

## **The Development of Intuitive Musical Understanding**

The extent to which humans have an innate ability to form coherent musical structures is not well known. Previous studies, such as the Puzzle experiment, have concluded that musically untrained adults lack the capacity to form coherent tonal structures and that a proper sensitivity to them are only learned through a proper education. This weeks paper by Jeanne Bamberger, although similar to the Puzzle experiment, it actually draws the opposite conclusion; that most humans do have some implicit knowledge of musical structures and can realize them given enough time and the proper tools.

The thrust of this paper is to describe the experiment that was developed to test people's innate ability to create structured and coherent musical tunes. This is done in three basic sections. First a basic introduction to what is being tested and the basic methodology of the process. The second section goes into a little more detail about the actual tools and working environment for the experiment. Finally two case studies are given that show the progress of the students as they go through the process of creating a new melodic piece from an unknown set of primitives.

Similar to the Puzzle experiment, in this study the students were asked to recreate melodies from familiar fragments. They were also asked to create new melodic structures from unfamiliar fragments. However, unlike the Puzzle experiment, the students in this study were not given a time limit, they each had their own workstation, used much simpler fragments, were asked to keep a log and think about their process and were encouraged to make small changes to the fragments if necessary.

Impromptu, musical software developed for this project, provided the students with a unique working environment that allowed them to manipulate the melodic fragments at various levels of representation. Each fragment was presented as a block with a neutral icon, in order to try to focus the attention on listening as opposed to visual stimuli. The user is also given access to a lower level representation in terms of pitch and duration. These blocks can be dragged and placed in a linear order in the workspace, which allows for higher structural representations as well. To introduce the workspace and to run the first experiment the subjects were given a familiar, that they could play as often as they liked, and asked to recreate it from a set of blocks containing the appropriate fragments. It was found that nearly everyone, including children as young as six, were able to complete this task.

After completing the first task the subjects were asked to complete a new tune from unfamiliar melodic fragments. The analysis was done by tracking the process of two students by following their journal entries and examining their pieces and modifications throughout the development lifetime. Although the thought process, assumptions and metrics of quality were quite different between the two subjects, Linz and Keven, their final pieces shared several similar features. Although not explicitly important to Linz, the balance of the piece was prominent to both as shown by Keven's explicit goal and Linz's modifications to

the blocks to give them all the same beat. Articulation of phrase boundaries was also important to both as well as metre. Both also benefited from an iterative process, that was encouraged, that let them feel through the piece intuitively at first and then go through and perform a meta-investigation of what had been produced so far. Along with the ease of switch between levels of representation this allowed their pieces to develop a hierarchical structure containing segments of antecedents and consequents as well as others.

As a result of this study the author suggests several techniques that could be useful in an introductory music class. 1) Since it does seem that people do have some intuitions, giving students 'units of work' resonate with these intuitions could speed up the learning process. 2) Using a working environment, like Impromptu, that provides access to various levels of structure is vital. 2) Develop projects that emphasize the context in the students focus of attention. 4) Provide several representations of the material to the student. 5) Help the students express their implicit knowledge explicitly.