Elec

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Elec is a piece for solo violin composed during 2015 for Linda Jankowska. The image inspiring the work is the idea of a constant flux of energy out of control moving erratically between channels. In the piece, this is represented by means of having very active situations where rapid gestures jump from one string to another in a rather chaotic way. In order to render an *electric* quality in sound, a crucial decision was made consisting in using only natural harmonics and harmonic-derived sounds[1] as the basic micro-material of the piece, excluding all sounds emitted with normal finger-pressure of the left hand. This initial decision triggered a chain of subsequent problems and solutions in the compositional process where each solution created a new problem leading to a new solution and so on. In considering the small-scale flux and syntax of the piece, some aspects of John Coltrane's phrasing style were taken as a model, implying a reflection on some of his particular devices. The following discussion will gravitate around the challenges and strategies arising from the choice of material and the approach to flow and syntax in the piece.

Sound: Harmonics and half-harmonics

Of the various reasons guiding the decision to work almost exclusively with natural harmonics on the violin, the most important is their sound quality. Individually, harmonic sounds produce an acute thinness due to their lack of partial content: they *are* the very partial content resulting from the division of the string's overall colour, similar to the diffraction of light into its individual frequency components in a rainbow. Therefore, when harmonics are disposed in a changing flux, they acquire an iridescent character, meaning a continuous shimmering texture covering a wide pitch-range where controlled -as well as random- harmonics arise, including noise content as well. This kind of behaviour corresponds well with the desired "electric flow" character. But what seemed as a simple task at the idea-level created some interesting difficulties and problems concerning practical aspects of the musical discourse that needed to be considered.

The first of these problems was the fact that taken as a whole, natural-harmonic sounds produce a *clichéd* harmony, an over-familiar sonority for the ear that has also some marked tonal connotations certainly unwanted. In order to overcome those issues (avoiding the typical harmonies formed by natural harmonics in standard tuning) a different *scordatura* was devised *(fig.1).*

[1] Such as half-harmonics and natural multiphonics, to be explained later.

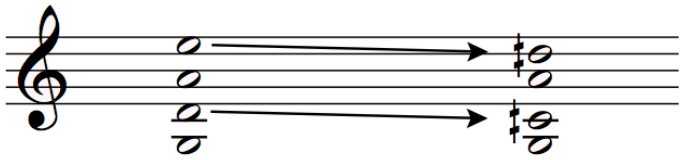

Figure 1: The scordatura consists in dropping the first and third strings by one semitone plus a quarter-tone (almost a tone), preserving some degree of symmetry by having the same harmonic relation between the first and second strings, and the third and fourth (both are at a distance of a slightly-big fourth), and similarly between the first and third, and the second and fourth strings, which maintain the original interval of a ninth.

However, using only harmonics creates a harmonic *mode* that easily becomes monotonous after being continually heard for a certain (not long) amount of time. This happens because inside the overall sonority a few harmonics will inevitably sound louder (the nodes corresponding to the 8ve, 5th and 4th). The solution to this problem was to include other harmonic-like pressure derived sounds: half-harmonics and natural multiphonics. Half-harmonics have a rather ambiguous sonority; they are produced by applying half of the pressure between harmonic and ordinary sounds. Their sound correspond usually to the depressed note (sounding an octave higher) and it incorporates other noise content as well *(fig.2).* Natural multiphonics[2] on the other hand are made by slightly pressing down some specific zones of the fingerboard where nodes are close enough for harmonics to vibrate together, with some overpressured bow on the *sultasto (fig.3)*.

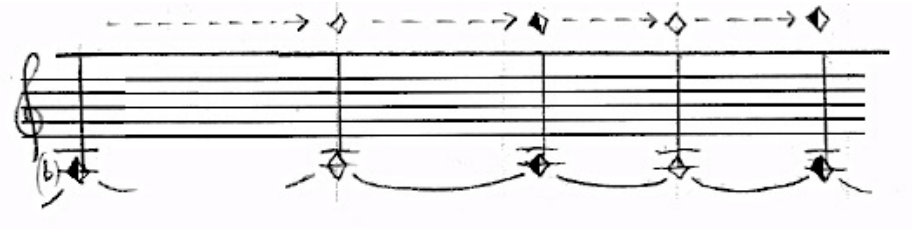

Figure 2: half-harmonic sounds are notated with half-darkened diamond noteheads. The passage corresponds to the beginning of the piece where transitions between harmonic and half-harmonic sounds take place.

[2] For more information about multiphonics on bowed strings, there is an excellent resource online developed by Ellen Fallowfield: http://www.cellomap.com/index/the-string/multiphonics-and-other-multiple-sounds.html.

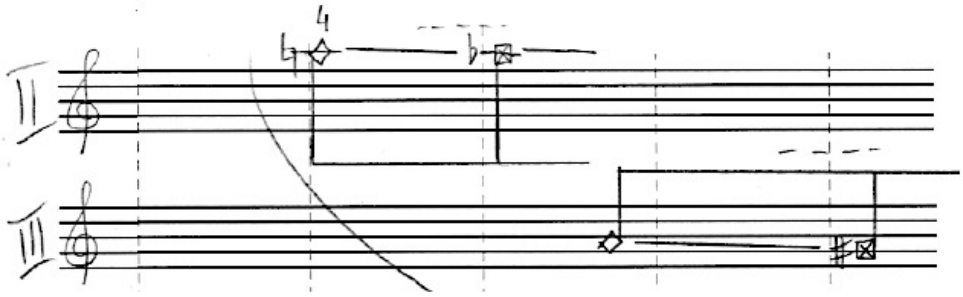

Figure 3: natural multiphonics are notated with a squared notehead with an X inside. The passage shows the "dive bomb" material (explained later on).

The next challenge was to overcome the problem of a too exposed and naked sonority resulting from having only one voice or line even if consisting of fast sequences of sounds. This problem suggested a more polyphonic approach; the solution was to incorporate the use of double stops (simultaneous sounds on adjacent strings) for almost the entire piece. The idea came from previous explorations in *Ohne,*[3] an ensemble piece from 2014 where double stops of harmonics are frequently used on the violin (played by Jankowska).[4] This opened the possibility to include polyphony in the piece, enabling more interesting textures on one hand and an extra-dimension in sound on the other, since by having two simultaneous harmonic sounds (where usually at least one of the voices changes and moves), noise and friction produce a result much richer in timbre than the mere sum of the two.

The polyphonic material of the piece of involves two possible situations basically: one in which rather fast figures on both strings somehow "compete" for the available fingers *(fig.4)*, and another situation where one string contains rapid figures while the other is still *(fig.5)* which is much more abundant. This material is the most undetermined of the piece concerning its sounding result because of the difficulty for the performer to fully control the rapidly changing flux of harmonics; unavoidable noises will emerge differently on each subsequent performance. The rapid successions are mainly scalar and chromatic gestures, but their sound does not correspond to those pitches as we will see. These gestures include also trills and tremolos that will appear on other materials as well. The polyphonic behaviour is present mainly on the first half of the piece roughly speaking (later on, two other materials involving double strings will emerge and prevail).

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[3] Piece for violin, viola, piano and percussion, composed in 2014, and premiered by the Distracfold Ensemble.

[4] *Ohne* ends with a solo violin playing a sustained sound consisting of a double-stop of natural and artificial harmonics during 40 seconds approx. The beginning of *Elec* (dedicated to the same violinist that premiered *Ohne*) consists of approx. one minute of a sustained double-stop made of natural harmonics and occasionally half harmonics. This intentional relation points to *Elec* as being the metaphorical continuation of *Ohne*, which can also being done in practice, by playing the last part of *Ohne* with the scordatura of *Elec* and continuing into the solo violin piece.

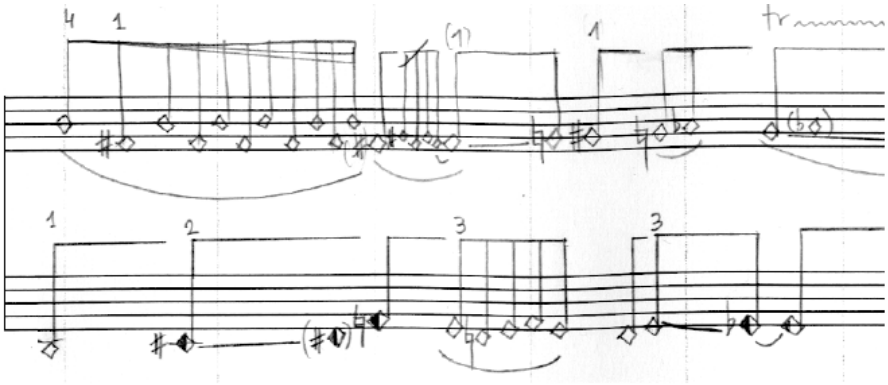

Figure 4: polyphonic material on two adjacent string in its more "challenging" version.

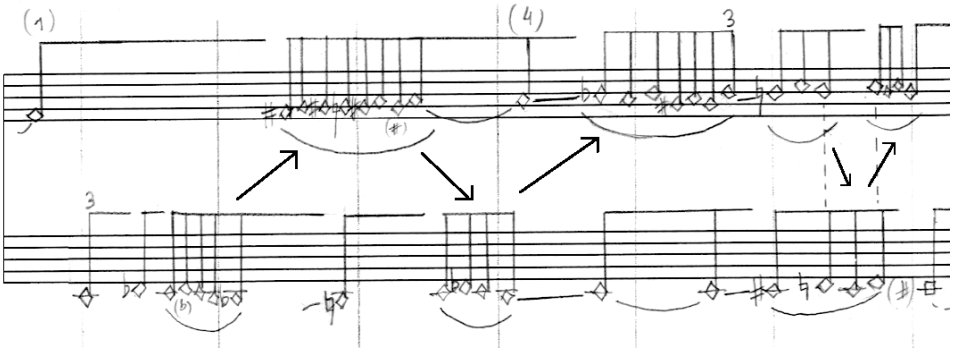

Figure 5: polyphonic material in its simpler version, consisting in the constant swap of movement between adjacent strings.

Finger mechanics

The decision to have two strings played simultaneously most of the time was a good solution regarding the overall sonority of the piece, making it sound more polyphonic and less determined at the same time. However, this produced some constraints in the mechanical dimension expressed as limitations on the mobility of the left-hand fingers. The reason is that in the adopted model for adjacent strings played simultaneously, one finger needs to remain static on a string,[5] being automatically "lost" as a possible moving entity. This reduces in great extent the options for finger movement since only three fingers are left free to move but in a very restricted space because of the *anchor* finger, allowing only small horizontal displacements to be done. In exploring the finger possibilities I realized that the most effective combinations were those where the static finger could also be used as a passing note on the moving string.

[5] In the more common version (shown in fig.5), but also applicable to the more polyphonic version of this material (fig.4).

This time the restriction of sound material (working exclusively with natural and half-harmonics) was an advantage since the internal map inside the strings is completely reshaped when using harmonics. This means that there is no gradual change in pitch –as in ordinarily pressed sounds– when moving from one node[6] to the next: the resulting pitch is totally counter-intuitive (specially in the middle-zone of strings) due to the different spatial logic arising from the complex of frequencies vibrating simultaneously.[7] So the advantage consists in the possibility of producing different pitches from a wide register by moving inside a small portion of the fingerboard. Figure 6 shows how different partials arise symmetrically from the center of the string in both directions, very different to the linear course of ordinary sounds.

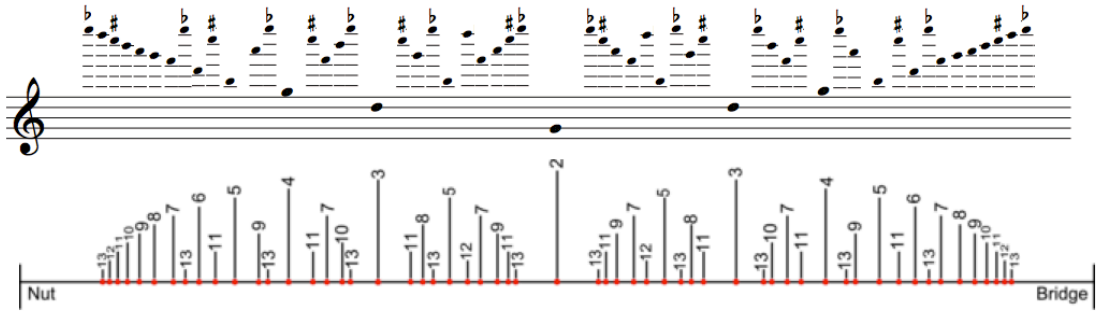

Figure 6: harmonic map from the G string of a violin. The diagram below (by Ellen Fallowfield)[8] indicates the harmonic or partial number (the fundamental being number 1).

This fact allowed other interesting situations, such as making variations in pitch of a gesture by repeating the same fingerings on different zones of the *tastiera (fig.7).*

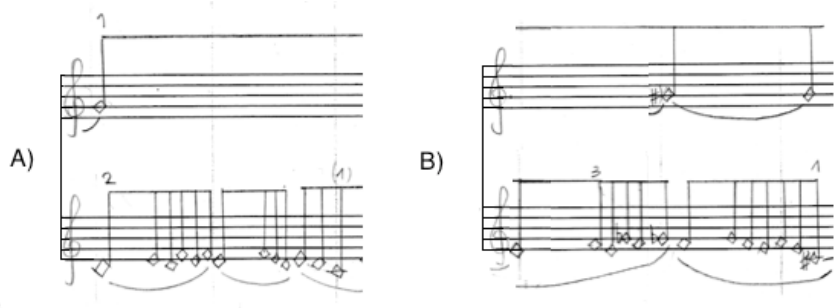

Figure 7: two moments where the same fingering is applied to slightly different geographical points of the fingerboard producing different "harmonies" because of the spatial logic of harmonic nodes, as opposed to a simple transposition.

[6] The place of the *tastiera* (fingerboard) where the finger lightly touches the string in order to produce harmonic sounds.

[7] This happens because the different oscillating waves –corresponding to ratios of the total length– coexist in the space of the string, so in touching one node only *that* specific harmonic is filtered from the whole complex of the spectrum.

[8] From www.cellomap.com.

Other materials

In addition to the polyphonic material explained above, other types of action were conceived and integrated in order to have sufficient resources to diversify the musical discourse. This seemed necessary in order to achieve some contrast inside the fast flow of events. These materials or behaviours are (in order of appearance) the *bisbigliandi* material *(fig.8)*; *homophonic* material *(fig.9)*; and "dive bomb" material *(fig.10).*

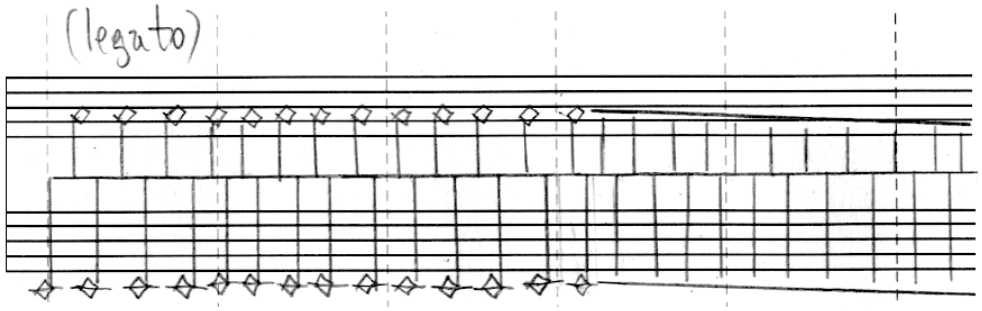

Figure 8: the bisbiggliandi *material consists in a series of "quasi-unisons" played in an alternated fashion –a very typical behaviour on bowed strings. There are a lot of these unisons and quasi-unisons produced by harmonics on different strings, arising from the special scordatura. This material start appearing as short instants, increasingly taking place until becoming the main material of the second half of the work. It also adopts small and slowly changing glissandi as a form of slight variation of timbre and pitch. Another variation consists in unisons made by tremolos on different nodes of the same string.*

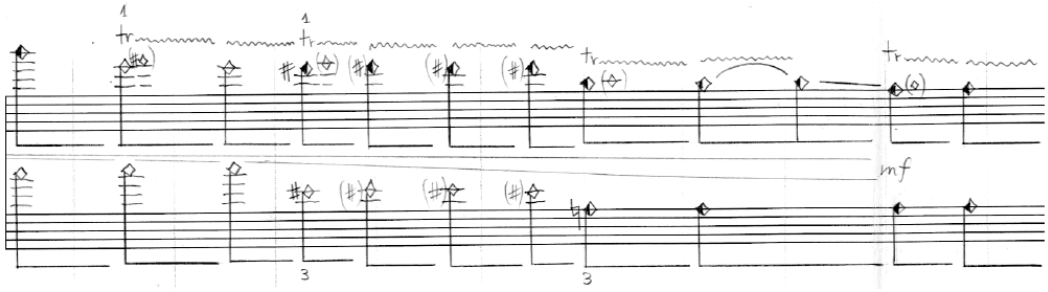

Figure 9: the homophonic material originates in the polyphonic behaviour. It predominates on moments using very high harmonic sounds in the first and second strings, as well as very high finger positions of the fingerboard on the third and fourth strings.

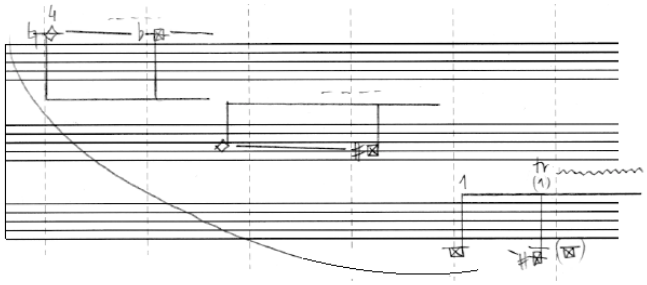

Figure 10: the "dive bomb" material consists in a deforming sound descending from an octave harmonic in the second string towards a subtle multiphonic created by the frequencies of that partial colliding with the mayor seventh half-harmonic reached gradually. Then it moves down smoothly to the subsequent adjacent strings. It is somewhat similar to the effect having that name used by electric guitarists, consisting in depressing gradually the whammy bar until reaching noisy sounds (using distortion) produced by the lack of string tension. This material emerges gradually on the piece, and ends up closing the work in a slowing down loop.

Small scale flow, Coltrane

The choice to have a constant flow of rapid notes organized with certain degree of modularity was a direct influence from John Coltrane's phrasing style. One of the great features developed by Coltrane –among many others– consists in what has been described "as sheets of sound,"[9] which are basically very fast successions of ascending or descending arpeggios or short scalar motives that produce the impression of rapid *cascades of notes*.[10]

When examined on a transcription[11] or in a slowed-down recording, this behaviour exhibits patterns; a plethora of small blocks glued together in a rapid modular fashion, with frequent repetition and variations.

But it seems that he did not conceived this characteristic way of playing as being strictly linear but as condensing subsequent harmonies in small time-lapses. In fact, he stressed that his approach involves thinking "in groups of notes, not of one note at a time."[12] This conception helped in conceiving the polyphonic material of *Elec*, by establishing groups of sound as small fields of possibilities where their exact sequence is not what matters most but the "vibration" of the field is to be perceived as a whole, as the harmonic atmosphere produced by rapid successions of sounds.

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[9] A famous term coined by Ira Gitler in the liner notes of the record *Soultrane* (1958). As cited on Porter, Lewis (1999). *John Coltrane: his life and music* .The University of Michigan Press, p.133.

[10] From http://www.britannica.com/biography/John-Coltrane.

[11] Giant step solo transcription of master take, by David Baker's "The Jazz Style of John Coltrane"(1980), as in Porter, 1999, p.152.

[12] As cited in Porter, 1999, p.133.

Another interesting feature from Coltrane's playing is the saturation in sound that he gets by overblowing or by using multiphonic fingerings, in reaching culminating points of phrases. A similar sound quality was searched by the use of multiphonics in *Elec,* changing the character of some "phrases" by the sudden appearance of saturation *(fig.11).*

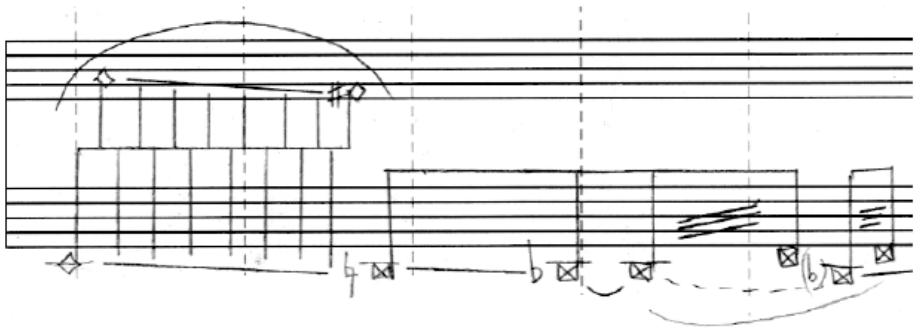

Figure 11: saturation takes place after the bidbigliandi material descends towards natural multiphonic nodes, and the later arrival of a multiphonic tremolo.

Syntax

The modular strategies used by Coltrane in his phrasing style inspired the model used for organizing the small-scale flow of events as well as the different materials of *Elec*. At the small level this means simply that short groups or phrases are put one after the other in a similar continuous way. Concerning bigger groupings of material a modular and alternating approach is also adopted in order to avoid a too repetitive discourse and its potential neutralization due to the reduced means employed in terms of the harmonic and acoustic material discussed earlier. At a yet wider formal dimension, in considering tendencies of the modular approach, a transition takes place during the piece towards a more frequent use of the bisbigliandi material, and as the piece gets closer to the end, a faster alternation between materials operates, in a sort of liquidation and auto-consumption process where the bisbigliandi and "dive bomb" materials predominate. Finally, the latter remains and closes the work. At this point we could say that there is a sort of "liberation" of the piece from its own constraints.

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