

The road to electronic music education and composition in China based on Csound

—An example of SCCM's Csound teaching research

Abstract. Using music programming for electronic music composition has been an important way of electronic music research and composition for more than half a century, but how to educate and promote it is a great problem for researchers. This paper will discuss the experiences and achievements of Chinese electronic musicians in electronic music education and composition with Csound. With the Sichuan Conservatory of Music as the object of analysis, we will explore how to combine new technologies with the essence of Chinese culture in electronic music composition and composer training, find new forms and explore the impact of the intermingling and collision of different cultures on the promotion of music art and technology.

Keywords: Csound, Chinese culture, teaching, composition, The Night of Coding

1 A history of music programming technology research in southwest China

As an inland province in southwest China, the province of Sichuan used to be comparatively closed to information dissemination. Nevertheless, after China opened its doors in the late 1970s, new ideas and technologies continued to emerge, and music scholars in Sichuan began to actively learn and explore. Sichuan Conservatory of Music (SCCM), the only professional music conservatory in western China, the study of electronic music composition and sound synthesis language also commenced to sprout during this period.

In the 21st century, the Department of Electronic Music (EMD) at SCCM has actively established ties and academic exchanges with international electronic music institutions, successively establishing partnerships with GRAME (France), CCRMA (USA) and ZKM (Germany); professor John Chowning from Stanford University, Professor Jeffry Stolet from the University of Oregon and others have visited one after another to hold academic lectures, workshops and concerts, actively providing study and research assistance for electronic music researchers at SCCM.

2 Teaching music programming techniques in the early days of SCCM

In search of theories and technologies that can better serve Chinese electronic music, a group of composers and researchers with backgrounds in both computer engineering and music composition have convened at SCCM to conduct research on electronic music composition for Chinese culture, to formally incorporate music programming technology

into their teaching programs, to provide courses based on music programming technology, and to create an electronic music communication community based on Chinese culture. These courses provide students with more options for creating electronic music. They provide researchers with new research directions and widen the genres and possibilities for producing electronic music compositions.

3 Teaching and research in Csound

3.1 Thesis writing and course offerings

In the early 1980s, Chinese music scholars only began to research and compose electronic music with a focus on synthesizer music, and related literature was uncommon. For a long time, Csound-related Chinese literature could not be found in the libraries of Chinese professional music schools, and there was only one short article introducing Csound in the 1990s in CNKI, the largest database of Chinese papers. Accordingly, Csound lacked systematic and open academic research in China for a sustained period of time.

In 2010, Professor Jon Christopher Nelson from the North Texas University visited SCCM for an academic lecture, where he introduced his Csound research and electronic music composition, giving us a renewed awareness of the vitality of Csound and its possibilities and importance in research and composition.

After a period of research, in 2010 I commenced to apply to teach a course on electronic music applications and composition at SCCM's Electronic Music program utilizing Csound as the primary teaching platform. In the process of teaching the course, I received help from the Csound community, where key members such as Dr. Richard Boulanger, Steven Yi, and Iain McCurdy responded positively and helped me greatly in teaching and further researching the course. In order to assist Chinese electronic music researchers to understand Csound, I have published three papers in Chinese introducing open source free music software and focusing on the importance of the Csound language in research and composition, which provides a starting point and help for successive researchers to study.

SCCM students have frequently used Csound as the main research object or Csound as the main creation platform in their thesis writing, and have written various Csound-related theses and created several works based on Csound, and their theses have been included in the academic thesis database one after another, which provides direction and new ideas for successive learners and researchers.

3.2 Compilation and publication of books

In order to make Chinese Csound literature accessible to Chinese students and to address the difficulties of literature research for students whose native language is not English, I have also made efforts to make English literature available in Chinese. Based on materials such as *Csound Canonical Manual* and *FLOSS Manual*, I translated and compiled the first Csound learning tutorial in China, ***Introduction to Csound Music Programming***, and

raised the funding myself to publish it publicly in simplified Chinese in 2015. Since then, the book has been used as a textbook in SCCM, accelerating the localized teaching and promotion of Csound. Many university and college libraries collected the book, and some music schools chose it as a textbook or reference for teaching, researching and composition.

After more than ten years of efforts, Csound is progressively recognized and adopted by researchers and composers in professional music colleges and universities in mainland China. Some young composers have also attempted to apply Csound to their electronic music works.

4 Instructional design and key elements of Csound

4.1 Addressing the inner confusion and creative needs of learners

In music school teaching, it is hard to obtain the sustained attention of students merely by talking about the importance of technique, and it is likewise difficult to gain the long-term support of the college. For contemporary young composers and researchers, the time spent studying at the academy is precious, and everyone considers the cost of the time spent studying and its output. Many learners will give up their studies if they cannot apply them to their compositions and better serve their subsequent research.

In the course of teaching, students and other professors often query: Why do we need to learn Csound language when there are so many excellent electronic music software available today?

Consequently, in practice, we try to merge the technology of Csound music programming with Chinese culture for composition and research, so that we can answer the needs of students in learning, composition and researching, and at the same time receive more support from schools and educational authorities.

Through specific theoretical research and practical creation, we explain the reasons for learning Csound in many ways. This work has led many students and professors to embrace Csound and try to employ it in their compositions, applications and research, which has accelerated teaching and creation and created a positive interaction. The course lasted for more than ten years.

4.2 Main Front-Ends used

Based on the professional background and characteristics of the students, Csound is taught at SCCM using predominantly CsoundQt and cabbage front-ends.

CsoundQt is used to complete regular teaching for the design and composition of works based on sound synthesis, audio processing and controller interaction, mainly for pure electronic music, acousmatic and electro-acoustic music composition.

Based on that many students use Steinberg Cubase for composing, students are taught to design synthesizer and effects in Cabbage, export patches as VST format plugins through Cabbage's export option, and then use Cubase as a host for insertion, which

facilitates students to apply Csound design to familiar DAWs for personalized music compositions, thus reducing students' technical difficulty in design and enriching their application in composing. For students with some research ability, they are encouraged to export the patches designed by Cabbage as VCV plug-ins and apply them to plug-in design and work creation. This both reduces the C++-related knowledge required to design VCV plug-ins and enhance efficiency, while providing the possibility of future application of their designs to commercial systems and widening the scope and field of student research and creation.

Combining coding technology with music composition and performance through live electronic music, acousmatic music and audio-visual music, forms the characteristics of SCCM's music coding technology teaching and composition.

4.3 Strategies and approaches for different students

For general learners, we provide them with paradigms and templates for learning and applying Csound. For example, specific functional modules and composition templates, so that they can swiftly get involved in the application and creation, without losing patience and enthusiasm due to the longtime of basic learning.

For students who have a good foundation in composition, they are guided to combine the techniques of Csound with the creation of local cultural features, such as traditional Chinese instruments like *Zheng*, *Sheng*, and *Dizi*. By using audio synthesis techniques and digital audio processing techniques to help students with tape music and acousmatic design, they are guided to learn to design sound processing programs in a coded way. By using real-time audio processing techniques, students can use their own instrument playing skills and add them to the design of electro-acoustic music or interactive electronic music.

For students with some design skills, students are instructed to use widget-related technologies to design interactive electronic music with graphical objects. Use MIDI, OSC and DMX protocols to interact with additional hardware devices or software to design new media works that integrate audio and visual.

These ways allow students to be able to create as a motivation for learning, to meet the need to create their work in the learning process, and to guide them to become more involved in Csound learning.

5 Presentation and dissemination of teaching and research results

5.1 Course completion work display

The methods used in classroom lectures essentially need to be validated by the work. As a form of course completion, all students, in addition to completing their assignments, are required to compose works by Csound at the end of the course and present them in a concert hall at the college. This is a way to assess students' learning, and also to give them some pressure to work harder on Csound and think about how to use the techniques they have learned to compose, so that they can merge learning and creation.

5.2 Csound Research Group

After starting the Csound course in 2010, in addition to my own efforts to conduct creative research, I also founded a Csound research group. The early team consisted of myself and several students who enjoyed Csound, and focused on new ways of creating and designing interactions, trying to find new possibilities for traditional Chinese instruments. With the development of research, the research content of the Csound research group has been extended every year. The works created by the group members have also become typical representatives of Csound research and serve as good demonstrations.

5.3 The Night of Coding

Young composers are learning to use Csound to create different forms of electronic music, with several outstanding works in each academic year. "The Night of Coding" is an exhibition and exchange platform for Csound works inspired by Miller Puckette's "The Night of Linux". It provides the venue, equipment, funding, posters and self-media; It also provides recording, video and live streaming equipment to help present the work in live or online formats. After the performance, a salon would be held for the composers to interact and communicate with the audience, discuss the experience of creating the work, and allow the concepts of Csound to be shared and spread. Through live performances and listening to the comments of professors, young composers can revise and adjust their works to make them better polished.

5.4 Composition and promotion of works in the context of Chinese culture

As well as studying programming and composition techniques, we also considered how to better incorporate technology and composition, and how Csound-related compositions could stand out among the many outstanding electronic music languages, software, and hardware. The sounds of traditional Chinese folk instruments are inherently highly individual and culturally specific, and the unique attributes and cultural traditions of traditional Chinese music have always been a constant source of creativity for young Chinese composers. After many attempts and arguments, we believe that the combination of Chinese music culture and research based on characteristics is an important entry point for Csound China research and composition. Choosing suitable Chinese cultural symbols to match the characteristics of Csound compositions, finding instruments and timbres, and using Csound to synthesize Chinese unique scales and tunings are all ways we try to integrate in our compositions. Based on the fundamental ideas above, we have composed works with traditional cultural elements and characteristics such as "CHINA", "911", "Cycle Etude", "Fragment of Iliad", and "DTMF" have been selected by ICSC, ICMC, NYCEMF and Musicacoustica, etc. While conveying the creative ideas and personalities of young Chinese composers, it also allows Csound's Chinese research to be presented in various forms on the world music stage.

5.5 Submission and completion of research projects

In China, research projects are an important form of assessment for academic research. For Csound to have a place in Chinese academic research, it needs to meet the needs of research project submission and completion. Over the past ten years, the Csound research group has submitted eight projects related to coding composition or application and plug-in development, including two projects financed by the Chinese Ministry of Education, two provincial key projects, two provincial projects and two faculty key projects, with Csound as the main research object. These projects have provided the required financial support for research and application, as well as better presentation opportunities. This has greatly increased the motivation of the members to research and create Csound, as well as increasing the awareness and acceptance of Csound and computer music programming by researchers in related disciplines and educational research authorities, which has opened up a broader platform and provided a better foundation for subsequent researchers and creators.

6 Csound's future path in China

After more than ten years of hard work, Csound has been presented in different ways, it is becoming acknowledged among Chinese electronic music researchers and composers, and its research is becoming an important option for young composers; Csound's influence in the industry and in China has been effectively increased.

This is not enough, however; There is still a long way to go for Csound in China in the future. Based on the experience and achievements made earlier, in addition to sustaining the goods, there is a need to strengthen teaching both inside or outside the classroom, to update teaching content, concepts and methods, to stimulate composition and presentation, to promote participation in academic activities, to attract more young composers to conduct research in theory and methods, to encourage the composition of works, the writing of papers, and the publication of monographs. There is also a need to think more about and experiment with the development and expansion of Csound to promote a wider range of applications. All this, of course, requires the help and support of the Csound community developers and researchers, in addition to the efforts of Chinese researchers, and the continued injection of more new ideas and methods.

7 Conclusion

Based on the above, we believe that the excellence of a technology and a language in itself is the basis for its existence and application, but in practice, teaching and promotion also require the necessary strategies to study, compose and present it in a context-specific manner, so that it can be adopted and better demonstrate its outstanding properties to the world and give other learners and researchers the will to learn, study, apply and compose. There is a Chinese proverb called "The wine is good, but the alley is deep". In the education and promotion of Csound, it is essential to explore the potential of the Csound language, but also to integrate and promote the culture, so that Csound can be rooted in a specific cultural soil and develop more vigorously.

It is hoped that the experiences and methods in this paper will inspire other educators and researchers, and provide assistance in the teaching, application and dissemination of Csound.

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