

# Creating Pedagogical Etudes for Interactive Instruments

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## ABSTRACT

In this paper I discuss the importance of and need for pedagogical materials to support the development of new interfaces and new instruments for electronic music. I describe my method for creating a graduated series of pedagogical etudes composed using Max/MSP. The etudes will help performers and instrument designers learn the most commonly used basic skills necessary to perform with interactive electronic music instruments. My intention is that the final series will guide a beginner from these initial steps through a graduated method, eventually incorporating some of the more advanced techniques regularly used by electronic music composers.

I describe the order of the series, and discuss the benefits (both to performers and to composers) of having a logical sequence of skill-based etudes. I also connect the significance of skilled performers to the development of two essential areas that I perceive are still just emerging in this field: the creation of a composed repertoire and an increase in musical expression during performance.

## Keywords

Pedagogy, musical controllers, Max/MSP, etudes, composition, repertoire, musical expression

## 1. INTRODUCTION

The inspiration for developing a series of concert-etudes for interactive musical instruments grew from my experiences creating and performing music with a P5 glove (see figure 1). Like most composers working in this field, I was not only designing the music, but also learning how to perform on this new instrument. Predictably, I found myself limited by my lack of technical skill. I observe this to be a common problem among composers and instrument designers in this field, with performances featuring interactive electronics often sounding more like demonstrations or experiments than musical performances.

As a musician with numerous years of training, I was not surprised that I needed to put in significant time to become proficient on this instrument. However, it is not only time that is needed to learn an instrument, but also a method. Currently, there are no existing methods for learning how to play a P5

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NIME08, June 5-7, 2008, Genova, Italy  
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glove, or any other interactive electronic instrument. The creation of such a method will, I believe, help to guide both composers and instrument builders in the development of a composed repertoire for interactive instruments, and an increase in the expressive capabilities of both the performers and the instruments they use.



Figure 1. The p5 glove

## 2. THE ETUDES

### 2.1 Providing a Musical Context

Since the eighteenth century, it has been common practice for composers and performers to write etudes for the development of technique on virtually every established instrument. All instrumentalists who have achieved some level of virtuosity on their instruments have done so through diligent practice of technical exercises such as scales, arpeggios, tone practice, and composed etudes.

Wanderley and Orio [6] describe another important purpose of etudes: evaluation of different instruments. They describe a method used to compare interactive music systems. This method uses short, repetitive “musical tasks.” With traditional musical instruments, they explain, “this task is facilitated thanks to the vast music literature available. This is not the case [for] interactive music instruments that have a limited, or even nonexistent, literature.”

Etudes fulfill an important role in learning an instrument by providing an ingredient that short repetitive exercises cannot: a musical context for the techniques they are teaching. [3] As a composer, I propose that instead of compensating for the lack of repertoire, we start composing a literature for interactive electronic music instruments.

### 2.2 Virtuosity

Historically, one important role of the etude has been to build virtuosity. For the purposes of this paper, I am using the

definition of virtuosity put forward by Dobrian and Koppelman [1]: “the ability to call upon all the capabilities of an instrument at will with relative ease.” As the authors point out, when working with computers it does not make sense to judge virtuosity only by the factor of speed, because computers can unquestionably play faster than humans.

When a performer has achieved virtuosity on an instrument, many levels of control and technique have become subconscious, and “when control of the instrument has been mastered to the point where it is mostly subconscious, the mind has more freedom to concentrate consciously on listening and expression.” [1]

Virtuosic performers are highly valuable to composers and instrument designers. Without virtuosic performers, and instruments capable of adequate expression, composers cannot hear their music fully realized. In many cases, instrument designers and programmers have to rely on their own, often limited, performing skills when first testing a new piece or instrument.

Etudes help to develop virtuosity, and therefore play a crucial role in further developing a repertoire for an instrument. Without etudes, players of acoustic instruments would not be able to handle the technique needed to perform musical works, and composers would not have performers to play the music they imagine. As it says in the New Grove Dictionary, “the true virtuoso has always been prized not only for his rarity but also for his ability to widen the technical and expressive boundaries of his art.” [4]

### 3. STARTING AT THE BEGINNING

#### 3.1 Ordering the Series

My initial series of etudes includes ten graduated studies that introduce the basic skills needed to manipulate different elements of musical sound. This series is designed for a beginner or novice performer on interactive instruments. The etudes are designed to create a non-intimidating experience for a musician with little or no previous experience with electronic music.

In choosing which musical elements and types of controls to include in the etudes, and in which order they will appear, I have also created a priority list. Undoubtedly, my etudes focus on the skills and musical elements most likely to be needed for my own compositions. However, I have tried to make the etudes stylistically diverse. By the end of the series the performer will have experience with: triggers, toggle, and more fluid or constant parameters.

#### 3.2 The Etudes

Each etude contains four elements: 1 – a basic description of the purpose and intent of the etude, including a simulation performance of the etude; 2 – a graphically notated score; 3 – the Max/MSP etude patch; and 4 – a Max/MSP patch that will be used to connect the interactive instrument to the etude patch.

Etude 1 introduces the performer to different approaches to rhythm and synchronization. At times rhythmic freedom is encouraged, and at times strict rhythm is required. Etude 2 focuses on pitch control, while Etude 3 focuses on dynamic, or volume control. Etude 4 combines the elements of rhythm, pitch, and volume control. Etude 5 focuses on spatialization and localization, and Etude 6 on timbre and envelope manipulation. Etude 7 combines the elements used in the first six etudes.

Etude 8 introduces different methods of synthesis (for example: granular and FM), and Etude 9 is a study in changing tempos. Etude 10, the final etude in the series, brings together all skills learned in the earlier etudes.

Each of these introductory etudes is notated along a timeline that the performer must follow, using a clock that has been placed in the etude patch. (see figure 2). The main goal is for the performer to become fluent enough on the instrument in these basic control parameters so that when further complexity is added the performer will be ready.

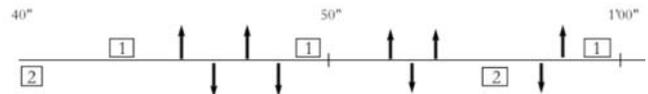


Figure 2. Example of Notation

Complexity is increased gradually throughout the series. It is understood that the level of complexity might depend on the characteristics of each interactive instrument. The main method of adding complexity is to increase the number of different control elements (for example, the number of triggers or different layers of sounds to be controlled) or by increasing the speed at which these elements need to be controlled. The first three etudes use only one dimension, layer, or direction of moveable data (constant flow between 0 and 127). Etudes 5 and 6 will involve two such layers. For example, one stream of data could control volume, and the other spatialization. With some instruments or mappings, the gestures that control this data may be completely separate (such as with a keyboard, or different pedals), and with others they may be more connected (such as with a wii, glove, or mouse). The final etudes will be the most complex: including many control parameters and requiring more intricate synchronization.

However, it is important to keep in mind that for now this is a series of beginner etudes, designed to prepare a beginning performer for future compositions that may require a much higher level of complexity and technique.

### 4. COMPATIBILITY

#### 4.1 A Universal Interface

One of the most important features of these etudes is their adaptability to many different controllers. Each etude is designed so it is playable by any device that can produce the required types of data. The interface for each etude lists the data needed and provides the necessary links into the etude. For example, Etude 1 requires an instrument that can produce eight separate triggers for sample playback (see figure 3).

Different mappings and interpretations can easily be tried with each etude. This flexibility will allow performers to practice different movements for different musical parameters, helping them to assess which of the movements will work best. Performers can gain a deeper understanding of the particular strengths and weaknesses of their instrument.

The etudes do not require specific movements, so the performer can choreograph all the gestures. For example, depending on the instrument being used, different actions can activate each trigger; different parameters (position, amplitude, pitch) can produce the same types of continuous numbers – yet the

resulting sounds will always be the same. Similar gestures, listening skills, and types of coordination are used by a large number of interactive instruments. Therefore, the skills a performer develops while learning this series of etudes on one controller will very likely be transferable to other controllers. Traditional etudes are also typically practised using a variety of approaches that challenge players in a variety of ways (for example, with different articulations or dynamic levels).

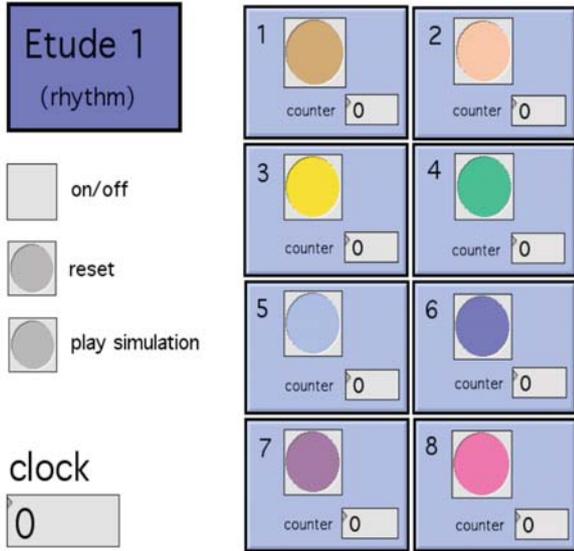


Figure 3. Etude 1 Interface

### 4.2 The Etude Patches

Each etude will have two Max/MSP components. The primary component is the etude patch (see figures 3 and 5). This patch contains all the programming needed for each etude, and should not be edited. Each etude patch includes an On/Off switch, reset button, simulation button, and clock. The patch shows all the needed information for performing the specific etude.

Each etude will also come with an optional User Interface (see figures 4 and 6). This interface will include all the “send objects” needed to communicate with the etude patch, as well as information about the type of data that the etude patch is programmed to receive. Performers will need to edit this patch or create a new patch that sends the necessary information from their interactive instrument into the etude patch.

### 4.3 A Shared Repertoire

Having a notated repertoire that can be performed by different musicians, as well as different instruments, is important to the development of any musical genre. Currently there is no such repertoire for interactive electronic instruments, and consequently no way to make musical comparisons between performers or instruments.

There is also extensive historical precedent for sharing repertoire across instruments, especially when the repertoire for one instrument is lacking. For example, several sonatas in the violin canon (Franck, Mozart, and Prokofiev) are commonly also played on the flute, and the Bach Sonatas for solo cello are performed on many instruments, including trombone and

marimba. The various strengths and weaknesses of each instrument become quickly apparent when repertoire is shared. Also, many composers, notably John Cage, have written pieces for open instrumentation. Performances of these works can vary widely depending on the instruments chosen.

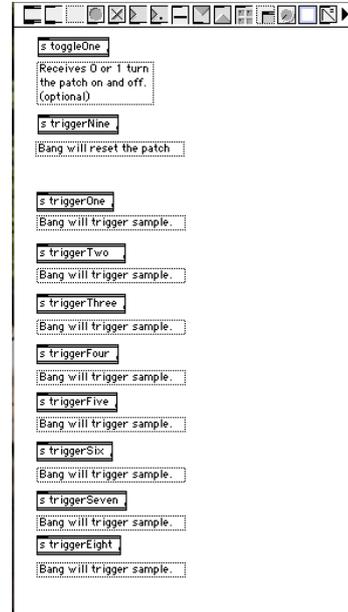


Figure 4. Etude 1 User Interface

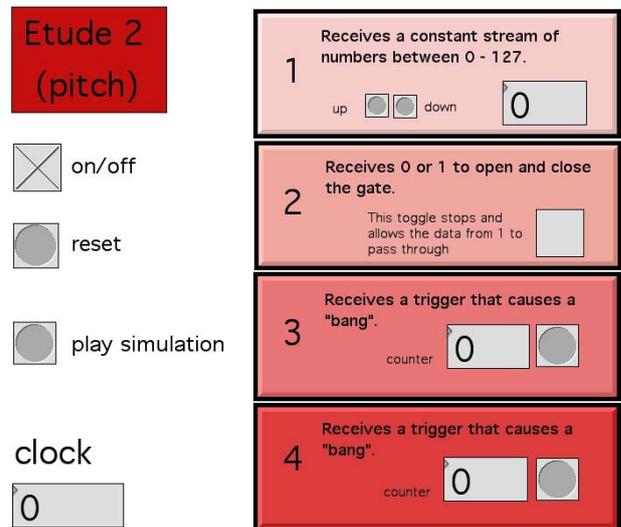


Figure 5. Etude 2 Interface

### 4.4 Point of Reference

One significant role these etudes will fill is providing a reliable point of reference when making comparisons between performers, performances, different instruments (level of subtlety and expressiveness achievable; ease of learning; performer reactions), and different mappings. Each etude will also focus on different musical or control elements, allowing a user to quickly determine the controller’s effectiveness and ability in each aspect of music.

The etudes may also be a good test of which type of controller might be best suited for a certain piece of music. This could be especially useful while the piece is still being composed. A more skilled performer could easily learn these basic etudes on several different controllers and quickly evaluate their effectiveness on many musical levels. As Wanderley and Orio state, "Musical tasks are already part of the evaluation process of acoustic musical instruments, because musicians and composers seldom choose an instrument without extensive testing to how specific musical gestures can be performed." [6]

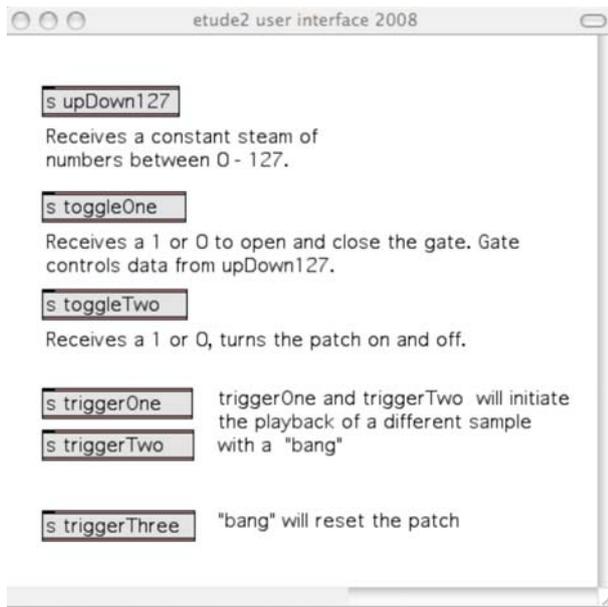


Figure 6. Etude 2 User Interface

## 5. CONCLUSIONS

My primary goals in writing these etudes are to:

1. Create a learning environment in which beginners can experience a non-intimidating introduction to interactive performance.
2. Encourage other composers and performers to create their own etudes and pieces that can be exchanged to broaden the level of shared knowledge, and help to define the skills needed for performing on interactive electronic instruments.
3. Create a tool that will guide performers and instrument builders towards higher levels of control and musical expression.

Interactive electronic music is an emerging field that has yet to solidly establish a repertoire or performance practice. I believe one of the most important steps in developing both of these fundamental parts of a musical genre is to create a method for learning performance technique. In the near future I hope to see strong performances of well-written pieces replacing the demonstrations and experiments that currently occupy many concert spots. For this to occur I believe composers, instrument designers and performers must work together.

These etudes can strengthen such collaborations by providing a foundation for evaluation of both the instrument and the performer. This basis for evaluation is an essential ingredient in building a lasting repertoire for interactive instruments.

## 6. ACKNOWLEDGMENTS

I am very grateful to Dr. Bob Pritchard and Dr. Keith Hamel for their support of this project, programming help, and generous feedback on my work. Thank you also to my husband Michael Begg for his invaluable editing skills. This project is supported in part through the Social Science and Humanities Research Council of Canada, grant 848-2003-0147, and by the University of British Columbia Media And Graphics Interdisciplinary Centre (MAGIC) the UBC Institute for Computing, Information and Cognitive Science (ICICS), and the School of Music.

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