Abstract
The SSMN Spatial Taxonomy and its symbols libraries, which are the cornerstone of the Spatialization Symbolic Music Notation (SSMN) project, emanates from research into composers’ attitudes in this domain. It was conceived as the basis for the development of dedicated notation and rendering tools within the SSMN project. The taxonomy is a systematic representation of all relevant features necessary to specify sound spatiality: shape and acoustic quality of the space, structure, position and movement of sound sources. It is based on single descriptors that can be combined in order to define complex spatial configurations. Descriptors can be transformed locally and globally and can be the object of structural and behavioral operations. The SSMN Spatial Taxonomy proposes a corresponding graphic symbolic representation of descriptors, operations and other functional elements facilitating the communication of creative ideas to performers and technical assistants. This paper focuses on the presentation of the taxonomy and the symbols. Additionally it describes the workflow proposed for using symbols inside a notation [...]
Taxonomy and Notation of Spatialization

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1. About SSMN

SSMN (Spatialization Symbolic Music Notation) proposes a new approach towards a better integration of spatial relationships and processes in musical thinking as well as in composition, rehearsing and performance practice.

It consists of a typology of spatial movements and a library of symbols representing them, together with an open source software tool (MuseScoreSSMN) integrating this library within a common musical notation context, allowing editing and acoustic feedback through a rendering engine.

Composers can use and edit symbols describing spatialization, and immediately hear the results. Performers are given full information on spatialization in the score and can hear the results from the beginning of the studying process. This poster presents the typology of spatial movements and some of its corresponding symbols.

2. Taxonomy

The taxonomy is a systematic representation of all features necessary to specify sound spatiality: shape and acoustic quality of the space, structure, position and movement of sound sources. It is based on single descriptors that can be combined in order to define complex spatial configurations. Descriptors can be transformed locally and globally and can be the object of structural and behavioral modifications.

- There are two kinds of descriptors: room descriptors and descriptors of sound sources. Descriptors can be simple or composed.
- Operations and modifiers can be used to transform elements previously defined using simple or compound descriptors or to generate new elements.
- Global operations can be used to generate relationships between complex entities like sequences and superpositions of existing compound trajectories.
- Cross-domain interactions can be used to link relationships between spatial audio information and other media like synchronization with visual or choreographic sequences.
- Behavioral relationships inspired by social and biological movement patterns suggest a new paradigm of sound spatiality based on processes rather than geometrical or visual structures. This aspect is not fully integrated in the taxonomy yet.

3. Symbols

The SSMN Spatial Taxonomy proposes a corresponding graphic symbolic representation of descriptors, operations and other functional elements facilitating the communication of creative ideas to performers and technical assistants. The actual symbol set consists of the following categories:

- Physical performance space characteristics
- Initial physical placements of performers, microphones, loudspeakers and objects
- Position of sound sources
- Trajectories and displacement of sound sources, microphones, loudspeakers and objects
- Operations
- Stop/End markers delimiting the time domain of symbols
- Inter-application communication resources (OSC, MIDI) for interaction with external programming environments

Table 1 includes only symbols created according to the taxonomy. Some of them are already available within MuseScoreSSMN. Trajectories appear in two variations: single direction and back and forth.

The symbols shown in Table 2 specify further positions and movements of sources or address new elements and functionalities.

4. Working with symbols

Figure 2 illustrates the basic workflow within MuseScoreSSMN: (A) selection of a symbol from the “SSMN Palette”; (B) placement in the score; (C) definition of parameters in the “Inspector window” corresponding to the symbol chosen; (D, E) display of the trajectory or trajectories designed by the user in the interactive “Fader window”. This window contains a top and a side view (E).

5. Conclusion

Early results of the SSMN project have been tested with composition students at the Zurich University of the Arts and presented at the Haute École de Musique of Geneva. This experience revealed increased awareness of spatialization possibilities within the composition process and augmented spatial listening acuity.

Additional tests will help to clarify if similar workflows can become practical and open enough to meet the requirements of different composers. In the near future questions of behavioral interaction between two or more sound sources affecting their spatial movement will be addressed. Other aspects being currently investigated are SpatDIF compatibility and the integration of SSMN Elements within the MusicXML protocol.

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References