

Effects of Vibrato Production Techniques and Use on Musical Collaborations among Flutists, Oboists, Clarinetists, and Bassoonists

Kathleen A. Cameron¹

Vibrato, as defined by Christopher Weait and John B. Shea, whose research used x-ray technology to record the process of creating vibrato, is concisely defined as “a repeated, voluntary rhythmical pulsation of tone used by vocalists, string instrumentalists, and wind instrumentalists to impart an expressive effect in music.”² Esteemed flute researcher Nancy Toff, in her book, *The Flute*, says that the pitch of vibrato in instruments should vary a maximum of only a quarter step, or halfway to the neighboring chromatic pitches, in each direction, unlike vocal vibrato, which can swing as much as a half step, or all the way to the next chromatic pitch, in each direction.³ Vibrato can be a fluctuation of pitch, as described by Toff, or of volume. Vibrato is used by most musicians at least some of the time and has been researched and featured in writings by many of the most significant performers and teachers of music. Misconceptions and misunderstandings about vibrato have been interwoven with insights, medical research, and clarifications of terms.

Performers on flute, clarinet, oboe, and bassoon frequently engage in musical collaboration, whether in chamber ensembles or in chamber-like passages in band or orchestral music. To understand the implications for vibrato usage in these collaborations, I studied writings on the processes of vibrato production and occasions for use of vibrato in each of the four aforementioned woodwind instruments. For applicability to typical performance concerns

¹ 395 Bricker Hall; 190 N. Oval Mall; Columbus, OH 43210. I would like to thank Professors Katherine Borst Jones and James Hill for their guidance in the research and preparation of this paper.

² Christopher Weait and John B. Shea, “Vibrato: An Audio-Video-Fluorographic Investigation of a Bassoonist,” *Applied Radiology* (January/February 1977), 89.

³ Nancy Toff, *The Flute Book* (New York: Oxford University Press, 1996), 106.

by students and performers in the Western tradition, this paper is limited to Western European-derived classical vibrato, with a focus on practices in the late half of the twentieth century and the beginning of the twenty-first century. My goal was to formulate basic guidelines for vibrato use for musicians so the highest level of performance can be achieved in ensembles comprised of these instruments.

Vibrato Usage in Flute, Oboe, Clarinet, and Bassoon

For flutists, vibrato is so much a part of the sound that some struggle to play without it. Accomplished flutists generally refrain from using vibrato only when making a conscious musical decision to do so. Many famous flutists and pedagogues, such as Marcel Moyse, Paul Taffanel, Phillipe Gaubert, André Maquarre, and Georges Barrère, shared the idea that vibrato is something that occurs naturally and results from the musician's own musical feeling.⁴ Some esteemed teachers, such as Moyse, are rumored to have refused to teach vibrato, insisting that it should occur naturally and that it cannot be taught. Other performers and teachers believe that vibrato can be taught, and have provided resources, writings, and presentations on the proper ways to create a good vibrato. Flutists most commonly produce vibrato with the throat, abdominally, or with a combination of the two. They do not employ the techniques of jaw or lip vibrato, and they use finger vibrato only as a special effect when performing modern music.

Oboists, on the other hand, do not always play with vibrato, but they do employ the technique often. They must make the decision to use vibrato or not based on the time period of the music and the role of the passage being played. One of the main struggles for oboists with regard to vibrato is the resistance experienced when blowing into the instrument. The oboe has a

⁴ Toff, 107.

conical bore and has the smallest opening of any woodwind instrument at its narrowest point.⁵ Oboe vibrato can be produced by the jaw or lips, throat, or abdominally.

Unlike most other woodwind players, clarinetists rarely use vibrato. The most common ways to produce vibrato on clarinet are through jaw movement and/or abdominal pulses. In his 1999 D.M.A. dissertation from Arizona State University, Scott Wright surveyed 80 clarinetists in the United States regarding vibrato usage and production. His analysis of the surveys indicated the following:

The jaw was favored for physical production of clarinet vibrato by 30% of the respondents. An additional 33% of the respondents indicated they use a combination of techniques including the jaw to produce vibrato. Both lip and diaphragm techniques were preferred by 7.5% of the respondents. Throat was preferred by 1% of the respondents, and breath was preferred by 6% of the respondents. One respondent indicated the use of finger vibrato as a viable alternative to the five others on the list.⁶

Finally, as with the oboe, bassoonists play both with and without vibrato often, making the decision based on the time period of the music and the role of the bassoon line. Common teaching regarding the production of bassoon vibrato includes its origin from the diaphragm or abdomen, larynx or throat, and lips or jaw.

Vibrato Production Techniques

Abdominal/Diaphragm Vibrato

Much controversy exists in the terminology and the methods for producing vibrato, even among master teachers, particularly on the issue of diaphragmatic vibrato⁷ versus abdominal

⁵ Jon Stephen Remley, "The Preferred Oboe Vibrato: An Analysis of Pitch Modulation and Intensity Level Modulation" (Ph.D. diss., University of North Texas, 1996), 1.

⁶ Scott Jude Wright, "Clarinet Vibrato: An Investigation of Its Use in the Classical Performance Medium," (D.M.A. diss., Arizona State University, 1999), 42.

⁷ Vibrato produced by movement of the diaphragm.

vibrato⁸. Christopher Weait, in his book, *Bassoon Strategies for the Next Level*, shared his belief that the controversy between the term “diaphragm vibrato” and “abdominal vibrato” comes from the fact that the actual source of the vibrato cannot be seen (without medical intervention) and we cannot feel exactly what part of the body is operating.⁹ Weait clarified the role of the diaphragm, stating that it is active only during inhalation and that “in order for it to have a part in producing vibrato, the diaphragm would have to be active during exhalation.”¹⁰

As musicians continue to study anatomy, their understanding of the human body should continue to develop and such inaccuracies should diminish. Even though some writings use incorrect terms, the material may be relevant if correct terminology is substituted; therefore, in this paper, vibrato termed “abdominal” and “diaphragmatic” will be treated together, under the assumption that the authors using the term “diaphragmatic” really meant “abdominal,” but the original terminology used by the authors will be retained.

Abdominal or diaphragm vibrato tends to be the vibrato method that many teachers advocate, even though it is not always the best approach, as it is limited in speed. To test possible range of speed with abdominal vibrato, one can try to pulse the abdominal muscles quickly. This muscle group has a definite speed limit. Pedagogues cited the importance of abdominal involvement in vibrato for varying reasons. For example, Philip Bate, author of *The Oboe: An Outline of its History, Development, and Construction*, said that most fine players use it “since they have already developed good abdominal control.”¹¹

Throat Vibrato

⁸ Vibrato produced by movement of the abdominal muscles.

⁹ Christopher Weait, *Bassoon Strategies for the Next Level* (Worthington, OH: Christopher Weait, 2003), 88.

¹⁰ Ibid.

¹¹ Philip Bate, *The Oboe: An Outline of its History, Development, and Construction*, (New York: Philosophical Library, 1956), 152.

The role of the throat in vibrato production is most commonly associated with vibrato in flute- and bassoon-playing. The resistance experienced when blowing into an oboe or clarinet may affect the performers from sensing the throat's involvement in vibrato production. Concerns regarding constriction of the airflow are the overwhelming reason for discouraging use of the throat in vibrato production; however, production of vibrato may involve the throat without realization by the performer.

Significant research on the role of the throat in vibrato production was performed by Christopher Pool, in his doctoral document from the University of Arizona, titled "Observations of the Larynx during Vibrato Production among Professional Bassoonists as Indicated in Experiments Utilizing Fiberoptic Laryngoscopy."¹² Pool's research built on the work of Christopher Weait and John B. Shea, and ascertained that the larynx is the main location for vibrato production and cited the misconception of the diaphragm as something that can be controlled at will to produce vibrato.¹³ He stated that "While most performers and teachers of the bassoon teach vibrato as a technique that uses abdominal pulsations of air to produce its effect, the role of the larynx has been largely ignored in its contribution to the process."¹⁴

The study by Weait and Shea, which provided the basis for Pool's research, involved visual studies using x-ray technology that captured the physical motion involved in creating vibrato. The observations by Weait and Shea revealed that the diaphragm moves steadily down during inhalation and up during exhalation and does not pulsate to create vibrato.¹⁵ They also noted that the lungs, trachea, jaw, tongue, and pharynx remained motionless during the pulsing

¹² Christopher Scott Pool, "Observations of the Larynx during Vibrato Production among Professional Bassoonists as Indicated in Experiments Utilizing Fiberoptic Laryngoscopy," (D.M.A. diss., The University of Arizona, 2004).

¹³ Pool, 20-21.

¹⁴ *Ibid.*, 8.

¹⁵ Christopher Weait and John B. Shea, "Vibrato: An Audio-Video-Fluorographic Investigation of a Bassoonist," *Applied Radiology* (January/February 1977), 90.

of vibrato, but that the vocal folds exhibited much movement when vibrato was being produced.¹⁶ Pool endeavored to better understand Weait's research by directly observing the larynx during vibrato production.¹⁷

Pool's research used videotaped examples and computer analysis of recorded sound waves and led him to the conclusion that bassoon vibrato is primarily controlled by the vocal folds at the laryngeal level.¹⁸ The electroglottograph and fiberoptic laryngoscope were used to record observations from within the body while professional bassoonists produced vibrato.¹⁹ From his research, Pool concluded that, while other factors may be involved in vibrato production, such as abdominal contributions, the larynx definitely contributes to bassoon vibrato.²⁰ The findings from these studies by bassoonists can be transferred to vibrato production in other instruments, as they concern the function of muscles, which would be common regardless of the instrument played.

Jochun Gärtner's book *The Vibrato* contains an in-depth look at vibrato production using electromyography, which allows certain electrochemical reactions that occur during muscle contraction to be documented as they take place. Gärtner examined the role of the muscles of the abdomen, chest, diaphragm, and larynx to determine the role of each in the production of vibrato.²¹ He described throat vibrato by saying that "in every case, the larynx is actively participating with muscular activity, even at low frequencies and in the *martellato*."²² Gärtner determined that it is possible to produce a vibrato that is purely a throat vibrato.²³ Throat vibrato

¹⁶ Weait and Shea., 13.

¹⁷ Pool, 13.

¹⁸ Ibid., 8.

¹⁹ Ibid., 11.

²⁰ Ibid., 67.

²¹ Jochun Gärtner, *The Vibrato: with Particular Consideration Given to the Situation of the Flutist*, Trans. by Einar W. Anderson, (Regensburg, Germany: Gustav Bosse Verlag, 1981), 84-85.

²² Ibid., 126.

²³ Ibid.

is created by a rhythmic or periodic opening and closing of the glottis (the space between the vocal folds) that causes an interruption of the air that is flowing up through the larynx, according to Gärtner.²⁴ This opening and closing cannot result in a complete closure of the airway, but can be executed in such a way that the path is almost completely blocked, as long as air can still pass through.²⁵

The “nanny goat” vibrato²⁶ often associated with throat vibrato occurs when the airway does become completely closed off, which is not proper technique for throat vibrato as it is used today. The most common reason for discouraging throat vibrato centers on the thought that the act of using the muscles of the throat to produce vibrato means that the throat will tighten and that the air column will be impeded. What must be understood is whether the throat muscles can be employed to make vibrato while maintaining sufficient openness for the air to move through and produce a quality tone.

Vibrato Produced by a Combination of Throat and Abdominal Muscles

Gärtner explained the role of large and small muscles, noting that large muscles, such as the abdominal muscles, cannot possibly move as quickly as small muscles, such as the muscles of the larynx, because of the difference in muscle-contraction speeds in each.²⁷ He stated that abdominal vibrato is possible, but that in many cases, the speed desired will necessitate the use of throat vibrato.²⁸ Gärtner has created a very helpful image (see Figure 1) to show the difference between very slow and accented vibrato (*martellato*) that would be primarily

²⁴ Gärtner, 76.

²⁵ Ibid.

²⁶ Also referred to as *Chevrotement*, and describes a vibrato that sounds much like the sound made by a nanny goat.

²⁷ Gärtner, 80.

²⁸ Ibid., 80-81.

abdominal, *Chevrotement*, and vibrato, which is produced by a combination of throat and abdominal involvement.²⁹

Similarly, Angeleita Floyd, Professor of Flute at the University of Northern Iowa, in her book, *The Gilbert Legacy*, described Geoffrey Gilbert's instruction that vibrato should start with the diaphragm and move into the throat or larynx.³⁰ Flutist John C. Krell, in his book, *Kincaidiana*, described the late master-teacher William Kincaid's teaching on flute vibrato as being "most probably produced by a combination of the delicate vibration of the throat and the elastic reinforcement of the diaphragm, acting together and sympathetically."³¹ Flutists William Kincaid and Geoffrey Gilbert are two of many teachers and performers who ascribe to the combined approach of abdominal involvement in a vibrato that occurs in the throat.

Bassoonist Joseph Polisi stated that "many bassoonists in the United States indicate that they use a combination of diaphragm and throat vibrato to produce all the nuances of intensity needed for the varied repertory of contemporary symphony orchestras."³² Pool described the use of a "vibrato system" as a means to incorporate the various types of vibrato to meet the expressive and artistic goals of the music.³³ His research showed that laryngeal vibrato would be most present, but that the best scenario would be that the bassoonist would alternate among the various types of vibrato almost subconsciously as needed to be most musical.³⁴ Clearly, what is essential is the use of a vibrato production technique that allows the performer to create a vibrato appropriate for the music and possible to control.

Lip or Jaw Vibrato

²⁹ Gärtner, 125.

³⁰ Angeleita Floyd, *The Gilbert Legacy*, (Cedar Falls, IA: Winzer Press, 1990), 92.

³¹ John C. Krell, *Kincaidiana*, (Santa Clarita, CA: The National Flute Association, Inc., 1997), 15.

³² Joseph W. Polisi, "Teaching Bassoon Vibrato," *The Instrumentalist* 31 (1976), 56.

³³ Pool, 71.

³⁴ *Ibid.*

Flutists, oboists, and most bassoonists do not use lip or jaw vibrato, as that movement would impede the tone quality. Weait named two notable bassoonists, Elias Carmen and Maurice Allard, who were known to have successfully used jaw vibrato, but noted that its use is rare.³⁵ He also described a technique of creating a comedic vibrato by using the tongue, but that technique is extremely rare.³⁶ Lip or jaw vibrato, however, is the most common vibrato technique used by clarinetists.

Jack Brymer, in his book, *Clarinet*, described jaw vibrato as “a vibrato produced usually by a chewing action of the lower jaw – an action which causes pulsations in the air column by compressing the reed intermittently, damping its vibration, and pressing the reed closer to the facing so that very little air can enter until the tension is released, when it enters with a rush.”³⁷ Brymer viewed jaw and lip vibrato as two different processes, saying that lip vibrato uses a gentle pulsation of the lips that “impels the air as does the jaw vibrato but without disturbance of the mirror surface of the tone.”³⁸ Lip vibrato is very shallow and results in only a slight raising and lowering of the pitch.³⁹

Conclusions

Excellent collaborating musicians strive to understand the limitations and idiosyncrasies of the other instruments in the ensemble. Vibrato use and production techniques should be considered along with the typical elements of pitch tendencies, articulation styles, and balance. When sharing a passage with a clarinetist, the musicians should decide whether to use a straight tone, as a clarinetist would typically do, whether the clarinetist should use vibrato, or whether the

³⁵ Christopher Weait, *Bassoon Strategies for the Next Level*, 90.

³⁶ Ibid.

³⁷ Jack Brymer, *Clarinet*, (London: Macdonald and Jane's, 1976), 205.

³⁸ Brymer, 205.

³⁹ Ibid.

passage will sound musical with one musician performing with vibrato and the other without. The final determination will vary with different musical works.

The various vibrato production techniques have different speed limitations and possibilities. For example, abdominal vibrato cannot occur as quickly as throat vibrato, since the larger muscle fibers of the abdomen do not move as quickly as the smaller muscles of the throat. When sharing a passage, musicians should strive to match the speed of their vibrato. The possible speed might be affected if the musicians are using different production techniques.

Also related to matching vibrato in the ensemble, the potential depth of vibrato varies with the different types of vibrato production. A clarinetist can dramatically change the pitch with the jaw, as is heard in the opening solo in George Gershwin's *Rhapsody in Blue* (which uses fingering changes along with pitch-bending with the jaw). In contrast, a musician using abdominal vibrato will not be able to achieve the same degree of pitch amplitude. Collaborating musicians should endeavor to produce a vibrato that is matching in amplitude.

For Further Study

In the process of studying vibrato to arrive at recommendations for musicians in collaborative ensembles, I arrived at three questions for further study. First, I wonder if instrument size affects the potential speed of vibrato. For example, is a faster vibrato possible on piccolo than on tuba? I also question whether the potential range of vibrato speed is affected by the length of the vocal cords. Is potential vibrato speed different for males who have lower voices than for females? Finally, I am curious as to whether throat involvement in vibrato production has any appreciable negative effect on the amount of air that can be used to produce the tone on the instrument.

Figure

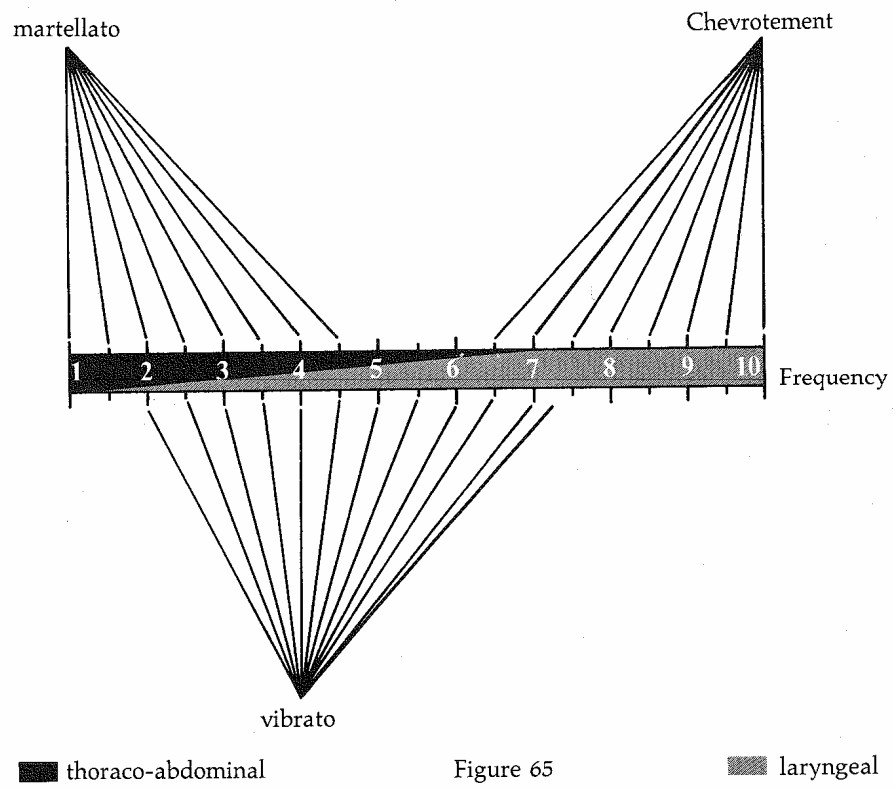


Figure 65

Figure 1: Chart of vibrato production⁴⁰

⁴⁰ Gärtner, 125.

Sources Consulted

- Bate, Philip. *The Oboe: An Outline of its History, Development, and Construction*. New York: Philosophical Library, 1956.
- Bordo, Victor A. "What's the Fuss about Clarinet Vibrato?" *The Instrumentalist* 44 (October 1989): 108.
- Brymer, Jack. *Clarinet*. London: Macdonald and Jane's, 1976.
- Burns, Michael James. "Thoughts and Strategies for Bassoon Vibrato." *The Double Reed* 28, no. 2 (2005): 121-124.
- Burgess, Geoffrey and Bruce Haynes. *The Oboe*. New Haven, CT: Yale University Press, 2004.
- Drushler, Paul F. "The Clarinet Vibrato." *The Instrumentalist* 32 (March 1978): 88-91.
- Drushler, Paul F. "Clarinet Vibrato: Terminology, Utilization, Aesthetics, Part I." *NACWPI Journal: Official Journal of the National Association of College Wind and Percussion Instructors* 27, no. 4 (Summer 1979): 37-48.
- Drushler, Paul F. "Clarinet Vibrato: Terminology, Utilization, Aesthetics, Part II." *NACWPI Journal: Official Journal of the National Association of College Wind and Percussion Instructors* 28, no. 1 (Fall 1979): 4-8.
- Floyd, Angeleita. *The Gilbert Legacy*. Cedar Falls, IA: Winzer Press, 1991.
- Garner, Bradley. "The Flutist's Guide to Tone Production and Vibrato." In *The Flutist's Handbook: A Pedagogy Anthology*. Santa Clarita, CA: The National Flute Association, Inc., 1998.
- Gärtner, Jochen. *The Vibrato: with Particular Consideration Given to the Situation of the Flutist*. Trans. by Einar W. Anderson. Regensburg, Germany: Gustav Bosse Verlag, 1981.
- Goossens, Leon and Edwin Roxburgh. *Oboe*. London: Kahn & Averill, 1980.
- Krell, John C. *Kincaidiana*. Santa Clarita, CA: The National Flute Association, 1997.
- Lancaster, Linda Karen. "Analyzing Flute Pedagogy: A Discussion with Selected Pedagogues." D.M.A. diss., University of Missouri - Kansas City, 1994.
- Peeples, Georgina Kay. "Developing the Bassoon Vibrato." *Woodwind, Brass, and Percussion* 23, no. 2 (1984): 17-18.

- Polisi, Joseph W. "Teaching Bassoon Vibrato." *The Instrumentalist* 31 (1976): 54-56.
- Pool, Christopher Scott. "Observations of the Larynx during Vibrato Production among Professional Bassoonists as Indicated in Experiments Utilizing Fiberoptic Laryngoscopy." D.M.A. diss., The University of Arizona, 2004.
- Remley, Jon Stephen. "The Preferred Oboe Vibrato: An Analysis of Pitch Modulation and Intensity Level Modulation." Ph.D. diss., University of North Texas, 1996.
- Thomas, Mark S. "Teaching Flute Tone and Vibrato Technique." *Woodwind World – Brass and Percussion* 18, no. 5 (1979): 24-25, 40-41.
- Toff, Nancy. *The Flute Book*. New York: Oxford University Press, 1996.
- Walker, Jim. "Vibrato and the Flute." *Flute Talk* 10 (January 1991): 4-5.
- Waterhouse, William. *Bassoon*. London: Kahl & Averill, 2003.
- Weait, Christopher. *Bassoon Strategies for the Next Level*. Worthington, OH: Christopher Weait, 2003.
- Weait, Christopher and John B. Shea. "Vibrato: An Audio-Video-Fluorographic Investigation of a Bassoonist." *Applied Radiology* (January/February 1977): 89-90, 148.
- Willoughby, Robert H. "Flute Vibrato." *Flute Talk* 11 (January 1992): 24-25.
- Willoughby, Robert H. "Letters, Comments: On Vibrato." *Flute Talk* 11 (May/June 1992): 21.
- Wright, Scott Jude. "Clarinet Vibrato: An Investigation of Its Use in the Classical Performance Medium." D.M.A. diss., Arizona State University, 1999.