

Chapter 1

INTRODUCTION

The Concept of the Physical Flute

The *physical flute* is the phrase that Canadian flutist Robert Aitken uses to describe the style of flute playing that he uses for performance and teaching. There are several defining elements of this style, some of which are in the mainstream of flute pedagogy and some of which are less well accepted by the flute community. The development of resonance through the use of proper support and breathing is a familiar concept. Of more significance to the ideals of the physical flute is the principle of using body resonance through setting the body as a sort of resonance chamber for the lowest notes, and keeping the body set for the low notes, while playing throughout the entire flute range. This paper will introduce and develop the most germane of Aitken's ideas on the physical flute method of flute performance.

The ideal of using an open throat when playing the flute is another concept that is widely accepted. However, Aitken's lowering of the base of the tongue, which allows the larynx to remain in the depressed inhalation state, is a technique more in line with vocal pedagogy than flute pedagogy. Aitken also advocates placing the tip of the tongue well back on the hard palate for the tongue stroke. This allows the tongue to rest along the floor of the mouth in the vocally neutral position after the articulation. This position of repose for the tongue is, again, more related to vocal technique than to flute technique.

Another important aspect of the physical flute is the use of the embouchure to achieve the goal of greater flexibility. Although there is little consensus among flute pedagogues as to the mechanics of the flute embouchure, through demonstration it can be shown that a little known physical property of air jets can aid in the development of a more or less automatic embouchure. The author uses the term *automatic embouchure* to refer to the ability of the flutist to use the downward pressure of the upper lip to allow the force of the air stream to control the forward and backward motion of the lips. This means of controlling the lips can increase the agility of the flutist as extremely small, nearly unconscious, lip movements can be used for wide leaps and register changes. After the internalization of the muscular processes involved through practicing the harmonic lip exercises in Chapter 4, the flutist should find that the lip motions which facilitate the selection of sounding partials should occur automatically.

The acoustic principle brought into play asserts that the distance from the source of the air jet (the lip opening) to the striking surface (the far edge of the flute embouchure hole) can help determine which partial of the flute tone sounds. The closer the lips are to the far wall of the embouchure hole, the higher the partial that will sound. This principle will be explored in Chapter 2.

The automatic embouchure is accomplished through the lowering of the upper lip into the lower lip, which results in the lip opening becoming smaller. If the flutist maintains constant support, this creates an increase in the air pressure behind the lips. If the lips are unencumbered by the teeth and if the lower lip is sufficiently relaxed, the lower lip, and to a lesser extent the upper lip, will move forward. This will decrease the

distance between the lips (the acoustic source of the air stream) and the strike wall of the embouchure plate allowing higher partials to sound. The opposite effect holds true as well. As the upper lip relaxes, the lips retreat somewhat allowing the lower partials to sound.

This is different from the traditional concept of embouchure that places a greater emphasis on consciously moving the lips, and perhaps the lower jaw, forward and blowing harder in order to change registers. The ability to use such small motions of the lips to change registers allows the resonance cavities in the mouth and throat to remain unchanged during the production of the sound. This aids in the production of a continuous homogeneous sound.

The defining characteristics of the physical flute combine the sometimes vague concepts of proper support and resonance with the use of a very facile embouchure to achieve the goals of flexibility, homogeneity of sound, and ease of playing. It is the intention of this paper, in the light of Aitken's ideas, to clarify these concepts of support, resonance, and embouchure. This paper sets out a systematic means of allowing the flutist to utilize these concepts in order to become a better flutist, and, ultimately, to become a better musician.

While this paper uses Aitken's ideas as a springboard for developing the concepts of the physical flute, the exercises are the result of the author's attempts for the past twenty years to incorporate these ideas into his performance and teaching. It is interesting to note that validation of many of these concepts comes not only from the flute pedagogy, but also from the vocal pedagogy.

Robert Morris Aitken, Canadian Flute Virtuoso

Robert Aitken is an internationally renowned flute virtuoso, a conductor, music director, and a composer and vigorous proponent of New Music. He is also well known for his pedagogical theories regarding the physicality of flute playing. Aitken has been a frequent performer and panelist at National Flute Association conventions where literally thousands of flute players over the years have been exposed to his theories.¹ Currently, Aitken teaches at the *Staatliche Hochschule für Musik* in Freiburg, Germany and is the artistic director of the New Music Concerts in Toronto.² He has also served as the director of the Advanced Studies in Music Program at the Banff Center and has served as professor of flute at the University of Toronto and at various other universities in Canada.³ As an example of the international demand for Robert Aitken, the master clinician, the Flute Network web site list of master classes for 1999 lists Aitken master classes at the *ARISTOXENOS* Summer Academy of Music in Aegion, Greece, the Taiwan Music Festival in Taipei, Taiwan, and at the Vienna Master Courses in Vienna, Austria.⁴

¹The author attended one such forum at the National Flute Association's Tenth Anniversary Convention in Seattle on August 21, 1982. The topic was flute fitness, "Beyond the Instrument and the Music." Panelists Aitken and Alexander Murray, a proponent of the Alexander technique, presented rather disparate views on physicality and breathing.

²David Charles Foley, cover text, *Toward the Sea, Music for Flute and Harp*, BIS CD-650.

³*Canadian Who's Who 1997 on the World Wide Web*, s.v. "Robert Aitken," available from <http://utpress.utpress.utoronto.ca/cww/cw2w3.cgi>; Internet; accessed 21 June 1999.

⁴"The Flute Network 1999 Master Class Listings," Online database, available from <http://www.flutenet.com/msclass>; Internet; accessed June 21, 1999.

Aitken was born in 1939 in Kentville, Nova Scotia. At the age of nineteen, he became the youngest principal flutist in the history of the Vancouver Symphony Orchestra, and later held principal positions with the Stratford Festival Orchestra, the CBC Symphony Orchestra, the Marlboro Festival Orchestra, and the Toronto Symphony Orchestra. Aitken has toured over thirty countries as a performer, conductor, composer, and teacher. Aitken has won the Prix de la Recherche Artistique de Royan, has been a prizewinner at the Concours Internationale de Flute de Paris, and has received the Canada Music Citation for his outstanding dedication to Canadian music. He has also received the Order of Canada for his musical activities.⁵

Aitken has studied with many outstanding flutists including Nicolas Fiore, Frederick Wilkins, and Julius Baker. During 1964, as the recipient of a Canada Council grant, Aitken studied in Europe with Jean–Pierre Rampal, Severino Gazzelloni, Herbert Barwahser, and André Jaunet. For several years, Aitken was a participant at the Marlboro Institute and studied there with Marcel Moyse, whom he considers his major teacher.⁶

Aitken has recorded over 40 records and compact discs on various labels including CBC, BIS, Koch, Denon, and Marquis.⁷ For those who have not heard him perform live, these recordings serve to establish his credentials as a virtuoso flutist. He has recorded works from the baroque to the avant–garde, which clearly show his mastery

⁵Foley.

⁶Ibid.

⁷For a complete discography of Aitken recordings, see Denis Verroust, “*Robert Aitken, Un Musicien Complet,*” *La Traversiere* January 1997, 44-51.

of the flute. Notable recordings include the recordings of the music of the Doppler brothers, virtuoso flutists who toured Europe in the early eighteenth century, which he recorded with Norwegian flutist Per Oien for the BIS label.⁸ Another of Aitken's recordings that shows the ease with which he performs virtuoso works is "The Virtuoso Flute" with works for flute and piano by Boehm, Kuhlau, Paganini (arranged by Callimahos), Saint-Saëns, and Taffanel.⁹ In 1980, Aitken and harpist Erica Goodman won the Grand Prix du Disque Canada for their recording "Flute & Harp," which includes works by Donizetti, Hovhannes, Krumpholtz, and Spohr.¹⁰

Another notable more recent Aitken recording with harpist Erica Goodman includes Takemitsu's *Toward the Sea III* for alto flute and harp.¹¹ Also included on the recording are works by Inghelbrecht, Damase, Lauber, and Petra-Basacopol.

A Flute Lesson With Robert Aitken

In December of 1980, the author traveled from Louisville, Kentucky to Toronto, Ontario, Canada to take a private lesson with Aitken. Having heard Aitken perform live and on recordings, the author knew that Aitken was an excellent flutist capable of performing with virtuosity and élan. The author also knew Aitken as a teacher who emphasized the physicality of flute playing. The author had recently participated in a

⁸Doppler, Franz and Karl, *The Complete Music for Flute and Piano*, flutists Robert Aitken and Per Oien with pianist Geir Henning Braaten, BIS CD-145/146.

⁹Robert Aitken, *The Virtuoso Flute*, flutist Robert Aitken with pianist Elisabeth Westenholtz, BIS LP-166 Stereo.

¹⁰Robert Aitken, *Flute and Harp*, flutist Robert Aitken with harpist Erica Goodman, BIS LP-143 Stereo.

¹¹Robert Aitken, *Toward the Sea*, flutist Robert Aitken and harpist Erica Goodman. BIS CD-650 Digital.

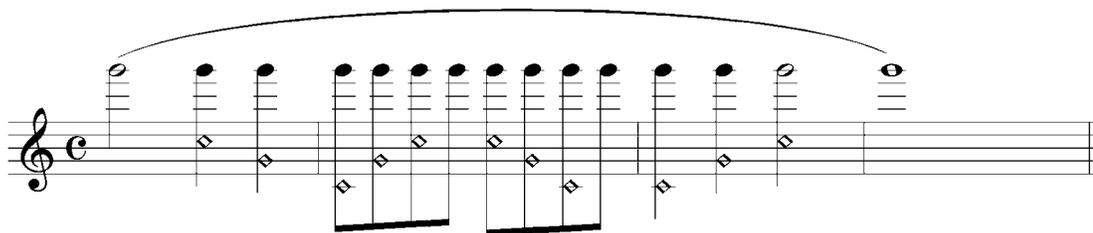
baroque flute master class with David Hart and had been made aware or reminded of the concept of keeping the diaphragm area expanded while the abdominal muscles contract during the exhalation to provide proper support. The author had then taken a few lessons with noted flutist James Pellerite, who had reinforced that theory of support.

The lesson with Aitken was extremely valuable. Aitken spoke with animation and with clarity of ideas—ideas that seemed, in several ways, quite original. The focus of the lesson for the writer was on three specific areas—all related to the manner of playing that Aitken calls the physical flute. These areas included proper breathing and support, the placement of the vocal tract with emphasis on the lowered position of the base of the tongue linked to a high, nearly backward, placement of the tip of the tongue for the tongue stroke, and development of a flexible embouchure.

Aitken also placed considerable emphasis on good body position—a relaxed posture with the spine well aligned. When used in conjunction with one another, these elements of performance allow the flutist to develop an approach to flute playing that allows the performer to play with agility and with a resonant, homogenous sound.

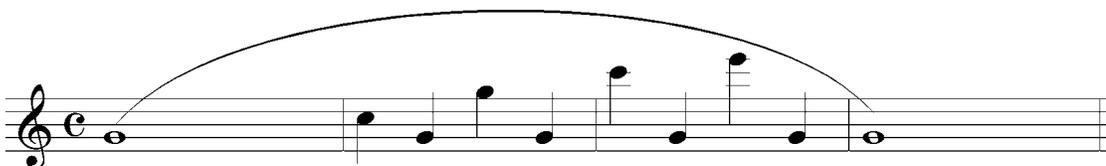
Aitken used several demonstrations to illustrate the cogent points of the physical flute. First, he illustrated that it was possible to set one's body for the high notes and to randomly finger notes and only play in a range of high notes. The flutist/reader can demonstrate this by playing a timbral trill on high G (G₆). If the flutist sets his or her body for the high G while fingering the harmonics, only the high G will come out. To set the body for the highest notes, the flutist can simply keep the jaws fairly closed and not take a very deep breath. Example 1.1 illustrates this point.

Example 1.1. G₆ with harmonics. The flutist should set his or her body for the high G. Only the high G should sound with the harmonic fingerings.



Another example that Aitken used was that of setting the body for a low note and then playing higher notes and returning to the low note. To set the body for a low note, the flutist should keep the throat open with jaws well apart, and take a very deep breath. As long as the body remains set for the low note, the return to the low note should be relatively easy. The flutist/reader can use Example 1.2 to illustrate this point.

Example 1.2. Low G (G₄) to higher notes and back again. The flutist's body should be set for the low G. Returning to the low G from the higher notes should be relatively easy.



Aitken proceeded to review the principles of a supported breath. He placed particular emphasis on the importance of keeping both the chest and diaphragm area expanded while contracting the abdominal muscles on the exhalation.

Another point that he stressed was the placement of the tongue. He made the point that to achieve the most resonant tone the base of the tongue should be in a lowered

position while producing the sound. He also made the point that the base of the tongue should remain in this lowered position during both the inhalation and the exhalation.

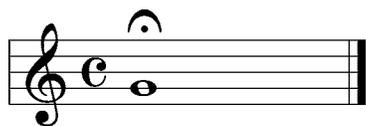
Aitken then stated that the tip of the tongue should be placed somewhat back on the roof of the mouth, behind the alveolar ridge, where it could reach without affecting the base of the tongue during the tongue stroke. Tonguing in this way allows the resonance cavities of the mouth to remain stable throughout the tongue–stroke, making it less likely that the tone of a tongued note should inadvertently change during its duration. He also stated that the tongue–stroke should be forward and down, rather than the front to back motion of the tip of the tongue that flutists tend to utilize.

After making these points he demonstrated a breathing exercise that aids in developing resonance and helps to increase vital capacity. This exercise can be used to prepare the flutist for playing long tones. This simple exercise requires the flutist to inhale slowly, hold the air, exhale some air, and then inhale some more. This action can be repeated several times before the flutist actually plays a long tone. Aitken advocated that flutists should be able to hold a long tone for 60 seconds.

Aitken used another exercise to develop the ability of playing with resonance. This exercise starts by blowing low G (G_4) and getting the sound to be as resonant as possible. See Example 1.3. It is important for the flutist to keep the rib cage expanded throughout the duration of the note. The diaphragm area should remain expanded as long as possible and the base of the tongue should remain lowered and in place throughout the note. The jaws should also be kept well apart. This will help keep the body resonance at

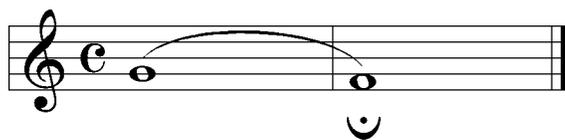
its maximum throughout. Aitken suggested that the body resonance cavities should be as open as possible to obtain the most resonant sound.

Example 1.3. Resonant G_4 . The flutist should concentrate on producing the most resonant sound possible by keeping the jaws apart and the throat open. The chest cage should be expanded with air and proper support should be utilized.



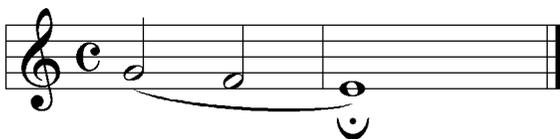
The flutist then plays the resonant low G again, while imagining playing the low F with as much resonance as possible. The flutist then slurs from the G to the F while keeping the sound resonant. See Example 1.4. The tone and resonance of the F should match that of the G.

Example 1.4. Resonant low G slurred to resonant low F. The flutist should use creative visualization to prepare for the slur to the low F. The body is set for the ensuing low note before the slur to the lower note is made.



The pattern in Example 1.4 is repeated, each time starting on G_4 and getting progressively lower. The next group is G_4 , F_4 , and E_4 . Before each change of note, the flutist is to fill the lungs with air, visualize the body placement for the upcoming note, and set the body for that note. See Example 1.5.

Example 1.5. Resonant low G to low E.



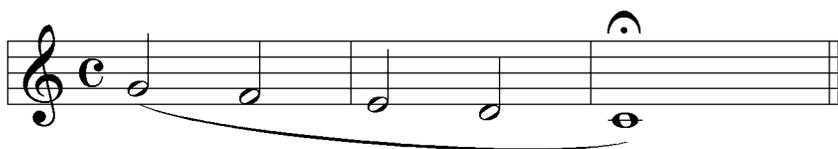
As the flutist performs each new group, attention must be paid to maintaining the body position and resonance for the lowest note of the group. In Example 1.6, the flutist should imagine playing the low D before beginning the exercise.

Example 1.6. Resonant low G to resonant low D. The flutist should fill the lungs with air and visualize and set the body position for low D before playing the G.



The final group is low G descending to low C. See Example 1.7. Aitken stressed that it is important for the flutist to remember the body position for the lowest notes played, and to use that position for the beginning of each new group. By the time the flutist finishes this exercise he or she should be able to play the G, and all subsequent notes of each group, with the same body position and resonance as the low C. The *raison-d'être* of this exercise is to enable the flutist to discover the maximum resonance setting for the body in order to use this body setting for the production of all notes throughout the range of the flute.

Example 1.7. Resonant low G to resonant low C. After extending the resonant exercise to the low C, the flutist should then concentrate on playing all notes with the body set for the low C.



Aitken spoke again of the principle of the body acting as a resonating chamber. He again stated that in order for body resonance to be as effective as possible the chest must remain high (expanded), the diaphragm area should remain expanded on the exhalation, and the cavities of the mouth and throat should be as open as possible in a natural way.

Aitken proceeded to use a straw and the flute head joint to demonstrate the means by which the upper registers can most easily be achieved. This demonstration relied on the article by Richard Hahn called “The Flute Embouchure and the Soda Straw.”¹² Aitken took a soda straw and after flattening it at one end (so that a sound could be produced), he blew across the blow hole of the head joint, producing the fundamental pitch of the head joint. Then, solely by moving the tip of the straw closer to the far wall of the embouchure plate, he produced the next octave. This demonstrated a fundamental law of acoustics—that by moving the source of the air jet closer to the strike-wall of the embouchure plate, one can attain the higher partials of the sound.¹³ The other two

¹²Richard R. Hahn, “The Flute Embouchure and the Soda Straw.” *The Instrumentalist* 30, no. 3 (October 1975): 46-50.

¹³Neville H. Fletcher, “Some Acoustic Principles of Flute Technique,” *The Instrumentalist* 28, no. 7 (February 1974): 58.

methods of attaining the upper partials, either by simply blowing harder or by angling the air stream more across the embouchure plate, are less efficient than this method of producing higher sounds. The physical flute actually combines the reduction of the distance from the lips to the strike wall of the embouchure plate with increased air velocity to achieve register changes in the most efficient manner possible. When the flutist understands the simple acoustical principles involved and can incorporate them into his or her embouchure technique, the flutist can develop a more or less automatic embouchure.

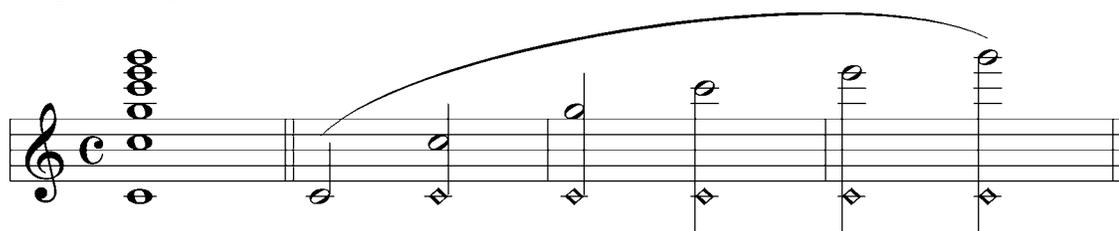
Aitken explained that the manner of utilizing this acoustical concept in embouchure placement is to set the body for the lowest notes so that when the flutist brings the flute to his lips and fingers a low note—a resonant low note—will sound. He went on to say that to produce the higher notes one needs to bring the upper lip down into the lower lip slightly, which makes a smaller lip opening. This creates more pressure behind the lower lip, which must remain relatively relaxed and flexible. As the pressure behind the lower lip builds, the lips (the lower lip mostly) are pushed forward a minuscule amount by the air stream. This places the lips and the lip opening (the acoustical source of the air stream) closer to the far wall of the embouchure plate, causing the higher partials to sound. This process is aided by the increase in the velocity of the air stream brought about by the smaller lip opening.

The flutist/reader can demonstrate this by playing the harmonic series on a low C (C₄). The flutist should keep the body set for the low C. A full breath should be taken, the throat should be kept open, and the jaws should be kept well apart. The jaws should

be kept well apart not only to increase the size of the resonating chamber in the mouth, but also to keep the teeth away from the lips so that the lips can directly control the air stream and vice versa.

To be able to control the center of the lips, it is important to minimize any adverse tension at the corners. After the low C is played in a resonant way, the flutist should attempt to bring the center of the upper lip down into the lower lip slightly. If the teeth are not directly behind the lips, hindering the action of the air stream, the air should act to push the lips forward to produce the higher notes of the harmonic series. It is very important that the flutist does not make any other changes in embouchure or jaw position, such as pushing the lips forward or by closing the jaw or thrusting it forward. The only action that should consciously be used is the slight lowering of the upper lip into the relaxed lower lip. Example 1.8 shows the C₄ harmonic series from low C to high G.

Example 1.8. The C₄ harmonic series from low C to high G. The flutist should finger the low C throughout, while bringing the upper lip down into the lower lip to attain the changes in register.



For the sake of clarity, harmonics are indicated by diamond shaped heads on the fingered note throughout this paper.

The Purpose of this Paper

It is the hypothesis of the writer that through the utilization of the physical flute technique, the flutist can enhance his or her quality of sound and ease of playing. The recommendations for physical actions, and the exercises provided, should act as a counter to certain *laissez-faire* and *imitato* methods of flute instruction, whereby some flutists are unable to perform adequately for physical reasons and are left to their own devices to try to fix things.

If the flutist/reader has access to a computer program such as *Cool Edit 2000*¹⁴ that can produce a frequency spectrum analysis or a spectral analysis of the flute sound, there is a quantitative means of measuring the results of the technical application of the physical flute technique. By opening the frequency analysis window in *Cool Edit 2000*, it is relatively simple to measure the appearance of partials in the sound upon playback of a recorded sound.

The primary use for frequency analysis would be to ensure that the flute sound is relatively bright and rich. For the purposes of this paper, a second partial of near equal or greater volume than the fundamental would indicate brightness in the sound. As a rule of thumb, one sound will sound richer and fuller than another if it has a greater number of relatively high amplitude partials. Generally, the flutist should try to keep the first six partials well represented in the frequency spectra of all three registers at a moderate

¹⁴*Cool Edit 2000*. Digital audio editor published by Syntrillium Software. Available as a download at <http://www.syntrillium.com>.

dynamic level. Due to the natural resonance patterns of the flute, this task is harder to accomplish in the upper register than in the bottom two octaves.

Examining the frequency spectra (in spectral view) of moving notes for discontinuity can be used to check that the resonant cavities of the mouth and throat do not change during tonal production. This discontinuity would be revealed by changes in the relative strength of partials of adjacent notes when moving from note to note.

The flutist/reader is encouraged to make recordings for comparison purposes before engaging in the exercises involved in developing the physical flute technique.

Recordings of individual long tones and scales without vibrato, including a three–octave chromatic scale, should be sufficient in this regard. In this way, frequency spectrum analysis and spectral analysis before–and–after screen shots can be used to determine whether there is a quantitative difference in the sound after performing the exercises in this paper.

Chapter 2 includes a survey of supporting materials that examines models for the physical flute technique in the flute and vocal pedagogy. The vocal science pedagogical works of Richard Miller, in particular, are used to note similarities between vocal techniques and the techniques involved in the physical flute. Some similarities to and specific differences from other flute techniques are noted.

The third chapter of the paper is devoted to the presentation of the physical properties of the physical flute. Photographs of actual flute players will show the important characteristics of the physical flute. The three most important areas of the physical flute—proper breathing and support; mouth, jaw, and throat placement; and the

placement and action of the lips—are examined. Screen shots of frequency spectrum and spectral analyses are used to show the effects upon the flute sound of certain physical actions—such as decreasing the size of the lip opening and the widening of the opening of the jaws and throat.

The fourth chapter sets forth a means for the flutist to incorporate these concepts and techniques into his or her flute playing. These studies place an emphasis on the overlearning of physical actions to decrease the amount of time necessary to implement them into the flutist's technique. Emphasis is placed on the development of proper support through abdominal pulsing exercises, and in the development of the automatic embouchure through harmonic lip exercises.

The final chapter uses examples from the flute orchestral audition repertoire to further train the flutist in the techniques of the physical flute. The flutist is presented with a systematic means of practicing certain excerpts with the end of developing the physical skills intrinsic to the physical flute manner of playing while learning or reviewing the excerpts. In addition, the more difficult excerpts serve as a kind of graduation examination to help the flutist determine if the principles of the physical flute have been learned and internalized.