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An Examination of a MIDI Wind Controller for Use in Instrumental Research

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The purpose of this investigation was to determine the validity and practicality of using a MIDI wind controller in instrumental performance research. Typical methodology for wind instrument performance research includes at least one expert judge repeatedly listening to randomized performances and scoring them for pitch and rhythmic accuracy. In addition to being very time-intensive, this process is subject to human error. Because MIDI wind controllers collect digital data, the scoring process for this data could become more accurate and faster. Specifically, this study examined correlations between performances of the same passages played by the same performers on a wind controller and played on a saxophone or clarinet, for pitch and rhythmic accuracy. Additional data analysis examined breath control (dynamics) on the wind controller.

Keywords: MIDI; technology; instrument; wind controller; methodology

The advent of the MIDI keyboard in 1983 (MIDI Manufacturer's Association 2010) made available a new tool for studying musical performance. Collyer *et al.* (1997) established the validity of using MIDI keyboards in music performance research. Since then, it has become common practice to use MIDI keyboards in piano research and music-motor learning research (e.g. Finney and Palmer 2003) because they facilitate data collection and analysis for piano-type performance. Another kind of MIDI controller is the wind controller. While MIDI wind controllers have existed for over 20 years, their feasibility as a proxy for acoustic wind instruments has not been studied.

MIDI wind controllers use a saxophone/clarinet style mouthpiece, are about 600 mm long and weigh about 520 g. The key system is Boehm-style and can be set to saxophone or flute fingerings. A true electronic instrument, MIDI wind controllers generate no tone but instead are connected to a sound generating module that enables sound production. The most widely used wind controllers are manufactured by Akai and Yamaha. In addition to purchasing the wind controller, one needs to purchase a sound generating module. For research purposes, these items need to be connected to computer software which records the digital performance data. When using a MIDI wind controller in this way, the researcher can collect data about pitch, duration, and breath pressure (volume). The purpose of this study was to determine how similar performance is on Yamaha WX5 Wind MIDI Controller to performance on a clarinet and alto saxophone. If high correlations can be found between performance on an acoustic instrument and a MIDI wind controller, this tool could greatly expedite the scoring of wind instrument data in research.

METHOD

Participants

Participants (N=10) were university music majors whose major instrument was either clarinet (n=5) or saxophone.

Materials

The Yamaha WX5 Wind MIDI Controller was used in this study. It retails for about US$700. It has two mouthpiece styles: clarinet/saxophone with a composite reed, and recorder. Although it is lightweight, it does come with a neck strap. It can be used with an AC adaptor, batteries, or phantom power. Several performance parameters may be adjusted, including tight or loose lip mode, amount of wind pressure, and fingering mode. There are three saxophone fingering modes and a flute fingering mode. The most significant difference in key set up between the WX5 and a flute or saxophone is that there are 4 octave keys operated by the left thumb.

Yamaha recommends the WX5 be connected to the Yamaha VL70-m, a virtual acoustic tone generator, which retails for about US$800. The unit is 220 mm x 212 mm x 46 mm and weighs about 1.3 kg. The advantage of using this tone generator over another tone generator is that it has a line-in to receive the WX5 line-out, and it has a pre-set for the breath pressure setting of the WX5.

The tone generator was connected to a MacBook Pro laptop using a USB MIDI Interface (UM-1G from Cakewalk, retails about US$40). This device transmits the MIDI data to notation or sequencing software. In this study, I used a version of Cubase. It is also possible to use Finale.

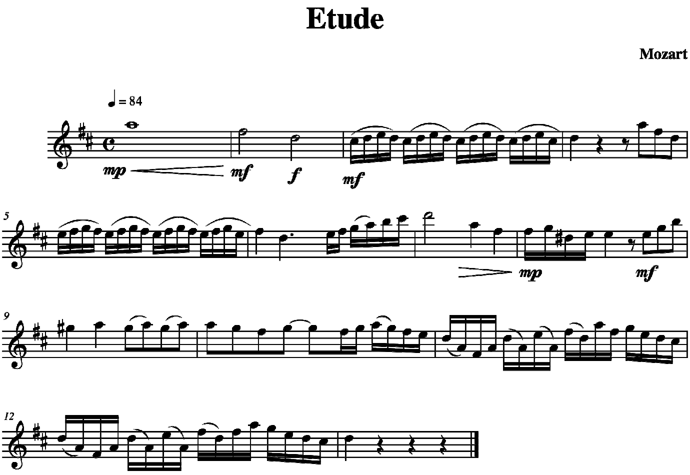

Figure 1. Musical piece participants learned.

Procedure

Participants elected to participate in a two-day study of repeated measures design. On day 1, they practiced scales and a short musical piece (see Figure 1) on both their acoustic instrument and the wind controller. Participants had as long as they wanted to prepare the scales and piece to specified metronome targets. When participants deemed they had learned the passage "as well as possible, including pitch, rhythm, and dynamics," they recorded a final performance trial. Approximately 24 hours later, participants returned to make the recordings again. The design was completely counterbalanced.

RESULTS

All acoustic trials were randomly ordered into master files for scoring. The experimenter determined pitch and rhythm accuracy by repeatedly listening to each trial. Each pitch and rhythm was scored as correct or incorrect. The MIDI data generated by the wind controller was collected by Cubase software, which provided graphical representation of the performances, as well as displaying it in standard music notation. The notation output for each performance was also scored on a note-by-note basis as correct or incorrect. Pearson's r was used to examine the relationship between the acoustic performances and the wind controller performances on a note-by-note basis. At the symposium, results will be presented for pitch and rhythmic accuracy for the technical scales and performance piece. Graphical and numerical results of the dynamics will also be presented.

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