

A New Library of Interactive, Collaborative Patches for Learning Music Theory

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Introduction

This presentation demonstrates three interactive, collaborative patches (or “programs”), that assist students in learning music theory skills, either in a live classroom environment or on their own. The patches are written for the Max/MSP environment (<http://www.cycling74.com>), and focus on subject matter ranging from very basic rudiments to graduate level post-tonal concepts. Max/MSP is one of the most widely adopted software ecosystems for creating dynamic tools for sound and video synthesis, analysis and processing. My patches form a library I call “Semita” (after the Latin word meaning “pathway” or “lane”).

Kidde^[1], Manzo^[2] and others have recently developed innovative pedagogies involving Max/MSP to teach music theory, and there are several other impressive alternatives (e.g. music-theory.net, Teoria, Artusi). Though inspired by all of these existing packages, Semita is unique in that:

1. No understanding of Max/MSP is necessary to use Semita, nor is there any attempt to teach students how to create patches;
2. My work is not constrained by the native Max/MSP score notation object [nslider]. Rather I use the Bach/Cage objects^[3], which generate sophisticated musical score notation on the fly;
3. The patches are interactive: students can manipulate musical notation in real time on a projector screen in front of a class, working with peers to solve problems together;
4. Though the patches begin at a very rudimentary level, the Semita library progress to more sophisticated topics that could be covered in post-tonal theory or graduate level courses;
5. Many patches take a sandbox approach, creating a judgement-free space where experimentation (and even failure) are encouraged

and acceptable. The idea is to embrace failure as an inevitable outcome in the process of learning complex concepts.

The library (in alpha version) is freely available under the GNUv3 license and patches can be downloaded at <http://semita.theoryofpaul.net>

Approach and Design Philosophy

A subset of music students still need to be fluent in standard staff notation (SN). The Semita library assists teaching SN by employing dynamic objects that students can manipulate and play around with by themselves.

Students are nowadays very familiar with multiplayer computer games and mobile devices. These interactive environments suggest opportunities for computer-supported collaborative learning (CSCL)^[4]. The philosophy behind the Semita library is to allow students to interact with SN in real time using their own wireless devices, either in a classroom setting or by themselves. No applications need to be downloaded in order to use the custom-designed controllers.

Figures 1 and 2 show the current version of one patch, a straightforward interval drill. The patches provide immediate auditory, visual and tactile feedback, and can be used to introduce topics or to facilitate drills within or outside of the classroom.

In my approach, building skills in music theory goes hand-in-hand with creating communities of learners in the classroom, fostering agency and developing fluency in a fun, engaging way.

Position in the Marketplace

The Semita library offers a way to facilitate student interaction within an in-person learning environment. The structure of patches is customizable, because they exist in the Max/MSP ecosystem. Semita has been highly effective in my own teaching, saving me time and reducing stress, while receiving high praise from students in their teaching evaluations over several teaching cycles.

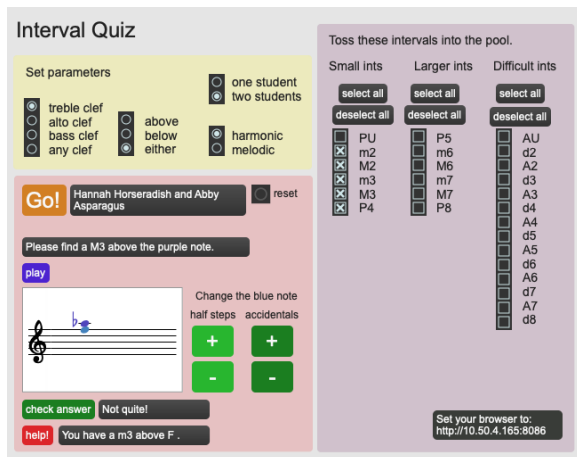


Figure 1: Interval Drill, main screen

Semita includes a patch that generates cantus firmi and first-species counterpoint [5] [6]. Individual constraints on the solution can be turned on and off, facilitating exploration of the principles behind composing good counterpoint. Students often find the number of “rules” governing counterpoint overwhelming and arbitrary. Semita invites students to generate both faulty and optimized solutions, encouraging experimentation while developing critical thinking skills.

Another notable feature is Semita’s collection of post-tonal patches. These range from a straightforward pitch-class set finder and twelve-tone matrix generator, to more sophisticated patches that allow exploration of advanced concepts such as Euclidean rhythms, Markov chains, equal-tempered systems, FM synthesis, interpolation, and more. In this respect Semita loosely resembles parts of Karlheinz Essl’s extensive RTC-lib (<http://www.essl.at/works/rtc.html>), though with a distinct pedagogical slant.

Semita’s score objects can easily export MIDI or XML files, so that students can further modify or extend their work in any standard DAW or engraving software. Thus, the patches could be a useful resource not only in a post-tonal analysis context, but also they could introduce topics in a composition course.

Further Work

While Semita is still in an early stage of development, I anticipate continually adding new patches and improving existing ones. I am also in the process of creating YouTube videos that explain how to use each patch. The hope is that by teaching old music theory in a new way, we reap the benefits of both worlds.

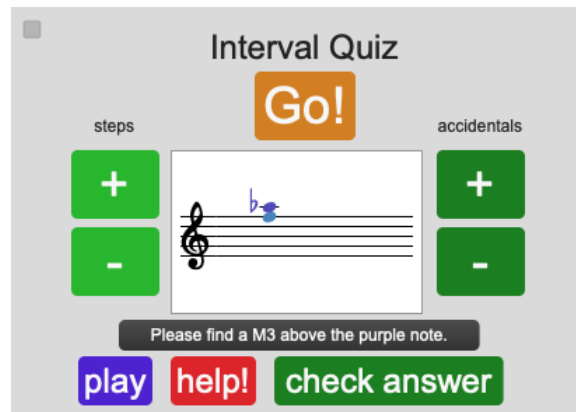


Figure 2: Interval Drill, iPhone screen shot

References

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