Baton vs. Open Hand:
A Comparative Analysis of the Effective Advantages and Disadvantages of Both Methods

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Every conductor seems to have a reason for their utilization of a baton or lack thereof, the variance of their justifications are usually based out of their personal bias or one particular variable associated with each style: one conductor may say utilizing a baton decreases his ability to shape the phrase, while another complains that the open hand does not do an adequate job at delineating a beat. It is a fact that each method has positive and negative consequences that cater to the operator, however it is the goal of this paper to compare variables that have been isolated through clinical study and compare the positive and negative connotations of both methods. This will be done through an analysis of the variables that are isolated to the use of the baton and an analysis of the variables that apply specifically to open handed gesture.

Use of the baton is commonplace among conductors of symphonies, bands, and other large instrumental ensembles. However it is not unheard of for a conductor of a large instrumental ensemble to use an open hand for a particular piece, or due to his preference of style. The effective variables of conducting that can be specifically attributed to baton technique present a problem, however, as the conductor is still likely shaping and articulating with both hands and not just the hand wielding the baton. This presents the question to the researcher as to how the effective variables of baton technique can be assessed. The answer to this problem lies in the study of radio, light, and digital baton interpretation systems.
In 1995, Forrest Tobey developed a software system that tracked tempo along all points of the path of a baton and allowed the conductor to take or release control of musical phrases. It also included a rehearsal module, so the conductor could train it to his gestures, and it used a Buchla Lightning baton as input device, which yielded two-dimensional position information. Forrest Tobey and Ichiro Fujinaga extended the system in the year 1996. The extended version of the system included a second Buchla Lightning sensor. With two sensors, movement of the baton could be tracked in three dimensions. This extended system featured tempo control, dynamic control, beat pattern recognition, beat style recognition, accentuation control and timbral balance.  

Systems like these have been emerging out of various technical programs around the globe; however, the majority of these systems now incorporate a left

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hand recognition system that utilizes a glove worn by the conductor and can recognize the shaping of phrase. More simplified baton recognizing systems exist that track the movement of just the baton, these systems are capable of delineating tempo, dynamic, articulation, and emphasis of beat. There are several methods of doing this, which involve a varied set of sensor arrays and processes. The first of which was Max Mathews “Radio Baton.”

In the 1970s, Professor Max Matthews determined that human performance gestures could be roughly approximated as functions of motion over time at a sampling rate of 200 hertz; this became the basis for the adoption of the MIDI standard. His program, entitled “Conduct,” allowed a person to control musical effects such as amplitude, tempo, and balance over the course of an entire piece of music. This was among the first known attempts to give conducting-like control to a human user. More recently, Professor Mathews created a device called the "Radio Baton," which uses a coordinate system of radio receivers to determine its position. The array of receivers sends its position values to a control computer, which then sends commands for performing the score to the ‘Conduct’ program. About twenty prototype copies of the Radio Baton exist at various computer music centers around the world, however no commercial version exists yet.²

Mathews’s system paved the way for many different baton interfaces. Including: the “MIDI Baton,” which utilized a vacuum accelerometer to determine

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the frequency of beats conducted as a MIDI score was played simultaneously. The Yamaha “Miburi,” which utilized flex sensors and eight buttons per hand to allow a wide array of effects to the user. Jon Borchers “World Beat,” which allowed users of very little musical skill to dictate beat, duration of beat, and improvise piano accompaniments using an illuminated “lightning,” baton that was tracked by velocity sensors as well as radio waves. The digital baton which was designed to simultaneously execute a number of musical and coordination functions in real-time, including mouse-like pointing and clicking in three dimensions, generating beats for tempo control, and executing individual notes along with volume, envelope, and duration information, all accomplished with a relatively simple sensory interface.