike setup for each instrument, a general stereo pair for the ensemble, and combinations of the above. Amplification of the instruments may do any of the following: (a) improve the blending with the recorded sounds; (b) allow for specific ‘micro’ sounds and timbres to come through which would otherwise be missed and (c) allow the live sound to become very loud, to the point of being capable of masking the electronic sounds when needed (as in the final section measure 251 – end, where the playing of the close miked players temporarily masks the delicate electronic sounds.) There are also times when the electronic part should mask the players, for example during cue 1, from measure 147, where the cello is eventually overwhelmed by a wall of sound from the sound files. The mixer should use her/his ears throughout to create a dynamic relationship with ebb and flow, following the indications in the score. The close mike set-up, in particular, allows for playing with an idea of scale, in which very tiny sounds can become very big, even overbearing. The stereo pair is used more for general balance and making a seamless join between the live sound and the electronic sound world.
Balance:

There is a fragility in the relationship between the live parts and the electronic parts; both are capable of extreme delicacy and of overt aggression. The amplification should start out with great subtlety, both in terms of level and placement: it should sound as if we have almost unawares got closer to the players, and that they have become bigger. The sound engineer should follow the guidance in the score, but use his or her own judgment regarding the balance between the two mike set-ups relative to each other and to the electronic sounds. In the score, the notation indicates when faders should be open for each of the mike set-ups, with fade-up and fade-out points, but the exact level and balance is left to the discretion of the sound engineer. Placement of the acoustic sounds in the speakers may also vary from hall to hall, the front speakers giving more presence and distinct edges to the sound, the back speakers allowing for more blending. In general, when the score indicates the use of the close mike set-up ‘A’, it is because greater clarity and distinction is desired for the live string sounds, and so placing these sounds in the front two speakers may be appropriate.

In general the sound engineer should fully exploit the range of available contrasts in the piece, from the wall of sound at measure 147 to the solo un-amplified violin measures 203 -206.

The Acousmonium:

If the piece is played in the context of a multi-speaker acousmonium, such as Motus in France, more can be made, in the mix, of the contrast between the delicacy of the ‘naked’ un-amplified string sounds and the hugeness and power of the acousmonium, and the point at which the live instruments enter into that broader electronic space.
Where a multi speaker set up is possible, the amplification of the instruments should remain in those speakers closest to the instruments for most of the piece, to fix the ensemble spatially, breaking out into the wider space only towards the end of the piece, in measures 220-225, and measure 248 to the end.

The electronic sounds should start in speakers close to the instruments, for maximum blending, and should stay focused largely in speakers on and around the stage, breaking out into the rest of the hall in surround sound towards the end of the piece (that is, during cue 6 from bars 215 onwards and throughout sound cue 7.)

Given the above guidelines, the sound projectionist should use his or her imagination and discretion, since any acousmonium set-up plays the room as much as it plays the piece, and performance spaces vary enormously.

**Notation of the Electronic Parts:**

In the score, the sound file cues and amplification indications are grouped together under each system as needed. The top line is mike set-up A (the three close mikes), the middle is mike set-up B (the stereo pair) and the wider lower section is for the sound file cues. The mike set-ups each have a shade of dark or patterned gray with diagonal fades to indicate the up or down motion of the faders, as follows:

```
Mike set-up A
Mike set-up B
Sound Files
```
There are 7 sound file cues. The starting point of each is indicated by a number in the score in the ‘sound files’ section at the bottom of a given system. The sound files are played using a ‘patch’ made in Max/MSP. Max has been used in this case purely as a convenient platform from which to trigger these sound files; there is no live sound capture or other live electronic manipulation in Max. A copy of Max/MSP Runtime accompanies the sound files (or can be downloaded from <http://cycling74.com/downloads/>.) All the sound files are pre-mixed to fade in and out, so no extra action is required by the person at the mixing desk at the end of any cue; that is, the faders should be open at the beginning of the piece and can remain open until the end. Some cues do overlap, but the levels are preset in the Max Patch to blend evenly. Where Max/MSP is not available or preferred, any other appropriate software platform may be used, provided it can play more than one stereo cue at a time, and that the trigger points for each cue can remain flexible in order to work within the variable tempi of live musicians. Alternatively, if a more low-tech solution is preferred, the cues could be put on to two separate CD’s and triggered from two sound sources. In that case, the even numbered cues should be on one CD and the odd numbered cues on the other.

The sound file cues are notated using a single shape, which grows bigger to indicate increased amplitude, as follows:

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No attempt is made to reproduce or notate specific timbres or rhythms. However, there are three cue points to help general co-ordination and orientation with the sound files, at measures 195, 247 and 251. See the graphic notation table for the sound cues on page xiii and consult the CD of example sounds.
The Max/MSP Patch pre-initialization. Follow the on-screen instructions to operate the patch.

Instructions:

I Click on speaker button below to turn the sound on.

II Click here to set optimum level for faders: The overall level can also be adjusted using the blue master fader below.

III Trigger each cue in turn, as indicated in the score, by clicking on appropriate round buttons above. There are level meters to the right of each button to show if that cue is playing (however some cues start very quietly and take a while to show.) Each cue also has a green level fader, in case you need an emergency fade out if something goes wrong in performance.

IV Use the '0' buttons under each button if you need to stop an individual sound (for example during rehearsal.)

V Use ‘ALL STOP’ button at top right if needed - this will stop all of the cues at once.

This stop button will turn off the sound. Press the speaker button or ‘start window’ to turn it back on.
The Max/MSP patch after initialization (ready to go.)

Before you start, click on this button to initialize the patch and stop the blinking lights.

**Instructions:**

I. Click on speaker button below to turn the sound on.

II. Click here to set optimum level for faders: The overall level can also be adjusted using the blue master fader below.

III. Trigger each cue in turn, as indicated in the score, by clicking on appropriate round buttons above. There are level meters to the right of each button to show if that cue is playing (however some cues start very quietly and take a while to show.) Each cue also has a green level fader, in case you need an emergency fade out if something goes wrong in performance.

IV. Use the '0' buttons under each button if you need to stop an individual sound (for example during rehearsal.)

V. Use 'ALL STOP' button at top right if needed - this will stop all of the cues at once.

This stop button will turn off the sound. Press the speaker button or 'start window' to turn it back on.
Performance:

The piece is designed to work within a fairly fluid relationship between the players and the electronic sounds. For this reason there is no click track, and a certain amount of give and take is perfectly acceptable. That being said, there are certain important sync points, such as the first entrance of the electronics, where the electronic sounds should blend in very subtly with the live sounds, before taking over. The sound engineer keeps a close eye on the score not only for his or her own part, but also to cue players, which may become necessary after the first entry of the electronics, when players often have to come in after several bars rest. Players should practice (alone and together) with reference to the metronome marks, to get used to temporal shifts, and to counting through their tacets. A software file (in Logic Audio) can be provided for rehearsal purposes so that players and the sound engineer can get a sense of how it all fits together, but this is not to be used in performance, as it is better for this piece for the players to work together with the sound engineer without being locked into a click. If necessary, the sound engineer could have an assistant to cue the players.

Notation:

Accidentals apply for the whole measure, but only in the octave in which they first appear. Occasionally a reminder accidental may be used, in parentheses.

Some graphic or non-standard notation has been used, explained in the table on pages xi and xii. Glissandi are the single defining feature of the score; it is relatively rare that players remain static on a pitch. Players should play close attention to the type of glissando required, as explained in the table; smooth continuous glissandi which start immediately the note is sounded; more lilting glissandi with gaps between notes which hesitate slightly before descending or ascending; and the
super fast (often very high) glissandi in which the shape and energy of the gesture are much more important than hitting specific pitches, and the pitches are turning points, not landing points. These latter glissandi started life as improvisations in the recording studio where I encouraged the players to get higher and higher and faster and faster, until they sounded like mosquitoes. Some of those early ‘mosquito’ gestures have been included in the sound examples CD (tracks 02 – 12) so that players can get a feel for them aurally; this is the spirit in which those passages should be played. Please note that these sound examples are only general models, not reproductions of specific measures in the piece; they are not to be followed exactly but are presented in order to give the player an impression of the energy and sound of the original gestures.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>An example of a ‘mosquito’ gesture. Very rapid glissandi, changing direction frequently. Energy and shape much more important than hitting specific pitches. After the starting note of each gesture, other pitches are turning points not landing points. Listen to the sound example CD tracks 02-12 to get a feel for these.</td>
</tr>
<tr>
<td>2.</td>
<td>Play the string behind the bridge, between the bridge and the tailpiece. Each line of the four-line stave corresponds to a given string, numbering high to low I – IV. The exact pitch, of course, varies from instrument to instrument.</td>
</tr>
<tr>
<td>3.</td>
<td>Over bow, very harsh pressure on the bow; pressure at maximum when the wedge is thickest – creates distortion.</td>
</tr>
<tr>
<td>4.</td>
<td>Very light pressure, at its maximum, a super light flautando, bow barely touching the strings.</td>
</tr>
<tr>
<td>5.</td>
<td>A trill in which the left hand alternates between harmonic pressure and normal pressure. Refer to track 01 of examples CD.</td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>6.</td>
<td>Ascending and descending glissandi with harmonic pressure.</td>
</tr>
<tr>
<td>7. <em>Vibrato lento</em></td>
<td>An exaggerated and slow vibrato, at least a quarter tone below and above the given pitch.</td>
</tr>
<tr>
<td>8.</td>
<td>Continuous smooth glissandi between notes, change bow as necessary. The notes start to move immediately and are in continual motion: after the first pitch other pitches are turning points not landing points.</td>
</tr>
<tr>
<td>9.</td>
<td>Glissandi with short gaps between notes, lingers on first pitch very slightly. Typically covers a pitch range of about a minor third.</td>
</tr>
<tr>
<td>10. <em>senza arco</em></td>
<td>Left hand finger slap on the fingerboard, followed by glissando; make as much noise rubbing the string as possible. Not bowed. Refer to track 13 of examples CD.</td>
</tr>
<tr>
<td>11.</td>
<td>Rapid up and down glissandi, like a crazy fast extra wide vibrato.</td>
</tr>
<tr>
<td>12.</td>
<td>A very rapid glissando that reverses direction frequently and part of an overall descent.</td>
</tr>
</tbody>
</table>
**Electronic Sounds Notation (Special Cue Points)**

1. Specific cue point, measure 195. Refer to CD examples track 14.

2. Specific cue point, measure 247. Refer to CD examples track 15.

3. Specific cue point, measure 251. Refer to CD examples track 16.
Examples CD Tracks List

1. Violin trill between open string and harmonic pressure.
2. Violin ‘mosquito’ gesture.
5. Violin ‘mosquito’ gesture, overbow.
8. Viola ‘mosquito’ gesture, various.
13. Violin string rub.
Acknowledgements

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