H160R

# "La cloche sans vallees"

22'03" Stanford 1993 Ludger Brümmer

## 1. The conception of the form

The technique of Cantus Firmus is similar with the way "La cloche sans vallees" is created. Where in the cantus firmus technique an existing melody is integrated in a new composition, the piece "La vallee des cloches" from the cycle "Miroirs" composed by Maurice Ravel is the only source sample for "La cloche sans vallees".

The algorithmical processes which read portions of the source sound and write it into a new sound can be seen as a restructuring process of the continuous time of the original piece. With other words the algorithm is like a second layer above the existing piano piece of Ravel.

The most important idea of the algorithmical structures is a "ritardando" or "accelerando" which means a process of increasing or decreasing values. These increasing and decreasing values are used to generate the time values and several other parameter like dynamic, pitch duration, envelopes a.s.o. The way those values increase (linear, exponential, logarithmical a.s.o) and decrease and how the different parameter grow and shrink in different characteristics represents one of the interesting points of the piece. Some parameters are coupled, some use a total different process to generate their values f.e. item-streams and some use a different kind or speed of increasing and decreasing.

A sound could have been generated by using the same algorithm over and over again for the resulting sound. These processes represent a ritardando in a second or third order which result in sounds with small ritardandi in each event. Ritardandi and accelerandi determine not only small structures of the piece: the first 560 seconds with all its structures continues to accelerate seven times, until it implodes into a click. At the point where time is compressed to its limit (the click) the melodic structure of the piano sound is revealed and mirrored, making reference to the symmetrical structure of the source piece. Out of this click a new structure grows with increasing durations and decreasing pitch. Following that the piece contains one accelerando followed by one ritardando which together create a symmetry by using two tendency processes in a mirror. The symmetry is as well present, where the quote of "La vallee des cloches" in the middle of the piece (if you leave the Coda away) sounds forward and then backwards like a mirror. The same part is then used again in the coda and continued at the position where it runs backwards in the first appeareance. It is counterpointed by itself, transposed upwards 5 halftones.

## 2. The concept of event structures

Beside the already mentioned ideas another idea can be described as an "identical or modified repetition of a section of a sound": a loop.

Changing the duration of a single loop (pulse) leads to the following types of perception: i.) The shortest loop is perceived as a pulse, or a click without any timbre or therefore pitch. ii.) A longer loop enables the auditory system to, in effect, apply a Fourier Transform to the signal and evaluate at least a part of the timbre of the source signal. iii.) If the loop is longer still, the ear can perceive timbre and pitch completely.

These phenomena also apply to continuous sounds containing repetitive

portions of signal and silents.
Human perception structures sound information in the sub audio domain into time units of different size e.g. events, sequences, and sections, while sound informations in the audio domain is perceived as pitch and timbre. Once placed in one of these categories the sound information is perceived. A process of decreasing or increasing speed causes a modification in the perception of a signal as the category crosses the threshold between sub audio and audio perception and with this the whole set of categories moves.

### 3. The looping program

The looping program which is created for the above mentioned ideas executes basically pointer operations. Four main functions are specified by envelopes: 1. loop length, 2. reading position in the source file, 3. silent time in between the loops and 4. glissando.
To have access to smaller events as well, some functions determine the individual loop. Each loop can be read forwards or backwards as specified in a list e.g.: (r f f f f r r f.....). The pattern of the list is then repeated. Each loop is separately transposable with a pattern given in the loop pitch list: (1 1.2 1.32 1 .....).
The idea of the parameter determination is to specify parameters on different time levels, so that a heterogenous global structure can be generated. The pitch parameter, for example is determined 1. globaly with a pitch constant, 2. flexible with the pitch envelope and an envelope scaler, 3. specific in the loop pitch list and 4. by the envelope which applies silents between the loops.
A zero crossing detector with settable limit values and two ramping mechanisms which fade the sound in at the beginning and out at the end of each loop helps to avoid click. An envelope controls the intensity of this process.
The loop and the deceleration of note patterns represent the central idea of the piece. A software synthesis language can now provide a totally different conception of composition. The instrument is not only the source of the sound and carrier of the musical structure (like a conventional instrument), it can represent as a sound synthesis program the musical concept of the piece every bit as much as the musical material iteself. The creation of the synthesis program as a creative part of the composition process influences to all the following work and determines the composition. In instrumental music the composition is determined by the technical abilities of an instrument and of its player. But while the abilities of player and instrument could be seen as inflexable constants, the program created for the sound synthesis represent a variable which is an interactive part in the process of composing.

The sound processing techniques used in the piece were restricted to sampling-rate conversion and pointer operations. The piece was entirely created digitally on CCRMA´s (Center for Computer in Music and Accoustics, Stanford University California) NeXT-Net using Bill Schottstaedt´s Common Lisp Music synthesis language, Rick Taube´s Common Music score/composition language, and Paul Lansky´s RT mixing program and one special filter designed by Julius O. Smith.