Practise without stickers -

Feedback in games for novice violinists

Position paper for Key Issues in Sensory Augmentation Workshop
University of Sussex, 26-27 March 2009

Janet van der Linden, Computing Department,
The Open University

Background

The project seeks to research the impact of different forms of feedback mechanisms for novice musicians - in particular for young children learning to play the violin or cello. A number of musical games are being developed, that are in spirit more in keeping with popular computer games that children enjoy playing. The aim is to strengthen children's motivation for instrument practice, to increase their aural skills and to increase their awareness of posture and technique, using a variety of devices ranging from simple microphones to motion capture devices.

In this paper we will briefly discuss how this project engages with the key issues for sensory augmentation.

How can empirical experiments with sensory augmentation devices be used to further philosophical and psychological enquiry into cognition and perception?

Learning to play a musical instrument is an important topic in the study of human cognition and perception. One of the main skills that novice musicians need to develop are their aural skills: Is this note higher or lower or the same as the previous note? Is this note flat or sharp, or is it at the correct pitch? Another set of skills they need to develop are related to their posture - things like techniques for bowing, position of hands and arms during playing, and using just the right amount of pressure on the bow to create long notes that have a consistent sound.

We have built a simple prototype system that picks up the sounds created by a musician playing (using a microphone), and analyses the pitch. The sound analysis data is then used for a number of different visualization games - some that describe clear paths to follow, and are fairly *task* oriented - others are more free and abstract - give more or less pleasing visual output based on the analysis.

Apart from microphone input, we will also develop games based on motion tracking devices - these will track the movement of the arm, wrist or elbow during bowing, or other posture characteristics, and give feedback in the form of vibrotactile feedback.

We will run a variety of experiments that will investigate the following questions:

- do children practise more if they can use games?
- does the quality of their playing improve (this will be measured using the analysis of sound data, but will also involve talking to teachers)?
- Which games work better than others?

Although the above are measurable and will provide quantitative data, they also raise new questions.

For example, according to violin teachers, the first thing novice violinists request when learning to play the violin is to have 'stickers' on their fingerboard. This is so they can *see* where to put their fingers rather than *hear* the right note. Placing stickers on the fingerboard goes against the grain for violin teachers - as children should be developing their listening skills and their musical ear.

So, if we develop games that give visual feedback on the child's play - are we thereby placing stickers on their fingerboards? Is it the case that certain certain games act more like stickers, and others not?

By mixing the various feedback mechanisms we create a rich test bed which will allow us to research whether single or multi modal feedback is most effective for training. We are also interested in testing how visual feedback can act as scaffolding that enables users to learn to interpret vibrotactile feedback. It raises the following philosophical questions about the nature of music playing:

- is visual feedback too distracting for an activity such as playing music, and is it better to use just vibrotactile feedback?
- Or vice versa - is visual feedback the most natural form of feedback for music making, as it goes quite naturally with the activity of reading music during playing?
- Is feedback about pitch more easily absorbed using visualisation, while feedback about posture is more easily absorbed using vibrotactile feedback?

What technologies are available for building sensory augmentation devices?

In this project we will use a combination of microphones, visualization on a screen, motion tracking devices and tactile feedback. This selection seems a good starting point, and would give a rich combination of feedback. However there are still a number of questions:

- How many motion capture devices are required to really capture bowing technique? Is it possible to reduce it to just one such device, and could we then still acquire enough information to be able to give sensible feedback?
- Are the devices too heavy, and are they in danger of interfering with the playing?
- Where, on which part of the body, do we place the various devices?
- What is a good mapping between vibrotactile interfaces and the actions they intend to guide? For example, if the arm should go 'up' a bit more, do we create a tingling sensation at the upper arm, and if it should go down, on the lower arm? Or do we use the head and toes?

It is therefore not just a question of what sensory devices are available, but also, how should they be used, so that the feedback is most understandable to the user.

References

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