Adding Value: Combining Ambient Visual and Vibrotactile Feedback to Encourage Good Posture in Trumpet Players

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1. INTRODUCTION

The role of the body of the player in trumpet pedagogy has either tended to go unrecognised, or the ability of the body to find appropriate techniques has been assumed. However, there has been increasing recognition that bodily posture is important, both in terms of its impact on performance and longer-term injury prevention. As a result, the literature of brass pedagogy has tried to identify the typical posture problems found in trumpet players and arrived at a consensus regarding optimal alignment of the body. The suggestion is that, standing or seated, the player should be upright with back and neck straight (Dalgleish & Spencer 2014).

This leads us to introduce a new aid that uses a combination of hardware and software to analyse the posture of a player and attempt to improve it in via the application of real-time feedback. Three common types of posture issue can be identified (Figure 1). These are: the head rotated forward thereby restricting the flow of air; the head rotated forward and the sternum collapsed, thus inhibiting respiration; excessive lateral twisting and strain. More detailed discussion can be found in earlier work by the authors (Dalgleish & Spencer 2014).

2. GUIDING PRINCIPLES

The most innovative aspect of the aid is the nature of feedback applied to the player. This is informed by two theoretical reference points: ideas of ambient experience outlined by Eno (1978); the concept of calm technology developed by Weiser and Brown (1996). In short, the Postrum system applies feedback on two levels. Initial feedback is visual only: an ambient projection aims to make the player aware of minor departures from optimal position while avoiding diverting attention from playing. However, if optimal posture is not soon resumed, additional haptic feedback is introduced via a torso-mounted vibration motor.

3. THE POSTRUM SYSTEM

The current version of the Postrum system consists of two main elements. The first element uses a Kinect 3-D camera to analyse the posture of a standing or seated player and produce a real-time skeleton model. 15 joint positions covering the head, neck, shoulders and torso are then sent as Open Sound Control (OSC) data into the Max programming environment. Max is used to compare the data to a player-specific reference image and calculate any departure from optimal position, and to control the two feedback layers, also via OSC.

The visual feedback (Figure 2) is produced in Processing and projected onto a wall in front of the player by a standard multimedia projector. The vibration motor is driven by a H-bridge shield mounted on an Arduino microcontroller. The latter is currently tethered to the host laptop via a long USB cable, but a wireless link is planned.

4. REFERENCES

Dalgleish, M. & Spencer, S. (2014) Developing Good Posture in Trumpet Players Through Directional Haptic Feedback. In Proceedings of the *9th Conference on Interdisciplinary Musicology (CIM14)*, Berlin, Germany, 4–6 December 2014.

Eno, B. (1978) Ambient 1 *(Music for Airports)*. EG/Polydor Records, London, UK.

Weiser, M. & Brown J. S. (1996) Designing Calm Technology. *PowerGrid Journal*, 1(1).

Figure 1: *Optimal position (far left) compared to three common posture problems found in trumpet players*

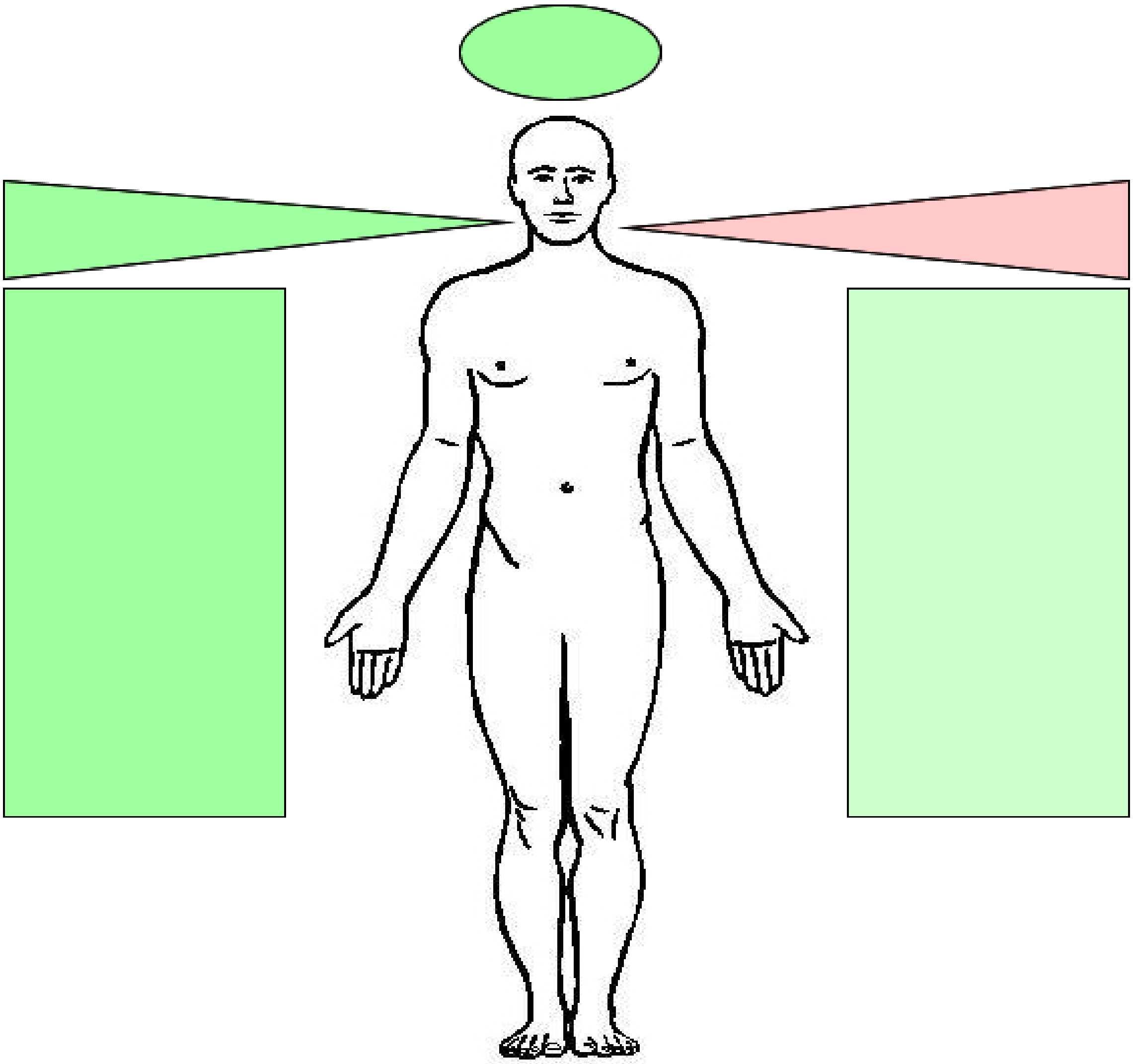

Figure 2: *The layout of the ambient visual display*