

CSound Tutorial

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Original PDF with new page layout.

Comment by Juan Parra Cancino

The paper, although brief, shows the right spirit of the Computer Music community: to enrich the documentation available for a programming environment in order to increase and improve its use in educational contexts. It shows preliminary survey results of its adaptation and potential contribution among students, reinforcing its value and the value of future development.

Abstract

The Interactive Csound Tutorial, running on the NeXT computer, has been developed as a tool to help new users get to grips with the fundamental issues relating to the software synthesis and sound processing software package Csound.

Introduction

Csound is arguably the most widely used computer synthesis program in the world. Once a tool used only by educational and research establishments equipped with specialist technology, it is now running on numerous platforms and is central to many university and college courses in Music Technology. Despite its widespread use there is still insufficient material to support the teaching of Csound, especially within the context of a traditional music department where users are less likely to have the technical experience necessary to grasp an understanding of how the programme works. There is clearly a need for more comprehensive teaching aids and, in particular, a hands-on, step-by-step guide to the operation of Csound. It was for these reasons that the Csound Tutorial was developed.

Principle Objectives of the Tutorial

- **To design a musician-friendly interface.** Many musicians still have limited experience of computers and are often deterred by features such as the Unix terminal window and the syntax of the language used in writing Csound code. The data required to create a sound and the method of controlling the hardware is far removed from the procedures familiar to most musicians and composers. It is for this reason that the information presented in the Tutorial is discussed primarily from a musician's point of view, leading the user from familiar musical or acoustic terminology to terminology specifically related to Csound.
- **To provide a dual function.** The design of the software enables it to be used either as a step-by-step tutorial or as a quick-reference guide for more experienced users.
- **To provide comprehensive on-line help.** A system of on-line help windows is included which enables the user to access information related to any of the topics. These include detailed explanations of terminology and answers to any of the projects which the user may choose to tackle. The Csound manual is also available on-line for reference.
- **To provide sound examples embedded within the tutorial.** One of the unique features of the Tutorial is that it provides numerous examples of sounds, processes and procedures to illustrate the topics discussed. This is particularly important in that it enables the user to appreciate immediately the process being discussed or to compare their own work with stored examples within the Tutorial.

Foremost in the design requirements for the Tutorial was the need to create a simple graphic user interface which provides methods of navigating from topic to topic, allows soundfiles to be monitored with ease, and for associated sub-windows to be linked to hypertext in the main body of the topic. (Figure 1 shows a sample topic within the Tutorial.)

The order in which the topics are presented was also a prime consideration. The model the Tutorial follows is based on the Computer Music course as it is taught at Queen's University. It progresses from simple examples in additive synthesis through more complex examples which have controls for envelope, amplitude and frequency, to instruments and score procedures which are the most advanced available in Csound. Projects throughout the Tutorial allow students to test their knowledge and understanding of the work covered as they go along.

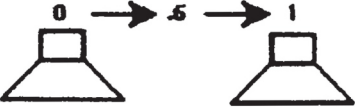
Panning

Panning

A sound can be positioned within the sound field using functions. One method is to define pan positions within the score using p-fields.

For example 0 would output the sound from the left speaker and 1 would output the sound from the right speaker. The value .5 would produce equal amplitudes from each speaker.

0 → .5 → 1



Score

f1	0	512	10	1	
:ins	start	dur	amp	pitch	pan
i1	0	.5	32000	8.00	0
i1	.5	.		8.04	.3
i1	1	.		8.07	.7
i1	1.5	.		9.00	1
i1	2	.		8.07	.7
i1	2.5	.		8.04	.3
i1	3	.		8.00	0
e					

This is implemented in the instrument as follows :

Orchestra

```
instr 1
kmp linseg 0,p3*.1,1,p3*.9,0
a1 oscili p4*kmp,cpspch(p5),1
outs a1*(1-p6),a1*p6
endin
```

When p6 takes the value .3 the left channel multiplies its signal by (1-.3) = .7 and the right channel multiplies its signal by .3. Therefore the output is divided in the ratio 7:3 between the two channels.

If we want to move a sound within the duration of a note we can define a line/linseg or expon/expseg statement within the instrument. For example if we wanted the sound to move from one speaker to the other within a duration of 5 seconds it could be carried out as follows:

Orchestra

```
instr 1
kpen line 0, p3, 1
a1 oscili p4,cpspch(p5), 1
outs a1*(1-kpen), a1*kpen
endin
```



Previous

Score Syntax <

Figure 1 Sample Tutorial page

It is intended that the Tutorial should be used in conjunction with or as a supplement to a taught course and since its completion in September 1992 it has been in use at The Queen's University of Belfast and at the University of Glasgow. Feedback from student questionnaires has shown the value of the Tutorial: 30% of the students questioned made very frequent reference to the tutorial, and 50% used it some of the time to assist their course work; 70% found the Tutorial the most useful resource available to them and 100% of the students questioned found that the Tutorial was easy to use and pitched at the right level.

Future Developments

Given the broad range of platforms on which Csound now runs it seems desirable to design versions of the program for other machines. Queen's University is now running Csound on Silicon Graphics Computers (as are an increasing number of institutions) and plans a move to a lab of SGI computers in the near future. A plan to rewrite the Tutorial is currently being considered along with a project to implement the Tutorial on the WWW pages of the School of Music at Queen's.

Acknowledgments

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