THE FUNDAMENTAL APPROACH TO TROMBONE TECHNIQUE:

A COMPREHENSIVE STRATEGY FOR ADDRESSING

COMMON TECHNICAL DEFICIENCIES IN TROMBONE PERFORMANCE

BY

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TABLE OF CONTENTS

Page

Introduction

Having studied, practiced, and taught trombone technique for more than twenty years; I have had the opportunity to observe a number of players from various backgrounds and of various skill levels. Many trombonists, including my students and myself, exhibit similar flaws in trombone technique. After noticing some of the same problems time and again, I began to wonder how this could be. The fact that so many students and even professionals struggle with similar difficulties led me to surmise that there must be common reasons for such common problems. If there are in fact common reasons for common problems, then there must also be a common solution. After much consideration and study I have arrived at the conclusion that the causes of most deficiencies in trombone performance can be traced to one of four fundamental components, and therefore the solutions to these deficiencies are also to be found in the fundamental components.

This dissertation investigates the idea that all of the challenges of trombone performance technique can be reduced to four fundamental components. These are:

1) Breathing and Air Support

2) Embouchure Control and Flexibility

3) Slide Precision and Timing

4) Articulation.

The trombonist's rate of success and progress in musical performance is directly related to his/her mastery of these fundamental components. Regardless of the difficulty of the music to be performed, all trombonists rely on their ability to master these four skill sets. The order in which these components are listed is important. While they are all important and in many ways related, it is safe to say that each successive component is built upon the previous components.

Scope and Limitations

Before continuing, I feel it necessary to establish to some degree the scope and limitations of this project. This dissertation will not attempt to comprehensively exam all of the tools necessary for musical performance, only those specific to the successful mastery of the fundamentals of trombone technique. In stating the general premise, I do not intend to overlook the importance of basic musicianship skill. Regardless of instrument or voice part, all musicians must work to develop certain essential skills. These include:

1) A strong, internalized sense of rhythm and time

2) An acute sensitivity to melodic and harmonic intervals and pitch discrepancies

3) A feel for the natural flow of musical phrasing.

These universal skills will certainly be required for the mastery of the four components mentioned above. However, they are not specific to trombone performance technique in themselves, and are therefore outside of the focus in this project.

I should also note that the specific nature of this dissertation topic does not preclude it from being useful to other instrumentalists, particularly those within the brass family. Many of the concepts to be discussed, while focused specifically on trombone technique, are also applicable to the other brass instruments. All brass musicians must understand the function of air, and by extension, breathing as it relates to tone production. The concept of embouchure flexibility is also essential to all brass musicians. The technical components of slide precision and articulation do require some specific attention and instruction for the trombonist, but even these two components contain some universal concepts that may benefit other instrumentalists. While I am clearly limiting the scope of this project to trombone related technical issues, I also wish to acknowledge that there will undoubtedly be areas in which the concepts discussed may prove useful to other musicians.

Conversely, methodologies generally associated with other brass instruments are not irrelevant to this project. Arnold Jacobs, the legendary tubist of the Chicago Symphony Orchestra, has left a tremendous legacy in terms of his understanding of the human respiratory system's function in musical tone production (Frederiksen 1996). Phillip Farkas, principal horn of the Chicago Symphony Orchestra, wrote a very helpful treatise on formation of the embouchure entitled *The Art of Brass Playing* (1989). Their teachings and writings contain a wealth of helpful information for all musicians. The fact that these great musicians did not play the trombone is irrelevant.

Rationale for the Project

Throughout the twenty years that I have practiced, studied, and taught trombone performance technique, I have identified several technical issues that all trombone players must address. My students, nearly without exception, exhibit the same deficiencies that I have worked to overcome in my own playing. In my private studio teaching, from the beginning band students to my most advanced college music majors, I find myself explaining the same basic concepts. Even professionals are subject to these challenges. In 2007, I had the opportunity and privilege of participating in a ten-day seminar with Joseph Alessi, the principle trombonist of the New York Philharmonic Orchestra. As I observed the other professional trombonists in the Alessi Seminar master classes, it occurred to me that Mr. Alessi was telling them many of the same things that my teachers have told me and that I often tell my students. I found it very interesting that the solutions to many difficulties encountered by these professional trombonists, could be easily traced to flaws within their fundamental skills. I contend that the same basic fundamentals are required of the beginning trombonist who is learning to play *Twinkle, Twinkle Little Star,* as are required of the professional trombonist who is performing the most difficult literature in the trombone repertoire.

As the title of this dissertation suggests, some common flaws in many trombonists' technique seem to stem from an inadequate understanding of the four components that I have mentioned above. I believe that the most important aspect of effective performing and teaching is the ability to accurately diagnose technical flaws and inefficiencies, and to address them within a musical context. I hope this project will help

trombone performers and instructors of all levels by providing a concise explanation of the fundamental skills required in trombone performance. The learning process is simplified when the student focuses his/her attention on the mastery of the four fundamental components mentioned above. In presenting simple technical objectives for the student, the instructor may be able to focus the student toward accomplishing positive goals instead of avoiding errors.

We may often hear performers or teachers discuss technical development as if it were separate from musical or artistic development. I do not consider technical and musical development to be separate issues. I believe they are as inextricably linked as melody and harmony are in the study of music theory. Many musicians attempt to improve technical facility with little or no attention to the musical nature of the exercise. It is my experience that trombonists are particularly guilty of this. For this reason, part of this project will contain musical exercises demonstrating the four fundamental components of this dissertation. I am intentionally avoiding referring to these examples as "technical" exercises or studies. I feel that they are, in fact, musical endeavors. Throughout this dissertation, but especially within the musical exercises, I will strive always to maintain a musical and artistic mindset.

I contend there really is no great mystery to creating a beautiful and consistent sound with proper articulations and clean slide technique on the trombone. I am convinced that the greatest players in the world are great, not because they have discovered some elusive secret or because they possess some superhuman talent. They

are great simply because they execute the basic fundamentals more effectively and consistently than the average player.

Elements of the Project

This dissertation project will consist of three elements. The first is the written element, the second element consists of musical exercises and the third element is an audio recording demonstration. In this written document, I will completely discuss the four fundamental components of trombone performance technique that I have noted. I will then identify some common deficiencies in trombone technique that may be addressed via a proper understanding of these four fundamental components. I will also discuss the current literature and teachings concerning these four technical components of trombone performance technique. Included in this element will be the answers to questions that I have developed to test and evaluate my assertions. With this questionnaire, I will be seeking feedback primarily from professional performers and college trombone professors, but also from some experienced band directors who teach beginning trombone students. I will select participants from these groups based on their experience in teaching trombone performance technique and addressing common technical deficiencies. The purpose of this inquiry is to find out how well my assertions conform to the common understanding of trombone performance technique, if there is in fact a common understanding. Also, it could potentially reveal limitations in my assertions that I will need to address.

The second element of this project consists of musical exercises specifically designed to target each of the four technical components. Some of these exercises will be my original compositions while others will be adapted from studies with my former teachers, or from existing trombone methods. The exercises will be organized into groups according to the technical skill set being developed in each case.

The third and final element is a digital audio demonstration of the techniques presented in the musical exercises. If a picture is worth a thousand words, then a quality musical sound must be worth a million. The longer I teach, the more I find that an economy of words is optimal and a pure and artful demonstration is essential.

Purpose

Through this dissertation project, I intend to provide a clear and concise explanation of the four fundamental components of trombone performance technique. I have attempted to find support for my assertions through the survey component and an examination of the current literature on trombone technique. Furthermore, I hope that the methodologies outlined in the musical exercises will offer a practical, systematic approach to the development of these necessary fundamentals for performers, teachers and students. Finally, the recorded audio demonstrations will put the musical exercises into even greater perspective and provide a model for those who may be new to these concepts.

I do not pretend to have all of the answers for every difficulty that the trombonist might encounter. Also, I reject the cookie-cutter approach to musical instruction in which

a student is expected to parrot the teacher's every action and method. Each performer and student is unique and may encounter a myriad of difficulties for which the solutions can be numerous and varied. Nevertheless, I believe that some fundamental principals will hold true for every trombonist regardless of the individual's physical tendencies or personal learning style. This project seeks to identify, explain, and demonstrate these core fundamentals in a way that will make them accessible and beneficial to trombonists of all skill levels.

Literature Review

Overview

The purpose of this literature review is twofold. First, I would like to identify the current available materials that deal effectively with the topic of trombone performance technique. I will be considering which areas of this topic are covered sufficiently and which areas are lacking. Second, I hope to determine how this dissertation project may contribute to the current body of literature.

I have organized this section by following categories of sources:

1) Books

2) Articles

3) Methods

4) Internet resources.

Because the intended audience for this dissertation is primarily American trombonists seeking modern solutions to trombone technical issues, I will limit this review primarily to twentieth-century, English language sources.

Books

Phillip Farkas (1989) was the principal horn player in the Chicago Symphony Orchestra, the Cleveland Orchestra, the Boston Symphony Orchestra, and the Kansas City Philharmonic. He was also horn professor at Indiana University, Northwestern University, Cleveland Institute, Kansas City Conservatory, De Paul University, and Roosevelt University. His book entitled *The Art of Brass Playing: A Treatise on the Formation and Use of the Brass Player's Embouchure,* now in its third edition, has been an essential resource for serious brass players for nearly fifty years. For the trombonist, this book presents fundamental issues such as:

1) The embouchure aperture
2) Wet versus dry lips
3) The function of the jaw
4) Mouthpiece angle, pressure, and placement
5) Air control
6) Articulation.

Another incredibly valuable part of this resource is the second chapter titled, *Photographic Studies of Virtuoso Players.* This chapter shows pictures taken from various angles of the embouchures of the brass players in the Chicago Symphony. The low brass players included in this study were Robert Lambert, Frank Crisafulli, Edward Kleinhammer, and Arnold Jacobs. While this book was not written by a trombonist, and some of the language is a bit dated, it is a must have for any trombonist who desires a working knowledge of the embouchure.

The Art of Trombone Playing, by the Chicago Symphony Orchestra's long-time bass trombonist Edward Kleinhammer (1963), is excellent reading for all trombone students. In some ways this book is similar to the Farkas book. It deals with many of the same concepts. Unlike Farkas, Kleinhammer applies each concept specifically to the trombonist. This is a thorough text that discusses everything from instrument maintenance to suggested solo literature. For the purposes of this review the important parts of his book are the sections devoted to fundamentals. He covers topics such as breathing, embouchure control, mouthpiece buzzing, legato and staccato articulation, and slide technique in great detail. This book includes a number of sample musical exercises that give the player an opportunity to implement the principles in each chapter. It also contains illustrations depicting correct embouchure and posture. Kleinhammer establishes some excellent concepts in this book that have helped to formulate my approach to trombone technique. In discussing how the air impacts the embouchure, he says, "Keep in mind that the first point of breath resistance should be the lips. Keep the throat relaxed and isolated from the functions of embouchure tension, and use the tongue only as an aid to articulation" (1963, 16). Regarding air in the articulation process, he states, "In rapid tongued passages, the production of the series of tones should evolve from the long-tone process" (1963, 64). This kind of sound technical instruction makes Kleinhammer's book one of the most important books the trombonist can own.

No other pedagogue has impacted modern brass teaching methods more dramatically than, Arnold Jacobs. For the trombonist, Jacobs is second in importance only to Emory Remington. Arnold Jacobs was the tuba player in the Chicago Symphony

Orchestra from 1944 to 1988. His teaching was characterized by a profound understanding of the physiological aspects of brass playing and an ability to address the most technical issues in a completely artistic manner. Much of his instruction was focused on efficiency of airflow and breathing. Arnold Jacobs never wrote a book or method but some of his students have made attempts to organize his teaching methods into written form. One of these attempts resulted in a book titled *Arnold Jacobs: Song and Wind* by Brian Frederiksen (1996). He presents Jacobs' methods in a very clear fashion. The greatest attribute of this text is the literal approach that it takes to instruction and the scientific understanding that is applied to brass technique. There is no substitute for studying directly with a master teacher like Mr. Jacobs, but this book is an excellent resource for those who never had the opportunity.

Another important book devoted to breathing is *The Breathing Gym* by Sam Pilafian and Patrick Sheridan (2002). Mr. Pilafian is known as a soloist, chamber musician, teacher, author, and composer. He is currently professor of tuba at Arizona State University. Patrick Sheridan began his career in "The President's Own" United States Marine Band and has since gone on to international acclaim as a soloist and educator. This relatively short book includes five types of exercises that the authors call:

1) Stretches

2) Flow Studies

3) Therapies

4) Strength and Flexibility

5) Breathing for the Brain.

The book is full of illustrations and instructions that guide the player through the exercises. The focus is always on efficiency of breathing, elimination of tension, and relaxation in general. This resource is a great aid to the player who is serious about developing his/her full breathing capacity and an effortless approach to tone production.

The last book in this selected list was written by one of Emory Remington's students, Reginald H. Fink. *The Trombonist's Handbook* (1977) is full of valuable information. Much like the Kleinhammer text, this book covers a broad array of topics. It contains concise explanations of issues including embouchure development, breathing, and slide placement. These explanations are direct and very concise. While I do not endorse all of Fink's methods, I believe that this book is very helpful in establishing the guiding principles of trombone technique. It also contains supplemental illustration and musical exercises to help the reader apply these principles.

I have chosen to include the books in this section based on the reliability of their content. This is not to say that I completely agree with every statement in each of these books, but by and large they are consistent with my understanding of proper trombone technique. There are many other books about the trombone currently available and some actually contain useful technical instruction. Many are designed to prepare music educators to teach beginning trombonists. *Wind Talk for Brass* (Ely and Van Deuren 2009) and *Guide to Teaching Brass* (Hunt 1984) are two examples. It is my opinion that while these books may contain some helpful information, they often take a very general approach and are unreliable for accurate and detailed instruction. The books that I have mentioned all directly address the most crucial issues related to trombone performance.

Over time these resources have become an irreplaceable part of my approach to performing and teaching trombone technique.

Methods

Emory Remington has been called the father of modern trombone pedagogy. He taught at the Eastman School of Music from 1922 until 1971. During that half-century he taught many of the trombonists who have populated the orchestras and music schools throughout the United States for much of the twentieth century. His ideas have been disseminated throughout multiple generations of players and they are still present in trombone pedagogy today. His methods stood in stark contrast with other methods of the time, which centered primarily on a marcato style with harsh attacks. Remington focused on a lyrical, singing approach to trombone technique. His warm-up exercises emphasized long tones, flexibility, and legato tonguing. These techniques have been compiled and nicely organized by Donald Hunsberger, one of Remington's former students, into a method entitled, *The Remington Warm-Up Studies* (1980). This method has become an essential part of any serious trombonist's library over the past thirty years. I insist that my students purchase this book and it has contributed more than any other method to my own approach to developing trombone fundamentals.

The famous Arban cornet method has been transcribed numerous times for various brass instruments. The version that I use and recommend to all my students is the Wesley Jacobs edition (2002) that incorporates commentary by Joseph Alessi and Dr. Brian Bowman. Mr. Alessi is the principle trombonist of the New York Philharmonic and

Professor of Trombone at The Julliard School. Dr. Bowman is an internationally renowned euphonium soloist and Professor of Euphonium at the University of North Texas. These two giants of the low brass world have provided commentary for many of the exercises throughout this longstanding cornerstone method in the brass repertoire. Given the specific nature of this project, Dr. Bowman's comments are not as applicable to this review as those of Mr. Alessi. His technical tips interspersed throughout the various sections cover topics such as:

1) Airflow

2) Articulation

3) Slide technique

4) Embouchure shifts.

Joseph Alessi is by, many accounts, the standard bearer for modern symphonic low brass playing. This method has been a terrific resource for years and the added commentary of Alessi and Bowman makes this traditional favorite even more valuable.

Joannes Rochut was the principle trombonist of the Boston Symphony Orchestra from 1925 to 1930. He is most well known to trombonists for the wonderful three-volume transcription that he created of Julio Marco Bordogni's sets of vocalizes. Bordogni was an Italian tenor who taught at the Paris Conservatory from 1820 until shortly before his death in 1856. Rochut's transcription of these vocalizes, titled *Melodious Etudes from Trombone* (1928), has become one of the cornerstones of the trombone repertoire. The flowing vocal, musical lines edited with appropriate phrasing for the trombone, provide an excellent vehicle for developing a singing approach to the

trombone. I do not know of any other method more perfectly suited for developing techniques such as legato tonguing, pure slurs, and fast, accurate slide technique. It is also interesting to note that the first volume of these vocalizes was released in 1928, roughly the same time that Emory Remington was establishing his new lyrical approach to trombone pedagogy at the Eastman School of Music.

Robert L. Marsteller held trombone positions in the National Symphony Orchestra, the United States Navy Band, and the Los Angeles Philharmonic Orchestra. Marsteller describes his method, *Basic Routines for Trombone* (1974), as a set of calisthenics for the muscles required in brass playing. He prescribes combining a few exercises from each of the various sections of the method to create a routine specific to the individual needs of the player. This method is consistent with my idea of developing technical skills apart from technically challenging music. Musical excerpts should never become a vehicle for technical development. This leads to an overly mechanical approach to the music. Methods such as Marsteller's *Basic Routines* allow the trombonist to perfect the skills necessary to be expressive through musical performance.

In addition to these primary methods, there are many other trombone methods in print. Some are more effective than others for developing fundamentally sound technique. Methods by Kopprasch (1973), Schlossberg (1947), and Blume (1974) have proven effective resources for trombonists over the years. These methods each have their strengths and weaknesses but used together they create a body of exercises that covers virtually the entire spectrum of trombone performance technique.

A more recent publication designed to improve flexibility and tone is Dr. Brad Edward's (2006) method, *Lip Slurs: Progressive Exercises for Building Tone and Technique*. Dr. Edwards is Associate Professor of trombone at the University of South Carolina School of Music. This method is a progressive approach to embouchure flexibility. Many of the principles that I promote in this dissertation are included in this extensive study. He has created a system of grouping these exercises into different levels of difficulty. Within each level he has included both slow and fast slurs. Additionally, Dr. Edwards has composed a series of lip slur melodies. These are melodies that can be played without tonguing focusing entirely on coordinating the slide and the embouchure. This relatively new method is extremely helpful and will likely become a standard resource for trombone teachers and performers.

The final selection that I will mention in this review is *Twenty-Seven Groups of Exercises* by Earl D Irons (1964). Irons, who played violin and cornet, was a music professor at the University of Texas at Arlington for nearly thirty years. This publication, originally for cornet trumpet, was adapted and released for trombone and euphonium. His exercises are similar in many ways to the Charles Colin (1980), *Advanced Lip Flexibilities* method. The most interesting aspect of Irons' method is the text interspersed between the musical exercises. His approach is very similar to the progressive approach to fundamentals that I have taken in this dissertation. Most of the methods that I've mentioned in this section, except for the Arban, do not include much guidance or instruction for proper execution. That instruction is what sets this simple method apart.

Over the course of the twentieth century, three methods have emerged as essential to all trombone courses of study. The Remington, Arban, and Rochut methods have become the three pillars of trombone pedagogy. There are other traditional studies that contribute to the body of literature known as trombone methods and there are new methods being written still today. I like the variety that exists in the old and new methods. Quality commentary or instruction adds a great deal to the methods that previously only consisted of musical exercises. If there is one thing missing from the current pedagogical materials, it is editorial commentary. It is extremely important for methods to offer clear direction to the player as he/she practices the musical exercises, ensuring that fundamental principles are being established.

Articles

While there are a number of journal publications that include articles about trombone history or current events, the best source for articles related to trombone performance technique, and brass technique in general, is *The Instrumentalist.* The decades of expertise contained in these journal submissions is really impressive. The following articles were selected for this publication.

Improving Slide Technique was written by Ernest Lyon (1951). Mr. Lyon, an Emory Remington pupil, served on the faculty of the music department of the University of Louisville School of Music, for forty-seven years. In this article Mr. Lyon comes to many of the same conclusions that I advocate in my discussion of the four fundamental components of trombone performance technique. He too makes a distinction between

legato slide technique and detached playing. Regarding legato slide movements, he states, "I feel sure that everyone will recognize the value of learning to move the slide as fast as possible just before the next tone must begin when playing legato." In discussing detached articulation style he says, "Again fast movement of the slide is the secret of a good slide technique, but this time the movement should be as soon as possible rather than as late as possible…many unclear attacks in slow passages are made because the slide is still in motion when attack is made" (1951, J-18). This is the earliest example that I am aware of in which the concept of differing slide timings is taught as a function of varying articulations.

Another article from *The Instrumentalist*, *The Trombone Slur,* by June Phillips (1951) also addresses slide technique and tonguing. The aspect of this article that I found most interesting was Phillips' approach to slide control. She said, "There are two fulcrum points, the wrist and the elbow, both coming into play on all positions with the elbow making the greatest compensations. The wrist should never be uncontrollably relaxed but serve only as a finer adjustment of the elbow movement, particularly in the area from 3rd position to 1st position" (1951, May-June). This approach is consistent with my assertion that the elbow should be the primary hinge in slide placement.

Because legato playing is such a great challenge for the trombonist, there is no shortage of authors attempting to definitively prove that their approach is the best method for achieving perfect legato phrases. In *The Legato Style of the Trombone,* James Graham (1965) makes just such an effort. While I do not particularly agree with his take on slide movement, I do like what he has to say about airflow in legato style. He says, "The flow

of the breath for the proper execution of the legato style must be very even and above all constant…" (1965, 79).

One of the most interesting articles that I have discovered is *Lip Vibration Characteristics of the Trombone Embouchure in Performance* by Dr. Loyd Leno (1971). In this article Dr. Leno reveals the results of the study he conducted using clear glass mouthpieces and high-speed photography to observe and analyze the actual workings of the embouchure as it relates to tone production. His research establishes that the buzzing embouchure can be measured in terms of frequency much like vibrating strings can be measured in cycles per second. This fact is crucial to understanding the difference between air quantity and air speed, and the effect they have on pitch and volume. This article demonstrates that as the aperture of the embouchure becomes smaller, the frequency of the individual lip vibrations increase, and therefore the speed of the air is accelerated. The article also briefly discussed the issue of volume as it relates to changing aperture size and shape. Because no attempts were made to maintain consistent dynamics, the results were inconclusive regarding the effects of volume on the embouchure.

In examining the current body of literature contained in the common music journals, I was surprised to find that very few actually contain articles specific to trombone performance technique. The *International Trombone Association Journal* seems to be more devoted to trombone history, current trends in performance, discussion of audition preparation, music and recording reviews. The writings in *The Instrumentalist* comprise a nice collection of informative articles that deal with many of the difficulties that all trombonists must address. I do believe that additional writings demonstrating

current methods and practices, would contribute to the body of literature that is presently available to trombonists. It may be that online resources are replacing traditional print articles and publications.

Internet Resources

There are many online resources that deal with various aspects of trombone history, performance, pedagogy, equipment, music schools, music festivals, and the music business in general. For the purposes of this review, I have identified five websites that contain helpful sections devoted to the narrow topic of trombone technical development. These websites all have minor issues in terms of the design and layout. Nonetheless, the content is the central consideration in evaluating their usefullness. It is important to remember that by and large, these websites are designed and maintained by trombonists, not professional web designers.

Scott Hartman is the trombone professor at Yale University. For many years Scott was the trombonist in the *Empire Brass Quintet* and today he performs with *The Brass Band of Battle Creek, Proteus7, Millennium Brass,* and *The Yale Brass Trio.* His website is called *slushpump.com* (Hartman n.d.). Scott has included an educational section on his website and there are a number of particularly valuable downloads in PDF format, including exercises in buzzing, slurs, articulation, and glissandi. In fact, Scott's glissando exercises are the inspiration for many of the slide precision exercises contained in this project. The only drawback that I observe in Scott's online educational materials is that they are not accompanied by much discussion or instruction. For someone who is

unfamiliar with his teaching, the exercises may at first seem somewhat unorthodox. Nevertheless, even without the benefit of Scott's instruction, these exercises can still be very helpful in establishing the connection between the air, embouchure, slide, and tongue in trombone technique.

Peter Ellefson is a former trombonist in the Seattle Symphony and currently teaches trombone at Indiana, Northwestern, and Roosevelt Universities. He frequently performs in both the Chicago Symphony Orchestra and the New York Philharmonic. Mr. Ellefson has successfully melded the playing and teaching concepts of the traditional Chicago style, established by players such as Arnold Jacobs, Frank Crisafulli, and Edward Kleinhammer, with the modern approach to symphonic performance characterized by the New York Philharmonic brass section. His website (Ellefson n.d.), contains a pedagogy section that consists of articles, master class handouts, and most importantly, three warm-up routines. These can all be downloaded and they are extremely effective. Mr. Ellefson has an incredible understanding of the principles behind so many of the traditional exercises of Remington, Arban, Kopprasch, and Schlossberg. This understanding combined with a no nonsense approach to trombone fundamentals makes this online resource valuable to players of all skill levels.

Carl Lenthe is also a trombone professor at Indiana University. Prior to beginning his tenure in Bloomington, professor Lenthe had a prestigious career abroad as an orchestral trombonist, chamber musician, and soloist. His positions included principal trombone appointments in the Bavarian State Opera in Munich, Germany and the Bamberg Symphony Orchestra. Professor Lenthe has developed a website that is

currently connected to the trombone page of the Indiana University website (Lenthe n.d.). There are a number of helpful articles and PDF downloads that are available under the sections titled *Lenthe Lessons* and *Masterclass Handouts*. As of this writing the website is being updated and is in a state of disarray. Much of the material that has been available in the past is being reorganized. However, this website still contains a great deal of useful information. Professor Lenthe has a very musical way of approaching the trombone and never seems to get bogged down by the technical nature of trombone instruction. The exercises and commentary contained in his website reflect his highly artistic approach to the trombone.

Perhaps one of the best online resources for trombonists today is *bonezone.org*, (Edwards n.d.) created and maintained by Dr. Brad Edwards. He has written several important methods for trombone, one of which I have mentioned in the review of trombone methods. In addition to these fine publications, he has also posted on his website a helpful free download that he calls the "Basic 6 Warm-up". There are six parts to this warm-up that focus on many of the ideas that affirm my four fundamental components. The warm-up is heavily influenced by Arnold Jacobs' principles and is designed to take twenty to forty minutes to complete. The one small issue I have with this routine is one of semantics. I do not think that a warm-up should take more than about ten minutes. In my opinion, anything beyond an easy loosening of the lips and lungs is not a simple warm-up. This is really a technical routine. This may seem like a distinction without a difference, but there are players who feel as though they cannot function without playing through their entire forty-five minute "warm-up". In reality this

perceived need for an extended warm-up is mostly psychological. It becomes a crutch or an excuse for sounding bad at the beginning of a practice session. A true warm-up loosens the embouchure muscles, expands the lungs, and most importantly focuses the mind. Regardless of what Dr. Edwards calls this routine, it is an excellent resource that addresses all aspects of trombone technique. He has also posted a simplified version of the "Basic 6 Warm-up" for younger students.

The final website resource that I would like to mention is *The Online Trombone Journal* (Human 1996). The *OTJ* was created and is managed by Dr. Richard Human Jr. Dr. Human is a graduate of Ball State University and he is currently Assistant Professor of Trombone at Mississippi State University. The *OTJ* website has a section titled *Archives*. This section contains a number of articles organized by category, and written by many established trombone performers and teachers. The categories labeled *Performance*, *Pedagogy*, and *Just for Beginners*, all include articles that deal with topics of trombone technique. Because the *OTJ* was established in 1996, the articles represent current trends in trombone pedagogy. Also, many of the articles are peer reviewed and they are marked accordingly.

Any minor flaws in the layout or organization of these sources are more than offset by their valuable content. The question that must be asked is whether or not the current online resources are sufficient. I do not believe they are. The sources mentioned above and others like them are a nice start, but I believe that the trombone community has only scratched the surface of technological and virtual pedagogy. I see a great deal of

potential for other websites to become more polished, more interactive, and therefore more effective.

Relevance of this Project

The current body of literature related to trombone performance technique is extensive. The traditional and current resources discussed in this review do address the four fundamental components that form the foundation of this project, albeit indirectly at times. The book resources provide the most comprehensive coverage of these topics but they are typically devoted to more than just trombone technique. The methods are often aimed at providing practice exercises and repetition and they are often short on instruction. Due to the necessarily brief nature of journal articles, they are usually not very expansive and lacking in specificity. The online resources are promising, but they are still fairly new and unpolished. The strength of this project is the fact that it focuses directly on the four components essential to fundamentally sound technique. I believe this focus combined with the information gleaned from the surveys, and the specifically designed musical exercises, makes this dissertation a nice addition to the current body of literature. This is not meant to diminish the importance of the resources discussed in this review. I believe this dissertation and similar works are best utilized in conjunction with other existing materials.

Discussion of Four Technical Components and Common Deficiencies

I have identified the following four components as essential to fundamentally sound trombone performance:

1) Breathing and Air Support

2) Embouchure Control and Flexibility

3) Slide Placement and Timing

4) Articulation.

Hours of personal practice time combined with years of study with a number of experienced and reputable trombonists has led me to the assertions that I am presenting in this project. My earliest trombone lessons with Dr. Douglas Baer and Dr. Robert Blaine at the University of Louisiana at Monroe provided me with a fundamental understanding of airflow in tone production. Both of their teaching styles were rooted in Emory Remington's method. Years later, Peter Ellefson, Professor of Trombone at Indiana University, further established this understanding with an instruction method based on the Chicago style of performance and pedagogy. My studies with Scott Hartman at Yale University formed the foundation for the guiding principles of the embouchure and slide placement components. Additional studies in the form of master classes with Joseph Alessi of the New York Philharmonic and private lessons with Peter Norton of the

Cincinnati Symphony Orchestra have also contributed greatly to these components. Finally, I have arrived at many of the ideas in the articulation component through my studies with Dr. John Seidel, Associate Professor of Trombone at Ball State University. It is fair to say that every musician reflects the ideas of his/her teachers and I am certainly no exception. In formulating the premises of these four fundamental components, it is important to note that they are not imagined or pulled from thin air. They are the product of decades of experiences of highly regarded musicians spanning several generations. Virtually every difficulty encountered in trombone performance may be traced back to a flaw in one of these areas. Once the trombonist has developed an adequate understanding of these four principle components, he/she can effectively diagnose and correct any and all deficiencies in trombone technique.

1) Breathing and Air Support

Proper breathing and air support is the first and most important concern in fundamentally sound trombone performance technique. Air blown through the lips is the fuel that generates every sound created on the trombone. An inadequate understanding of the crucial role that airflow plays in tone production is often the root of many technical difficulties.

Two primary concerns determine how air should be used in the production of musical tones. These are 1) the desired pitch and 2) the desired volume. In order to produce a full, rich, and resonant tone on the trombone, the player must create the rate of airflow and pressure necessary to support each pitch frequency that is sounded by the

embouchure. Additionally, variations in dynamics alter the requirements of the airflow. The louder the player is required to play, the greater the quantity of air needed to create the appropriate intensity of vibration. I like to think of airflow in terms of quantity when discussing dynamics and in terms of speed when discussing pitch. Because the aperture in the lips varies in size for each pitch, the airflow must accommodate this ever-changing point of vibration. For lower pitches, the aperture is wider creating a bigger space in the lips and therefore a higher flow-rate. For higher pitches, the aperture is smaller creating a lower flow-rate. I am using the term flow-rate to describe the amount of air that is moving through the aperture. Also, the speed of the air moving through the smaller aperture on high pitches is naturally faster than air moving through the larger space required for lower pitches. This principle is easily demonstrated by visualizing a garden hose. The speed of the water exiting the hose can be accelerated by partially covering the end of the hose with the thumb causing the water to spray. Nothing about the source of the water has changed but the pressure and speed has increased because the opening at the end of the hose is smaller. If the dynamic remains constant, this is a perfect example of the way air moves through our lips, supporting vibrations at different pitch frequencies.

Having established these two premises regarding airflow, I should point out that it is not possible for the trombonist to consciously gauge and regulate the specific rate of airflow, pressure, and quantity for every pitch at every dynamic that is played. Because airflow is created by a complex set of muscle contractions within the human respiratory system, a detailed technical analysis of every note would be counterproductive. It would

create awkwardness and limit the natural flow required for effective musical phrasing. During performance, I prefer to think of air movement as a simple inhale/exhale process that creates resonant vibration within the embouchure. However, a basic understanding of these principles is helpful in developing the ability to convert air into pitched vibration.

With a basic knowledge of the role that airflow plays in tone production, specifically the production of various pitches at different dynamics, we can now more fully appreciate the act of breathing as the catalyst for this process. Because air expelled from the lungs generates the vibration within the embouchure, it is important to understand the relationship between the inhalation (breathing) and the exhalation (blowing). The inhalation must prepare the lungs to maintain the proper exhalation that will support the necessary airflow for a musical passage. Factors such as range, dynamics, length of phrase, and style ultimately contribute to the airflow requirements. The preparatory breath should always match the requirements of the music.

Teachers of beginning students and even upper level advanced trombone instructors often teach players to always take the biggest breath possible. Sometimes this is necessary but often it is simply counterproductive. Every bit of air that the trombonist inhales increases pressure within the lungs. If the player takes in as much air as possible on every breath, he must then do something with that air. This type of breath is appropriate if the music requires a very loud volume since a large quantity of air is necessary to produce extremely loud dynamics. If the music does not require all of the air inhaled through that large breath then the player must somehow manage the excess air that he has just inhaled. Conversely, if the player only inhales a very small amount of air

with each breath the tone will likely suffer and a broad dynamic spectrum will never be achieved. I always ask students to breath very freely with no restrictions in the mouth or throat, but I also insist that every breath be governed by the specific requirements of the music. In short, the nature of the inhalation is determined by the quality of exhalation as dictated by the music.

One of the main concerns in proper breathing is posture. The trombonist should always maintain a comfortable posture that allows the lungs to expand freely in order to inhale the necessary air to perform the music at hand. Regardless of whether the player is in a seated or standing position, the back should be slightly arched, the chest should be raised and the shoulders back. This provides the necessary space within the torso in order for the lungs to work uninhibited. Of course this should all be accomplished without introducing any tension in the neck, shoulders or arms. The attempt is not to produce a rigid posture but one of freedom and comfort that allows the player to utilize his entire natural breathing capacity.

Common Deficiencies Related to Breathing and Air Support

The trombonist cannot consciously manipulate the airflow for every note. However, many of the common deficiencies associated with this component are easily addressed once the player conceptualizes this fundamental understanding of airflow as it relates to pitch and dynamics in tone production. I have briefly discussed the first two common deficiencies associated with breathing and air support in my explanation of this important component. Under-breathing and over-breathing both have undesired affects on

tone production. As we will discover, many of these problems negatively impact other components of trombone performance technique.

Under-breathing often occurs in younger students, but I have also noticed this problem with college students who did not have sound training in their formative years of beginning band. This deficiency often manifests itself in a variety of technical problems. When the trombonist does not inhale the necessary quantity of air to support the embouchure's vibration, the tone and the pitch are likely to be unstable. Aside from the obvious negative effects of this type of instability, an unsteady tone also affects the player's ability to efficiently transition from one partial to the next, limiting the flexibility that is crucial to all brass instrumentalists. Nothing hinders the creation and shaping of musical phrases more severely than a lack of air supply. The musical phrase and the air supply are inseparable. One of the earliest lessons I teach my students is that they must take in the amount of air necessary for each musical phrase they are attempting to play. This approach provides a musical solution to an otherwise highly mechanical process.

Over-breathing, while not as common as under-breathing, is another cause of instability in the trombonist's tone and pitch. This deficiency often occurs in players who have been told for years to always breath as deeply as possible and have taken that advice to heart. The pressure an over-breathing player creates within the lungs leads to tension. Tension tends to travel throughout the body, so it is common for a player managing excess air to have a strained tone quality and a very physically awkward and jerky approach to slide movement. The difficulties created by over-breathing may be

compounded if the player attempts to perform passages involving soft dynamics and/or a high tessitura.

High breathing is similar to under-breathing but is caused by underutilization of the diaphragm in expanding the lungs. The largest capacity for air exists in the lower portion of the lungs. The high breathing player fails to expand this lower region of the lungs and operates using only a portion of his/her total lung capacity. It is easy to spot this particular deficiency since many affected players raise their shoulders when they breathe. It is important to remember that there are no air compartments in the shoulders. Lifting them is generally counterproductive. This does not mean that the shoulders should never move or that they should remain stiff. In the course of very deep breathing the shoulders might move slightly as a result of expanding the lung capacity but they should not lift. Any movement of the shoulders should be as a natural result of the expansion of the torso. Most of the time a player who lifts the shoulders to breathe is a player who does not understand the important concept of a low, deep and effective musical breath. I teach my students to always think pouring the air into their bodies. Just as liquid fills a glass from the bottom to the top, the air inhaled during a musical breath should do the same. While such images may not be completely correct, anatomically speaking, the analogy seems to work.

Restricted airflow is another common issue related to improper breathing and air support. Many players, perhaps due to tension, nerves, or other factors struggle to take a purely uninhibited breath. This flaw is often detectable by listening to the sound of the inhalation. The deep musical breath should sound the same as the breath you take when

you yawn. If the player is creating a high-pitched, airy or hissing sound during the inhalation then they are likely experiencing some restriction. The most common areas of restriction are in the mouth (around the tongue or teeth) and in the throat. Keeping the tongue flat in the mouth is vital to taking in a relaxed, musical breath. Forming the mouth into an "Oh" syllable usually provides the space required in the mouth and throat for an unrestricted breath.

The Valsalva maneuver is a technique named after Antonio Maria Valsalva, a 17th century anatomist from Bologna. The Valsalva maneuver occurs when air expelled from the lungs is blocked by either the tongue or the glottis (vocal folds). It most often occurs on the first note of a phrase. This problematic technique is often triggered by one of two misunderstandings. The first misunderstanding is with the function of the air. Many times this deficiency occurs when the trombonist intentionally holds the air after the inhalation. Holding of the air in the lungs builds up unnecessary pressure that must be controlled by the glottis. Once the glottis is engaged there is a lock between the internal intercostal muscles (those used for forceful expiration of air from the lungs) and the glottis. This produces a "freeze" sensation and a paralysis in the tone production process.

A misunderstanding of the function of the tongue causes the second type of Valsalva maneuver. The tongue should never be used to hold the air pending the release of a note. The tongue only characterizes the attack at the point of articulation. It never regulates airflow. Air should be inhaled into the lungs and released from the lungs as smoothly as possible without any noticeable pause in the air stream. The stoppage of air caused by the tongue also creates a paralysis in the tone production process. In fact, one

method of eliminating the Valsalva maneuver is to focus on the downward movement of the tongue when initiating the attack.

Another important factor in this equation is the issue of timing the air and tongue movement to begin a note. Since the Valsalva maneuver is almost always encountered at the outset of a musical phrase, it is important to mentally establish a pulse prior to initiating a tone or phrase. This provides for a specific time of release for the initial note of the phrase and assists in the coordination of the tongue and air in the tone production process. I have dealt with this deficiency in my own playing. The solutions mentioned above are the products of my own study as well as some valuable advice from M. Dee Stewart, professor of trombone at Indiana University.

2) Embouchure Control and Flexibility

Every note played on the trombone must be created by vibrating the lips at the frequency required for the desired pitch. This vibration is transmitted into the mouthpiece setting up a frequency of vibration within the air column inside instrument. Of course the length of the instrument has to be compatible with the pitch created at the embouchure. With that in mind, slide technique and accuracy should eventually be considered in tandem with embouchure control. For now, it is important to establish the fact that there are two simple principles that govern effective and efficient embouchure control. The first principle involves the muscles required to control the vibrating portion of the embouchure. I call these the control points. The second principle involves the vibrating

portion itself. Any reference to the vibrating portion of the embouchure is a reference to the portion of the lips within the mouthpiece actually creating the pitched vibration.

When discussing the first principle of control points, I often ask students to hold a pen or a pencil between their lips, not touching the teeth but sticking straight out at roughly the same angle that the air leaves the lips while playing the instrument. I ask them not to clench the lips but to use just enough muscle tension at the corners of their mouth to maintain the angle of the pen or pencil. I insist that they not draw the corners of the mouth up into a smile and that they not create any tension in the red part of the lips. All of the effort to maintain the angle of the pencil should be felt in the corners of the mouth. Usually within a minute or less of holding the pencil at the correct angle the student begins to identify the muscles that should be controlling the embouchure. I then encourage them to utilize those muscles to maintain the correct size and shape of the aperture.

In addressing the vibrating portion of the embouchure, I keep it very simple. This part of the embouchure should be free to vibrate and as supple as possible at all times. Maximum resonance in tone production occurs when the source of vibration (in this case the vibrating portion of the embouchure) is uninhibited. I don't want to imply that complete relaxation is necessary or even possible; nor do I wish to imply that the tension within the vibrating portion of the embouchure will be consistent. Loud dynamics and higher tessituras do require more effort to maintain the shape and size of the aperture. I simply wish to establish the premise that maximum resonance requires maximum vibration regardless of the volume or range.

Common Deficiencies Related to Embouchure Control and Flexibility

Mouthpiece placement is the most common embouchure deficiency that I have observed in trombone students. This is such a personal issue that it is difficult (and actually very unhelpful) to make blanket statements dictating exactly how much top lip and bottom lip should be used within the mouthpiece. Many factors come to mind when determining just exactly where the mouthpiece should be placed on the players lips. Lip size and shape, overbite, under bite and tooth formation are all factors that must be considered when establishing each individual's anchor points for mouthpiece placement.

Many players encounter endurance or range problems throughout their playing careers because they failed to discover the correct mouthpiece placement in the earliest stages of their development. To establish proper mouthpiece placement, I try to do as much work as possible away from the instrument. Many times the trombone can be a hindrance in this process. Particularly for younger players, the weight and overall bulkiness of the trombone can influence the placement and angle of the mouthpiece on the lips. I like to have students experiment with just the mouthpiece at first to search for a mouthpiece position that is comfortable and natural. It is extremely important to find a mouthpiece placement that:

1) Feels comfortable

2) Distributes pressure evenly

3) Allows for maximum vibration

4) Does not bias the player's embouchure toward the high or low register.

The first three objectives in mouthpiece placement are fairly self-explanatory, but the fourth may require some explanation. I find that it is important to establish a neutral position for the mouthpiece that allows the player to make only slight shifts and changes of the angle of the mouthpiece to accommodate extremes in range. For example, if a player's normal setup involves a tucked chin and an airflow that is straight into the mouthpiece (a typical position for extreme low range playing), that player will not have the flexibility needed to transition into a low range set. In essence he/she is already there. This type of bias towards a low range set will invariably cause the player to make a drastic shift to play in the middle and upper ranges. Conversely, if a player's normal setup involves a sharp downward angle of the mouthpiece and the air stream is blown down across the lower lip (a typical position for extreme high range playing), that player will not have the flexibility needed to transition into a high range set. As with the low range bias, the high range bias creates the necessity of a drastic shift in the opposite direction. All of this points us to the necessity for a very neutral embouchure position that will require only small shifts in one direction or the other to facilitate high and low ranges.

The second deficiency, often related to the first, is the issue of excessive mouthpiece pressure. As one who has struggled with issues related to this deficiency, I can confirm from first hand experience the need for a limited amount of mouthpiece pressure. A certain amount of pressure on the lips is necessary to seal the connection between the mouthpiece and the embouchure. The amount of pressure varies depending on the range and volume. Because higher tessituras create greater air pressure within the

mouth, the amount of mouthpiece pressure must increase accordingly. Problems arise when the amount of mouthpiece pressure exceeds the amount necessary to maintain the seal at the embouchure. Excessive pressure only serves to hinder the vibrating portion of the embouchure. Additional pressure causes:

1) Difficulties in tone production

2) A strained or pinched sound

3) Flexibility problems

4) Endurance limitations

5) Constraints on range development.

As with the search for optimal mouthpiece placement, experimentation with mouthpiece pressure should begin away from the trombone. Mouthpiece buzzing is a crucial step to establish the correct amount of mouthpiece pressure for varying ranges and volumes.

The habit of allowing air to build up within the cheeks or lips is another common problem encountered by most trombonists at some point. With very few exceptions this tendency is nearly always detrimental to tone production. The bebop trumpet player, John Birks Gillespie is the most notable. Puffing the cheeks hinders a player's ability to maintain control of the vibrating portion of the embouchure. I encourage students from the very beginning to think of anchoring the corners of the mouth downward. I also ask that the student always feel his/her teeth touching the inside of the cheeks; the theory being that if the cheeks are in contact with the teeth, then there is no room for air. Both of these conditions should be satisfied without introducing unnecessary tension into the

embouchure. Practicing this technique in conjunction with the pencil exercise is usually helpful.

Rolling the lips in over the teeth can become a hindrance. When students form an embouchure they commonly roll their lower lip over the bottom teeth. This is normal and generally causes no real difficulties. The problem occurs when this becomes extreme. When attempting to play in the upper register, many trombonists tend to roll their lips farther and farther back over the teeth in an attempt to produce the higher pitches. The lower lip is usually the most affected by this deficiency but the upper lip is often involved as well.

There are a couple of issues created by this lip rolling deficiency. First, severely rolling the lips inward eliminates an important part of the vibrating portion of the embouchure therefore limiting the amount of lip tissue available for vibration. As a general rule, the more lip tissue a player involves in the embouchure vibration, the better the sound. I try to encourage players to get as much lip into the mouthpiece as possible. For some players, this involves a puckering of the lips slightly outward.

The second problem created by rolling the lips in is that it requires an unnecessary shift to get into and out of this embouchure position. Because inward lip rolling is only used to produce higher pitches, it becomes necessary to shift into this position and then back to a neutral embouchure to play in the middle and low registers. This creates yet another aspect of variability to manage and coordinate. The goals of my teaching method have become increasingly focused on developing the simplest possible approach to create consistent vibration in the embouchure and therefore resonance within the instrument.

The fewer motions and shifts the player must manage, the better. Extreme inward rolling of the lips for higher pitches is unnecessary and any short-term gains in range are offset by other problems.

As I previously acknowledged, a minimal amount of this lip rolling is not problematic. In fact, playing in the extreme high register (E5 and higher) may even require a very extreme inward rolling of the lips. This being said, very few trombonists have any need to play in this range and the standard trombone repertoire certainly does not require it.

Finally, many players experience this lip rolling effect as an unintended byproduct of an effort to change the angle of the air stream through the aperture. While I recognize the benefits of using variable angles of airflow in different ranges, I do not promote this technique at the expense of the integrity of the embouchure. The trombonist should always use embouchure shifts sparingly and never in a drastic or abrupt manner.

The last embouchure deficiency discussed in this work is the smile. Many players, as they attempt to expand the upper portion of their range, develop a smiling embouchure, by drawing the corners of the lips up and back. This stretches the vibrating portion of the embouchure and while it often aids in playing higher pitches, it produces other problems. When the vibrating portion of the embouchure is stretched it becomes thinner. This creates unnecessary tension in the vibrating material and it also minimizes the amount of lip in the vibration. Both of these conditions limit the vibration and thus the resonance within the mouthpiece.

The recurring themes in these embouchure deficiencies inevitably reveal that the vibrating portion is in some way hindered, causing harm to the tone; or the control points are limited, causing unsteadiness in pitch and flexibility. Extremes in pitch and dynamic ranges often exacerbate these deficiencies. For this reason, I encourage players to work within their most comfortable pitch and dynamic ranges to produce the best sound possible. From that comfortable point, ranges should be expanded very gradually, never sacrificing the beauty of the sound, the quality of the tone production, or the ease of the flexibility.

3) Slide Precision and Timing

There are three concerns regarding proper slide precision and timing. The first concern in quality slide technique is maintaining a correct slide grip. The second is identifying the proper hinges in the slide arm. The third is the issue of timing the slide movements based on the requirements of the style of music to be performed. There are many approaches to this fundamental technique. I maintain that simplicity is the key to success in perfecting this component as well as the other components of trombone performance technique.

In teaching the correct slide arm motion, I begin by asking the player to extend the slide arm out directly in front of the body slightly lower than parallel to the floor. From there I have them bend the arm at the elbow bringing the palm and fingers of the slide hand to about four or five inches in front of the face. This establishes the elbow as the primary hinge in the slide arm. I then ask that without flipping the wrist they fan their

face with the slide hand simulating a basic slide movement. In doing so the player begins feel the correct manner of moving the slide arm with most of the movement occurring at the elbow with only slight movements in the shoulder and wrist.

At this point the trombone is added to the equation. I insist that the student grip the hand slide firmly between the index and middle fingers and the thumb maintaining the palm's original position in relation to the face. The thumb and fingers should always be in contact with the slide bar. The grip pressure should be only firm enough to control the slide placement without introducing any tension that may spread to other parts of the arm or shoulder. As the player acquires a feel for the placement of the slide into each of the seven primary positions, the slide arm should function with minimal points of variability and the fingers should maintain constant control of the slide placement. This allows for a speedy development of the necessary muscle memory for accurate slide placement.

The final issue involved in fundamentally sound slide technique is the principle of timing the movement of the slide from one position to the next. There is a very specific point in time for the slide to transition from one note to the next. This point is determined by the amount of space (time) between notes, which in turn is determined by the length of those notes being played. In legato phrases, the space between notes is virtually nonexistent; therefore the slide must move at the last possible instant taking the absolute shortest amount of time to move from one position to the next. In separated playing (marcato, staccato, etc.) there is naturally more space between notes. This allows for more time to move the slide from one position into the new position prior to initiating the

next pitch. The simplest explanation that I can give for this principle is that there are basically two approaches to slide movements. In legato playing the slide must move as late as possible and in more separated playing the slide must move as early as possible. In both approaches the slide movements should be as quick as possible without becoming jerky or abrupt.

One other thought regarding the slide technique component involves a technique often referred to as "gliding the slide." Most of the music that the trombonist plays requires the slide to stop in each position in order to produce the pitch. Occasionally when the notes move at a very rapid tempo, it is impractical or even impossible to stop the slide for each pitch. In these passages, the player actually allows the slide to move in a constant motion "gliding" the slide through a series of positions. The "Storm Scene" from Rossini's *William Tell Overture* is one example. In this very fast, predominately chromatic passage, there simply is not enough time to place the slide into every position, stopping the motion for each note and restarting for the next. Therefore, the trombonist must learn to coordinate the articulation with a constantly moving slide and attack each pitch in time as the slide reaches the correct position. This requires extensive practice to gauge the correct slide speed. Given the fact that no two positions are the same distance one from another, the slide movement, while constant, is not consistent in terms of speed, and must be regulated so that each note finds the proper position and sounds in tune.

Common Deficiencies Related to Slide Precision and Timing

An incorrect or inconsistent grip on the slide is responsible for many players' struggles with slide technique. The trombonist must maintain a firm, but not clenched, grasp of the hand slide. I often encounter students who have not mastered this technique. Many utilize a type of "throw and catch" method in which the slide is literally tossed from one position by the thumb and caught in the next position by the fingers or vice versa. This is a very faulty technique that causes a number of issues with regard to pitch accuracy as well as articulation and slide timing. There is a temporary disconnect between the slide arm and the slide when the trombonist allows the slide to essentially leave his/her hand in route to the next position. In order to stop the slide in the correct position, the player must re-gather the slide into the slide grip. This adds a step to the slide movement process making it more difficult to achieve perfect accuracy and timing.

Supporting the weight of the trombone with the slide hand is another prevalent deficiency relating to the slide grip. This is a very common habit among younger players, who often struggle with the weight and bulkiness of the instrument. Upon encountering difficulty supporting the instrument with the left hand alone, these players resort to balancing the trombone between the slide hand and the left shoulder. This flawed technique leads to instability of the instrument and this causes inconsistencies in mouthpiece placement, angle, and pressure. The only fundamentally sound method of maneuvering the slide is to support the instrument with the left hand and allow the right hand to operate completely unhindered by the weight of the trombone. This method

isolates the movement of the slide from rest of the trombone preventing any unnecessary disruptions of the embouchure.

A loose or floppy wrist movement plagues a great number of players. As previously mentioned, the primary hinge in the slide arm should be the elbow with only minimal movement from either the shoulder or wrist. Players using an excessive amount of wrist movement not only introduce an unnecessary point of variability, thereby sacrificing accuracy, but also create a sort of perpetual slide motion, complicating the precise timing of articulations. This is often manifested in what I call "hooking" the slide positions. A loose wrist inevitably allows the slide to move past the correct position. It must then be pulled back into place by the thumb or fingers depending upon the direction of the slide movement. This sloppy hooking movement is often accompanied by a "bounce" when the slide finally does come to rest. While the difficulties created by this deficiency may seem minor, it is important to remember that note transitions occur within a fraction of a second. Any faulty or mistimed movement of the slide can create the necessary discrepancy to cause an unclean attack or even worse, a missed partial.

Many players, myself included, have a tendency to overcompensate for faulty technique. If the player's slide movements are too slow or the slide wrist is too loose, efforts to fix these problems sometimes lead to a stiff or jerky slide movements. Jerky slide action is almost always the result of overcompensation by a conscientious player who is very diligent in his/her pursuit of absolute slide precision and accuracy. Many times, this type of player has been informed that his/her slide technique is too slow or

lethargic. A very stiff and jerky slide action is often the result of a reactionary attempt to correct this flaw.

Actually, the energy used to initiate the slide movement must be matched by the same amount of energy in order to stop the slide in the correct position. Newton's first law of motion (inertia) reminds us that an object will remain at rest or in motion unless acted upon by an outside force. This principle applies directly to the transition of the slide from one position to the next. Because the energy used to mobilize the slide must be matched by that used to stop the moving slide, failure to balance the energy may cause a cycle of harsh stops and starts in the slide movement if the player is not aware of this principle.

There are two typical results of jerky slide motions. The first is that abruptly stopping the slide can create a "bounce" in the slide action similar to that created by the "hooking" motion associated with the floppy wrist deficiency. The results of this bounce have the same effects on pitch and articulation as the bounce caused by the hooking action.

The second result of the jerky slide motion is that it can have a jarring effect on the player's embouchure. When the trombonist uses excessive energy to start and stop the slide, then that additional energy is absorbed by the instrument and transferred directly into the lips. This may cause any number of potentially harmful effects to the embouchure. At the very least it upsets the source of vibration, and in the worst-case scenario, it could possibly injure the lips. The slide must move quickly between positions,

but never at the expense of influencing the accuracy of the slide placement or disrupting the vibration in the lips.

The final deficiency relating to slide technique discussed in this paper is poor slide timing. Many players have the tendency to move the slide too early in legato. Trombonists must recognize that the timing of the slide movement is based on the space (time) between notes, and the note lengths determine that space. Given this understanding, it seems obvious that the way to perform slurred note transitions in a legato style is to lengthen the duration of each pitch as long as possible producing a smooth connection between tones. Conversely, the space created by a separated playing style provides ample time between pitches to move the slide into the next position prior to attacking the next note. Many players tend not to take full advantage of this additional time. Many times faulty attacks are the result of a slide that is still in transition at the time of articulation. A clean attack is more easily achieved if the slide is stopped and in the correct position at the time of the articulation. In summation, the correct timing of every move of the trombone slide should be governed by the space (time) available between notes.

4) Articulation

The final component in trombone performance technique is articulation. I place this component last deliberately. All of the other fundamental components must be in place before even considering the function of the tongue and the articulation process. The tongue frequently serves as a disguise for many flaws in the areas of airflow, embouchure

control and slide precision. It is essential to recognize that the process of articulation, particularly the tongue's function in that process, plays absolutely no role in tone production or regulating pitch. In fact, the tongue has the potential to do as much harm as good in creating an articulation.

Articulation, simply defined, is the manner in which notes begin. The term "attack" is frequently used to identify the beginnings of individual notes. This is not the best term because it implies an aggressive approach to starting each pitch. Nonetheless, it is the term often used and I will use it here as well. Musical tones on the trombone begin when air moves through the aperture in the lips, creating a pitched vibration. The articulation is the manner in which the airflow impacts the vibrating portion of the lips, initiating the tone.

In its purest and simplest form, an articulation is not dependent upon any assistance from the tongue. For obvious reasons, many people assume that articulation is solely a function of the tongue. In reality, the tongue may or may not be involved in the articulation process. It is my experience that the airflow and embouchure control are the two essential elements in clean, clear attacks. If the player supplies the correct rate of airflow combined with the correct size and shape of the aperture, he/she will produce the correct pitch at the desired volume. If articulation were dependent upon the tongue, then air attacks would be impossible. In fact, the best way to fully understand the roles of airflow and embouchure control in articulation is to practice beginning notes in all ranges and at varying dynamics without using any tongue attack at all. Many times players initiate tones with an airflow and aperture that is slightly off for the given pitch and

volume. This produces a faulty articulation often manifested as a scoop into the pitch, an unclean attack or even a split partial. When diagnosing articulation flaws or difficulties, it is crucial that the trombonist understand how these two components function together to produce a basic articulation with no tongue.

Given that quality articulations depend on correct airflow and embouchure control more than tongue action, just what purpose does the tongue serve? In the articulation process, the tongue works in many ways like a valve. That is not to say that this valve regulates the rate of the airflow. Instead, it functions in an all or nothing capacity as it creates interuptions in the airflow. The tongue performs two basic responsibilities here. Those responsibilities are: 1) creating space between fast notes and 2) creating various degrees of intensity in attacks.

First, the tongue creates small interruptions in the airflow, which is otherwise constant. The tongue's neutral position is lying flat in the lower jaw with no tension. By rising to strike the roof of the mouth (usually just behind the upper teeth) the tongue, like a valve, briefly interrupts the flow of air through the embouchure. This brief stoppage of the airflow provides the desired space between fast notes. When the tongue drops downward into its neutral position, the airflow returns to the embouchure restarting the momentarily paused vibration in the aperture. The amount of note separation required by the musical style dictates the amount of interruption created by the tongue. In legato playing, where the space between the notes is minimal, the tongue must be used very delicately so that the interruptions in the airflow are nearly imperceptible. On the other

end of the articulation spectrum, marcato or staccato playing styles require larger interruptions of the airflow in order to produce greater separation between pitches.

The second responsibility of the tongue is to control the intensity of the various types of articulations by creating the necessary initial burst of air speed required for the desired attack. The pressure created when the tongue rises in preparation for an articulation creates this initial burst of air. As the player builds greater pressure behind the raised tongue, the speed of the initial burst of air increases, creating a more intense attack. The trombonist must develop a feel for the required pressure to produce different types of articulations, including accents of various intensities.

With all of this mention of interruption of the air, I must reiterate that the airflow generated from the lungs should not alter or fluctuate in synchronization with the tongue movements. This means that in common time, the airflow required to produce a whole note is the same as the singular airflow required to produce two half notes or four quarter notes or even eight eighth notes. For general playing, it is imperative that the trombonist develops a mental concept and a practical application of airflow that is consistent from the initiation of the tone or phrase to the release.

The one exception to this rule is accents. Accents are produced by an increase in the initial velocity of the airflow. Increased velocity is produced by greater air pressure. Therefore, heavy accents may require some increase in airflow coordinated with tongue movement.

Trombonists should routinely practice producing a variety of articulations, including accents. Many players fall back on two or three basic articulations. This

tendency is like an artist who only uses a few colors. Musical interpretation and expression depends on a full spectrum of dynamics, pitches, articulations, and accents.

Common Deficiencies Related to Articulation

By far the most common articulation deficiency that I have observed in my students is the tendency to pulse the air on each note of a musical phrase. The negative effects of this deficiency are most easily observed in legato playing. The pulsing air causes a swell on every note. This tendency must be eliminated if the player is to develop the beautiful, singing legato style that the trombone is capable of producing. The key to this legato style is the airflow. My first step in developing an approach to air that has no bumps or pulses is the use of the glissando technique. Musical phrases are initiated by blowing the air and tonguing simultaneously. Players often mistakenly repeat that process on each note causing a pulsing of the air throughout the phrase. I approach legato phrases by first playing that phrase with no tongued articulation on any note. I focus on connecting the embouchure with the slide movements as I blow an unyielding air supply through each note and through the glissando created between the notes. I think of this as "blowing between the notes." This produces the correct feeling of an airflow that doesn't stop or pulse between notes.

Another deficiency that causes problems in the articulation process is the issue of tongue placement. Most teachers encourage players to only allow the tongue to strike the roof of the mouth just behind the teeth. While this is generally helpful advice and a good starting point, it should not be considered the only proper tongue placement. When

playing in the upper range the air column is often directed downward across the bottom lip. In this case the tongue is more effective and less obstructive if the point of contact is farther back on the roof of the mouth away from the teeth. In the lower register, when the air column typically maintains a more direct angle into the mouthpiece, the tongue will necessarily strike more forward and often directly between the teeth. Of course the shape and size of the player's lips, teeth and tongue also impacts the optimal tongue placement in various registers. In addressing this deficiency, it is not necessary to determine a hard and fast rule regarding where the tongue should strike the roof of the mouth. The most important concept to establish in tongue placement is that the tongue should contact the roof of the mouth in a manner that accomplishes the two goals mentioned above (note space and articulation intensity) and then return to it's neutral position, all the while creating no unnecessary disruptions in the airflow.

The issue of timing the movement of the tongue is often the source of flaws in articulation technique. The primary concern in timing the tongue movement is to recognize that the actual articulation occurs when the tongue drops into its neutral position allowing air to impact the embouchure. There are two tongue stages (movements) involved in every tongued articulation. The first move is an upward motion to the roof of the mouth creating the desired space between notes and the adequate air pressure required for varying attack intensities. The second move is a downward motion in which the tongue returns to the neutral (flat) position.

Many times trombonists and other brass players play more by feel than by hearing when it comes to articulation. They allow the sensation felt when the tongue touches the

roof of the mouth to be established as the point of articulation. It is important that all brass players listen to the sound that is coming from the instrument. They should always hear the articulations and not just feel them. What we feel in terms of the tongues contact with the roof of the mouth occurs slightly prior to the actual sounding of the pitch. The trombonist should train the tongued part of the articulation process to occur quickly and in sync with the movement of the slide and the buzz of the embouchure. No matter the style, dynamic or accent required by the music, the two stages of the tonguing motion must occur the instant before the note is to speak.

Issues in timing the tongue movement are often very noticeable in legato playing. Invariably the tongue moves too late in the articulation process. Because legato style demands a transition from note to note that is as seamless as possible, the timing of the tongue strike is crucial and the window of opportunity for articulation is minute. Remember, the goal of legato tonguing is to create the smallest possible space between notes. When the trombonist moves the slide very quickly from one position to the next (as he should in legato) the tendency for the tongue movement to occur after the slide's movement is magnified. If the player articulates the note after the slide has arrived in the new position, then a slight glissando is heard between pitches. The solution to this deficiency is to initiate the tongue movement while the slide is en route to the new position. A simple generalization of the legato articulation process is that the slide should move as late as possible and the tongue should move as soon as the slide begins its transition.

The final articulation deficiency that I would like to discuss involves the actual speed or quickness of the tongue movements. If the trombonist is not quick to move the tongue through both phases of the tonguing process, the interruptions in the airflow are not clean and the beginnings and ends of notes are likely to be unclear and inconsistent. In both legato and marcato styles of playing, it is essential that the tongue strokes be well timed and also very quick.

Discussion of Survey Results

Overview

The survey component of this dissertation project has two intended purposes. The first is to test the fundamental assertions that I have established as central to my performing techniques and teaching methods. These assertions also form the basis of this dissertation. The second purpose is to determine the degree to which the deficiencies that I have identified among trombonists are widespread and commonplace.

The participants in this survey are all musicians who have experience regarding trombone performance technique. Some are primarily performers, some are college trombone professors, and some are beginning band directors. They have all demonstrated a level of understanding and experience that will contribute to the purposes of the survey. The participants are listed in Appendix H.

The survey is constructed parallel to the discussion of the four technical components and common deficiencies. For each component there are two pages. The first page contains a series of statements in which the participants are asked to indicate their level of agreement or disagreement. They are presented with the following choices in the online survey:

1) Strongly Agree

2) Agree

3) Disagree

4) Strongly Disagree

5) No Opinion.

There are also text boxes beneath each statement that allow the participants to expand upon their answers. The second page contains statements regarding common deficiencies that I have observed in trombonists ranging from beginners to professionals. The participants are asked to indicate how frequently they note these deficiencies. In this case their choices are:

1) Extremely Common

2) Common

3) Uncommon

4) Extremely Uncommon

5) Never Encountered

Again there are text boxes for additional comments. An actual copy of the survey may be viewed in Appendix E. Graphs depicting the complete results of the survey are contained in Appendix F. In addition to the quantitative results of the survey, many of the participants included interesting quotes and clarifications in the optional text boxes. Appendix G contains all of the participants' quotes for each survey statement and the comments included in the *Common Deficiencies* sections.

Quantitative Results - Survey Statements

Because response choices to each statement were basically limited to two affirmative responses and two non-affirmative responses with a fifth response allowing for a neutral response, the participants were prompted to provide decisive reactions to each statement. I believe this format led to survey results that were clear enough to draw accurate conclusions. In analyzing the reactions to the survey statements, I have combined the percentage values of the *Agree* and *Strongly Agree* responses. This allowed me to calculate the percentage of affirmative responses to each statement. These statements have been organized, by category into tables below along with the calculated percentage of affirmation.

It is apparent from the high percentage of affirmative responses that these statements are for the most part generally accepted. Most statements met with levels of affirmation ranging between ninety and one hundred percent. There were others that received affirmation levels from eighty to ninety percent, also a strong showing of support. There were a few statements that received less than eighty percent agreement and I believe they deserve some discussion. Following each section of survey statements, I will address and clarify some of the issues raised in the survey analysis.

Breathing and Air Support Statements

1. Airflow, and by extension breathing, is the most important concern in proper tone-production on the trombone.	91.7% Affirmative
2. The air may be considered the fuel that creates vibration in the embouchure.	100% Affirmative
3. With the exception of extreme articulations and accents, or drastic leaps in range, airflow should remain constant.	91.7% Affirmative
4. Due to variations in the size of the aperture of the lips, the speed of the airflow should be faster in the upper range than in the lower range.	75% Affirmative

Statement number four in the *Breathing and Air Support* category caused some disagreement. It elicited a wide variety of comments from the participants. Apparently, despite the decades of instruction and writing on the subject of airflow as it relates to pitch and dynamics in brass playing, there is still a wide range of ideas and methods of instruction relating to this topic. I think this is partly due to the discrepancies between concept based instruction and literal instruction. Teachers, myself included, often advocate pedagogical concepts that lead to great results, but are not actually rooted in fact. For example, I might instruct a student to imagine blowing through the trombone and across the room to a point on the wall. This encourages projection of sound and focus of the air column. It is a great visual concept, but it is not at all based in fact. We blow in order to create vibration in the lips, causing the air column within the instrument to vibrate. We are not actually moving enough air through the instrument to blow across the

room. Some of the comments in the survey, particularly those who expressed disagreement, seemed to lean more toward the conceptual than the literal. I am not discrediting the conceptual approach to instruction and performance. As I mentioned, I also use this method. However, I am approaching this project and this survey from a very literal perspective. This difference of approach could account for the apparent lack of consensus.

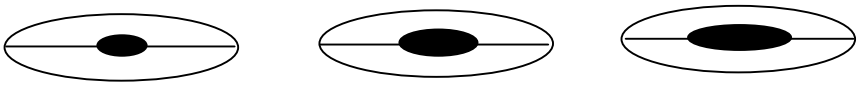
Another possible reason for the comparatively low level of affirmation for this statement is the fact that I think of musical airflow as being two-dimensional, where as many trombonists do not. Understanding this idea requires a working knowledge of how the trombonist's embouchure produces a pitched vibration, or buzz. Air is blown through the lips creating vibration within the aperture. This vibration is created when the air pressure behind the lips becomes strong enough to push the lips open. This reduces the pressure in the mouth and the elasticity of the embouchure pulls the lips back to a closed position. This constitutes one oscillation or cycle of vibration in the embouchure and it creates a small puff of air. The speed of the vibration cycles varies depending on the pitch. Just as the shorter (higher) strings on a piano vibrate faster than the longer (lower) strings, embouchure vibrations cycles also follow these same tendencies. The higher the pitch, the narrower the aperture, the more rapidly the vibration cycles occur. The lower the pitch, the wider the aperture, the slower the vibration cycles occur. Ultimately the faster vibration cycles produce more puffs of air per second, creating faster moving air exiting the lips. Joe Wolfe of the physics department at the University of New South

Wales, in Sydney, Australia has produced a very interesting website that describes the acoustics of the "lip reed" (Wolfe n.d.).

I contend that faster air and higher pressure is created in the upper register by the diminished width of the aperture, and not by the lungs. The lungs may alter the quantity of the air moving through the embouchure, but the speed of the air entering the trombone is more dramatically affected by the width of the aperture. This makes sense when we consider that given a constant dynamic, the amount of air required to play in the upper range is significantly less than what is required to play in the low range, even though the air moves faster due to the smaller aperture. One of the participants, Dr. Jemmie Robertson, agrees. He commented, "…I believe the air-flow rate remains nearly the same or in fact diminishes as we ascend. I believe that is why we can generally sustain a middle C longer than a low register trigger C…" I have included some illustrations below to clarify these concepts. Figure thirty-one demonstrates the widening of the aperture for lower pitches. Figure thirty-two demonstrates a consistent pitch (aperture width) that increases in volume (aperture height).

Figure 31

Changing Pitch Embouchure with Constant Volume (High, Medium, Low)

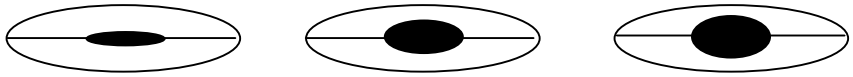


High Pitch = Narrow Embouchure (Rapid Puffs) = Fast Air Speed & Low Air Volume

Low Pitch = Wide Embouchure (Slow Puffs) = Slow Air Speed & High Air Volume

Figure 32

Changing Volume Embouchure with Constant Pitch (Piano, Mezzo-piano, Forte)



Soft Dynamic = Low Air Volume = Less Intense Buzz (Small Air Puffs)

Loud Dynamic = High Air Volume = More Intense Buzz (Big Air Puffs)

The term *flow-rate* is often problematic. Many trombonists use this term to describe both the amount and speed of the air. I prefer to think of the speed and quantity of the air as two separate but related factors. These related factors impact different aspects of the musical tone. The quantity of air is responsible for the intensity of the buzz and therefore the volume, i.e. piano, mezzo-piano, forte etc. The speed of the air is a result of the frequency of oscillation in the embouchure, which is directly affected by the width of the aperture in the lips. This faster buzz is actually what produces the faster air stream.

Embouchure Control and Flexibility Statements

1. Every note played on the trombone must be created by buzzing the lips at the desired pitch frequency.	83.3% Affirmative
2. The portion of the embouchure that vibrates within the mouthpiece should remain as relaxed and supple as possible.	91.7% Affirmative
3. The vibrating portion of the lips increases (widens) for lower pitches and decreases (narrows) for higher pitches.	83.3% Affirmative
4. The muscles at the corners of the mouth provide the necessary control of the vibrating portion of the embouchure and should remain firm but not clenched.	100% Affirmative
5. The corners should be anchored downward, never drawn up as this creates a thinning of the lip material in the vibrating portion of the embouchure.	100% Affirmative

The statements contained in the *Embouchure Control and Flexibility* section received a very high level of affirmation from the survey participants. The apparent consensus for these principles shows no real need for further explanation.

Slide Precision and Timing Statements

1. The movement of the slide from one position to the next, should be quick but never abrupt or jerky.	100% Affirmative
2. Wrist, hand and finger movement should be minimized so that the primary hinge in the slide arm is at the elbow, thus creating fewer points of variability in slide placement.	75% Affirmative
3. The timing of the slide movement between notes is different in legato playing than in more separated or articulated playing due to the difference in the amount of space (time) between notes.	66.7% Affirmative

There were two points of contention in the *Slide Precision and Timing* section of the survey. This second statement in the table above encourages limiting the wrist, finger, and hand movement of the slide arm. Some of the participants disagree with this statement while others agreed in principle with some reservations. Dr. Seidel and Andrew Hicks stated that they use the fingers and wrist for small pitch adjustments or fine-tuning positions. Dr. Josh Bynum pointed out that for him the key word of this statement is "minimize". His comment was, "Minimized...but not completely eliminated. Otherwise, students tend to be overly rigid with the slide which results in very poor legato technique." The fear of becoming "overly rigid" seems to be the biggest concern with this statement. I appreciate the desire for smooth slide transitions, however the point remains that unnecessary movement in the wrist, hand, and fingers contributes to sloppy and inconsistent slide placement. I do not prescribe stiff or jerky slide movements, but I think

smooth transitions can be achieved while maintaining the kind of control that is necessary for accuracy of pitch and articulation.

The final statement that received significant disagreement and therefore warrants some discussion is number three in the *Slide Precision and Timing* section. It concerns the timing of the slide movement between notes in different styles. This statement only received 66.7% affirmative responses, the lowest of all. This concept is based on the need for coordination of slide movement and articulation. In legato playing there is very little space (time) between notes, therefore the slide movement must occur at the last possible instant before the note speaks. In separated playing styles, the articulation creates a larger space between notes, thus allowing more time for the slide to transition from one note to the next. Creating the cleanest attack possible on each note is more easily accomplished if the slide is in place prior to the release of the articulation. This is why I generally encourage players to move the slide as late as possible in legato styles and as early as possible in separated styles. The simple rule of thumb is that the style of articulation determines the space between the notes. That space is the window of opportunity in which the slide must transition.

Several participants seemed to take the simpler, conceptual position that slide movements should just be coordinated with the tongue. Dr. Bynum said, “Always to the rhythm....regardless of style” and Dr. Robertson’s stance was, “In both cases I believe slide motion should be rhythmic.” Again, I do not disagree with this simplified approach, but an understanding of how various articulations change the timing requirements of slide movements is an important concept to grasp.

Articulation Statements

1. Defined simply, an articulation is the manner in which a note begins.	100% Affirmative
2. Air, not the tongue, creates vibration and thus a musical tone.	100% Affirmative
3. The tongue's function in articulation is to help characterize the manner in which the air impacts the vibrating portion of the embouchure.	100% Affirmative
4. Articulations occur when the tongue drops, allowing the air to impact the lips.	83.4% Affirmative
5. With the exception of extreme secco articulations the tongue creates articulations by briefly interrupting an otherwise constant airflow.	100% Affirmative
6. Generally speaking, notes should never be stopped by the tongue.	100% Affirmative

The statements contained in the *Articulation* section received a very high level of affirmation from the survey participants. The apparent consensus for these principles shows no real need for further explanation.

Quantitative Results - Common Deficiencies

In my analysis of the *Common Deficiencies* portion of the survey, I have combined the percentages of the *Common* and *Extremely Common* responses to determine the level of commonality for these deficiencies. They are organized by category, are listed below along with the calculated level of commonality. It is important to note that the figures beneath each deficiency are not an estimation of the percentage of trombonists who struggle with that deficiency. These numbers represent the degree to which the participants view these deficiencies as common problems.

Breathing and Air Support Deficiencies

1. Under-breathing	100% Commonality
2. Over-breathing	25% Commonality
3. High-breathing (Shallow-breathing)	91.7% Commonality
4. Restricting Air Flow (Tight Throat)	91.7% Commonality
5. Holding Air (Valsalva Maneuver)	72.7% Commonality

There are two deficiencies in the *Breathing and Air Support* section that were viewed as uncommon by many of the participants. These deficiencies are *Over-breathing* and the *Valsalva Maneuver*. I am not surprised that over-breathing was not considered common by some of the participants. I noted in chapter three of this project that this deficiency was not as common as under-breathing. Because it is often the natural result of over-compensating for the under-breathing deficiency, I think it is important to mention.

Peter Ellefson agrees. In his comment, obviously based on college level teaching experience, he said, “Regarding exhalation, it is very common for students to use too much air. As young students they have been encouraged to ‘use more air, use more air.’ As the body matures and strengthens, the ‘use more air’ paradigm actually produces a situation where air is too powerful and too abundant.”

The Valsalva Maneuver is probably more common than many trombonists realize. It can be difficult to diagnose for those who are not familiar with this problem. Dr. Seidel notes the following, “While I have not encountered the Valsalva Maneuver frequently, I think it normally is a common problem.” The best way to solve the problem called the Valsalva Maneuver is to prevent it from occurring in the first place. Trombonists should strive for a simple approach to blowing the trombone without stopping the air between the inhalation and exhalation. If the player never allows himself/herself to stop the air after the inhalation, the chances of developing the Valsalva Maneuver are very unlikely.

Embouchure Control and Flexibility Deficiencies

1. Improper Mouthpiece Placement	83.3% Commonality
2. Rolling Lips In (Over Teeth)	50% Commonality
3. Rolling Lips Out (Into Mouthpiece)	50% Commonality
4. Smiling (Embouchure Corners Pulled Up)	91.7% Commonality
5. Puffing Cheeks or Lips	91.7% Commonality

Regarding the *Embouchure Control and Flexibility Deficiencies*, there were two related deficiencies that both shared low ratings of commonality. Lip rolling, both in and out, received a fifty percent rating. Inward lip rolling, of both lips or often just the bottom lip, is almost always an attempt to play in the upper register without having developed the embouchure muscles needed to create the small aperture necessary for the higher pitches. This is a very flawed method of reaching those pitches. Peter Ellefson addressed this tendency in the following comment, "I frequently see students rolling their upper lip over the lower lip. This condition, while a short term solution for upper register, creates a circumstance where one set of muscles has to work much harder thus creating fatigue and limited endurance."

Outward lip rolling is something that I have noticed in beginning students. If the player's first tendency in forming an embouchure is to roll his/her lips out and into the mouthpiece, this is not altogether a bad thing. From this position, the student only has to use the muscles at the corners of the mouth to pull the lips back slightly and produce a proper embouchure.

Slide Precision and Timing Deficiencies

1. Inconsistent Slide Grip	100% Commonality
2. Loose Wrist Action (Floppy Wrist)	66.7% Commonality
3. Poor Slide Timing (Moving Slide Too Early or Late)	100% Commonality
4. Jerky Slide Action	100% Commonality

The only *Slide Precision and Timing* deficiency that was not considered very common was the *Loose* or *Floppy Wrist* deficiency. This was not surprising considering the fact that some players don't see this as a significant problem and others even teach that the slide arm should utilize as much wrist action as possible. I still contend that the most effective way to transition from one slide position to the next with maximum control is by hinging primarily at the elbow with only minimal movement of the wrist, hand, and fingers.

Articulation Deficiencies

1. Pulsing Airflow on Each Note	83.3% Commonality
2. Tonguing in Teeth or Lips	66.7% Commonality
3. Tonguing Too Late	25% Commonality
4. Tonguing Too Early	33.3% Commonality
5. Tonguing Too Slow	75% Commonality

There were three articulation deficiencies that the survey participants did not seem to find very common; *Tonguing in Teeth or Lips, Tonguing Too Late,* and *Tonguing Too Early.* The fact that *Tonguing in Teeth or Lips* was not considered common surprised me. This is something that I have been warned against by many teachers. It is also a problem that I have encountered with students ranging from beginners to college level players. There were a couple of comments that called attention to an interesting idea that I had not considered prior to developing the survey. Two participants, Dr. John Whitaker

and Peter Ellefson, stated that they prefer a lower tongue placement, even down in the teeth, for extreme low range playing. I was not considering extreme ranges when developing this part of survey, but I must agree that there are occasions when tonguing between the teeth is acceptable. As a general rule, I do like to keep a consistent tongue placement just behind the upper teeth understanding that there may be exceptions depending on the player's dental/facial structure and occasional range issues.

The final two articulation deficiencies that need additional discussion both deal with timing the tongue movements in different styles of articulation. It has been my experience, in my own playing as well as that of others, that there is a tendency to articulate (tongue) too late in legato playing. If the player waits to tongue a given pitch until the slide has reached the correct position, then that player has created a smear between those pitches. The trombonist must articulate ahead of the slide's arrival in the new position if he/she desires to have a clean legato articulation. In separated playing styles, the opposite is true. Adequate space between notes allows the slide to move into position prior to initiating the next note with the tongue and air.

Additional Participant Comments

In addition to the quantitative data produced by the survey, text boxes allowed the participants to comment on the survey statements and to clarify or expand their reactions to the statements beyond the multiple-choice, level of agreement responses. There were also text boxes at the bottom of the *Common Deficiencies* section. These text boxes produced a number of insightful comments, some of which I have already included in the

quantitative survey analysis above. I would like to include at this point some of the other interesting quotes that I think contribute to a greater understanding of the central concepts of this dissertation.

Regarding the first statement of the survey, two participants pointed out that it is important for the trombonist to have a solid mental concept of the sound he/she wishes to make prior to playing the instrument. Dr. Josh Bynum commented, "I would also say that having a concept is equally important" and Joseph Rodriquez said, "I also think that hearing the sound in your head is an important factor in proper tone production. Perhaps it is the most important factor." While these comments do not specifically address the technical concerns that form the basis for this dissertation, they do have merit. This type of thinking is consistent with the teaching philosophy of Arnold Jacobs. He often spoke of having "a tuba in the hand and a tuba in the head." He was an advocate of having a clear mental image of the desired sound before creating a tone on the instrument. The example of a child learning to speak exemplifies this concept. Parents do not teach children how the vocal chords and tongue function to produce words. They simply demonstrate how words sound and once the child internalizes the sound, he/she naturally develops the physical ability to duplicate those speech patterns. Jacobs believed that many of the necessary physical adjustments involved in brass playing could be accomplished naturally, without extensive or complex explanations from the teacher. I understand and appreciate this approach, but it is important to remember that Jacobs had an unparalleled knowledge of the physical aspects of brass performance. That knowledge guided his "natural" approach to pedagogy. Just as some children require speech therapy

when they develop speech impediments while learning to talk, trombone players often need a teacher with a thorough understanding of performance technique to eliminate playing deficiencies.

In the *Embouchure Control and Flexibility* section of the survey, one comment that stood out was Joseph Rodriquez's reaction to my statement about the widening and narrowing of the aperture throughout the range of the trombone. He said, "I never thought about it in this way. I just try to get my lips to get the most vibration possible on all pitches. Perhaps even though I am trying to buzz the whole lips, your statement is what generally does happen." This is another example of a phenomenal player taking a conceptual approach to a technical aspect of trombone performance. I am not at all opposed to this approach, as his idea of creating maximum vibrations in the embouchure does not prohibit him from creating the correct aperture in the lips. I do think that a literal understanding of the factors involved in tone production should necessarily preclude a conceptual approach to performance. I believe there is room for a literal understanding and a conceptual application within the same performing or pedagogical method.

I always appreciate simple guidelines that produce sound fundamentals. In responding to the *Slide Precision and Timing Deficiencies* section, Peter Ellefson summed up his general approach to slide technique very succinctly. He said, "The slide grip is one of the most difficult deficiencies to correct. Students usually grip the bar too far up on the finger. My ideal slide grip is: Hold the bar as you would hold a wine glass for a toast...or when presenting a rose to someone. Use as little squeeze as possible and

keep the thumb on the bar at all times. Also, no bounce into each position...either push or pull but not both."

Finally, Dr. John Seidel and Dr. Josh Bynum agreed that there is more to consider regarding articulations that just the attack. Dr. Seidel commented, "…I tend to include note length and shape under the heading of articulation" and Dr. Bynum's response was, "Equal importance should be given to releases." I agree with both of these statements. An analysis of how notes are released is certainly pertinent to the subject of articulation. Releases are often a defining characteristic of musical styles, just as much as attacks.

Summary

Based on the results of the survey, I believe it is clear that most of the assertions that I make in this dissertation fall within the realm of mainstream, trombone pedagogy. While there were some points that did not find overwhelming support, those participants who dissented often did so on issues of terminology or approach and not content. The concepts contained in my four fundamental components seem to hold up well under the scrutiny of experienced performers and teachers. In addition to the statistically measurable evidence, many of the comments indicated further support for the foundational principals of this project. Also, the participants' reactions to the issues that I have labeled common deficiencies demonstrate that to a large extent they are common among trombonists. This suggests that these deficiencies may be traced to common flaws in fundamental technique, and therefore they should be addressed using a systematic method like the one prescribed in this dissertation.

Discussion of Musical Exercises

General Comments

I have developed four series of musical exercises that will serve as a guide in developing fundamentally sound performance technique. I have divided these exercises into four categories.

A) Long Tone Exercises

B) Flexibility Exercises

C) Slide Precision Exercises

D) Articulation Exercises

The four fundamental components of trombone performance technique and these four groups of musical exercises are correlated. These exercises are designed to target many of the common deficiencies that I have identified in the previous section of this dissertation.

This section is intended to provide a context and focal point for the player's attention in the performance of each of the musical exercises. Each group of exercises is included in its entirety as a separate appendix. I have included samples of the exercises in the body of this text. The letter of the appropriate appendix and the number of the exercise identifies each sample. I have also recorded an audio demonstration of each of these samples and they are cross-referenced with the appropriate audio CD track

numbers. With a proper understanding of the four technical components and the examples provided by the audio recordings, these musical exercises should prove to be a helpful resource in eliminating deficiencies and establishing fundamentally sound technique.

These exercises do not represent a complete or definitive trombone method. Their purpose is to establish and reinforce the guiding principles of the four fundamental techniques. They are for the most part very simple exercises. Some require a moderate range and some flexibility but they can all be tailored to suit younger players. Advanced players may want to use these as a starting point and develop additional exercises based on these principles.

Players should not feel limited to the keys and ranges present in the exercises. All of the exercises may be transposed to introduce different pitch registers and tonalities. Specific dynamics have been intentionally omitted. The player should begin these exercises at a comfortable mezzo-forte dynamic. Once the principles involved in each exercise has been established, the trombonist should challenge himself/herself at both ends of the dynamic spectrum.

To a large extent, the effectiveness of any musical exercise depends on the player's mindset and level of mental engagement. While the physical aspects of practice are obviously important, the mental cues necessary for fine muscle control are equally important. Every note or phrase performed on the trombone should be played with a clear and specific intent, never in a random or rudimentary fashion. The trombonist should clearly understand the point(s) of emphasis essential to achieving the musical goal of

each exercise before he/she attempts to perform the passage. It is also important to maintain a musical attitude when performing these exercises. Technical facility in musical performance is valuable only if it contributes to an artistic product. The trombonist should always practice technical studies with the same musical intent he/she would apply to the performance of a solo work or orchestral excerpt.

Finally, I would like to stress the benefits of playing these exercises on just the mouthpiece. I know of no better way to develop the physical and muscular agility necessary for embouchure control than mouthpiece buzzing. Also, since most technical deficiencies are developed while playing the trombone, the instrument itself becomes a sort of cue for those deficiencies. Establishing proper technique is often much easier when the horn is removed from the equation.

Long Tone Exercises

The core of any effective practice routine must be long tone exercises. The ability to maintain a steady tone with a stable center of pitch is one of the earliest and most important fundamental skills that every trombonist must acquire. Long tones are essential to the development of a strong, rich, and focused trombone sound. The key to this ability is muscle memory, and nothing is more effective in training the embouchure muscles than playing long, slow tones at various volumes and pitch levels. Additionally, due to the necessarily slow nature of these exercises, the trombonist can also use long tones to hone many other aspects of his/her technique. When playing long tone exercises the trombonist should evaluate the following:

1) Consistent and supportive airflow

2) Formation and consistency in the slide grip

3) With a tuner, note the exact placement of each position

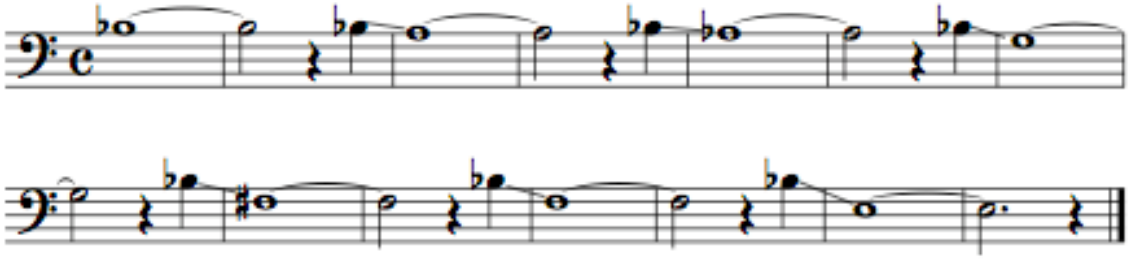
4) Correct embouchure formation

5) Necessary mouthpiece pressure

6) Observe the entire body for points of tension.

Figure 3

A1 - ***Audio Track 1***



Long tone exercises one through three are adaptations of a similar exercise created by Emory Remington in his famous warm-up method (1980), edited by Donald Hunsburger . Remington's long tone studies also involve a chromatic passage that returns to the harmonic focal point of the exercise prior to each descending interval. My version includes a glissando following the return to the top note that carries the sequence into the next lowest note on the partial. This is designed to encourage continuity in the airflow as the trombonist moves from one position to the next.

While the airflow is the primary focus, other aspects of trombone performance technique may also be considered during the execution of this exercise. Players should repeat the exercise several times and allow the mind to refocus on a different concept

each time. The following are tips for using this simple extrapolation of the Remington warm-up sequence to instill sound fundamentals.

1) Use alternate positions as necessary in order to keep these exercises all on one partial.

2) Play this exercise at a comfortable mezzo-forte dynamic at first.

3) Use a metronome (69-80 BPM) to establish an unwavering tempo and pulse.

4) Use a tuner to identify precise slide positions.

5) Create a slight crescendo throughout each glissando in order to encourage continuous airflow between notes.

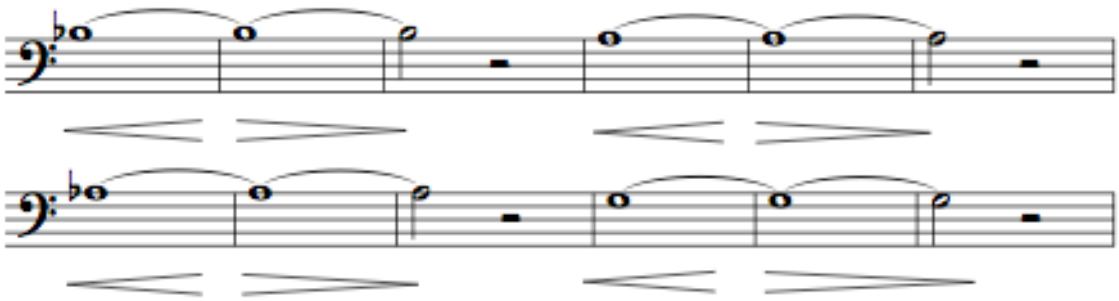
6) As is the case with nearly every musical exercise, buzzing this passage on the mouthpiece is very beneficial.

7) Repeat this exercise on higher and lower partials.

The player should not to attempt to mentally grasp too many concepts at once. Focusing on one or two thoughts throughout the course of each repetition allows the trombonist to internalize the requisite skills.

Figure 4

A4 - *Audio Track 2*



Long tone exercises four and five involve the use of alternating crescendo/decrescendo dynamics commonly referred to as “hairpins”. These hairpin studies allow the trombonist to test the ends of the dynamic spectrum and feel the effects these dynamics have on the airflow and embouchure. The tuner should also be used in this exercise to ensure that a stable pitch is maintained throughout each note. Because dynamics are relative, I have not included specific markings to indicate the loudest and softest levels within each sequence. It is important that the trombonist move beyond his/her comfort zone by expanding these hairpins into very aggressive ranges both on the forte and the piano ends of the dynamic spectrum.

Exercise four begins with a soft dynamic, crescendos, and then returns to the initial soft dynamic. This affords the player an opportunity to begin notes at a very soft dynamic and to practice the technique of fading away softly to the note’s conclusion. In exercise five the dynamic scheme is exactly the opposite of exercise four. The notes begin at a loud volume, decrescendo, and then swell to the original loud volume. In this case the player must carefully regulate the use of air in order to achieve the necessary volume at the end of each note. These are common musical effects and the trombonist should be comfortable playing these hairpin exercises in a wide range of dynamics.

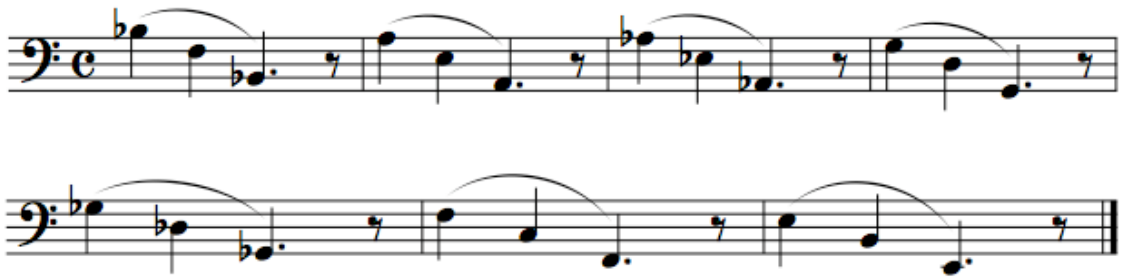
Flexibility Exercises

Flexibility exercises, commonly known as lip slurs, are extremely important to the trombonist’s technical development. Because each partial is basically limited to seven pitches, trombonists must be able to transition smoothly and efficiently throughout the

harmonic series. Smoothness is the primary goal of all lip slurs. The player should avoid bumps between the notes. While the airflow may change slightly to accommodate the shifts between various partials, it must never cease. The concept of continuous airflow, established by the long tone exercises, is essential and should transfer to the flexibility exercises. The embouchure should not be clenched nor should it move or bounce on each note transition. I like to think of all the embouchure movement occurring within the mouthpiece.

Figure 5

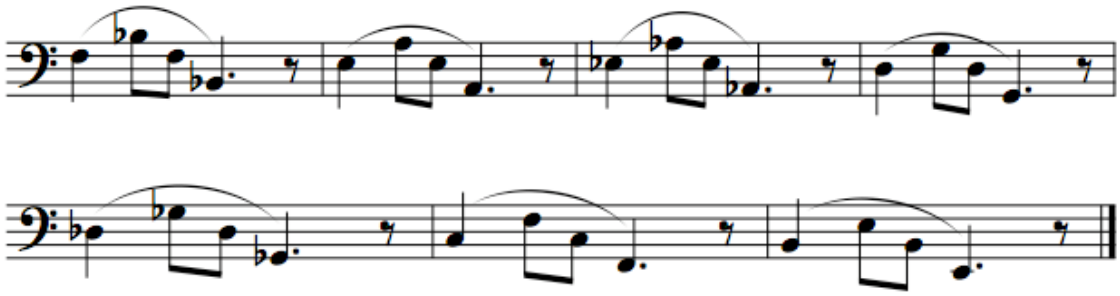
B1 - *Audio Track 3*



Flexibility exercise one is a simple descending three-note slur that extends throughout the seven primary positions. This exercise should be incorporated with the long tone exercises as part of a daily warm-up routine. Because this exercise is so simple, the player should focus intently on proper technique throughout. The slurs should be performed with minimal movement in the embouchure and maximum commitment to the airflow through each pitch. I always encourage players to think of blowing between the notes.

Figure 6

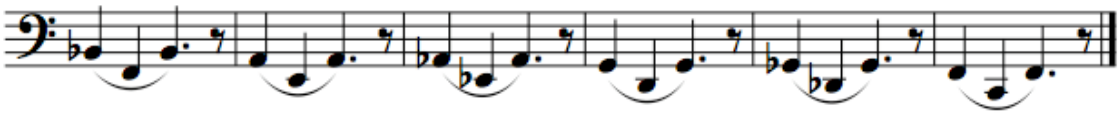
B2 - *Audio Track 4*



Flexibility exercises two through four combine ascending and descending slurs. The same points of focus should be applied to this exercise as to exercise one.

Figure 7

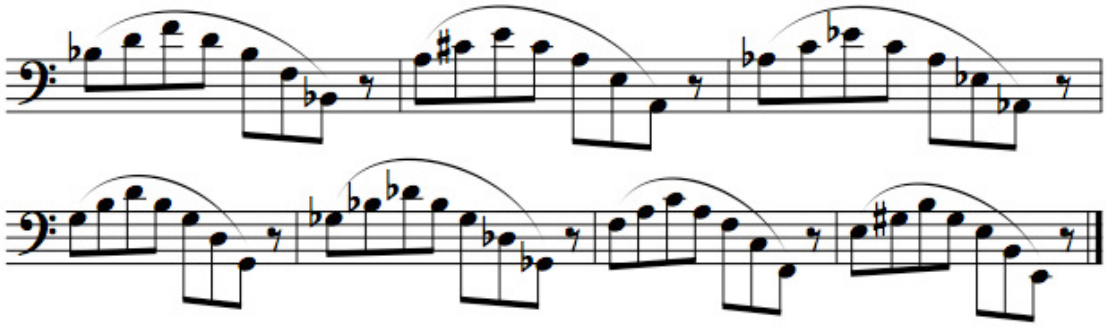
B5 - *Audio Track 5*



Exercise six requires that the player extend into the low range and onto the valve. This exercise should not be performed on a straight trombone with no valve. The lower partials on the trombone require slightly more air and this exercise should be played at a mezzo forte dynamic or louder. This will encourage the use of a larger airflow in this important range.

Figure 8

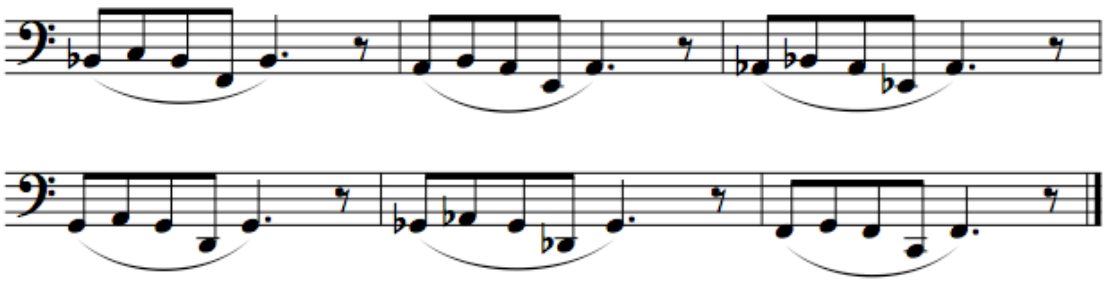
B6 - *Audio Track 6*



Exercises six and seven expand the range of playing upward into the fifth, sixth, and seventh partials. The player should be aware of the difference in air speed and pressure from the highest note to the lowest in this exercise.

Figure 9

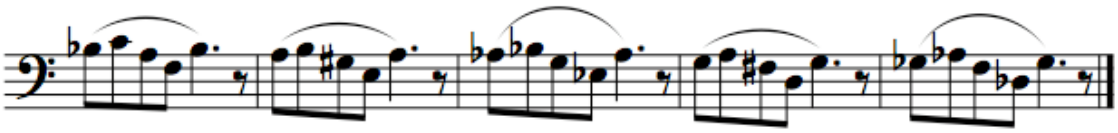
B8 - *Audio Track 7*



Exercise eight once again utilizes the valve and should not be played on the straight trombone. In this series, the timing of the valve is important. It should be quickly opened and released.

Figure 10

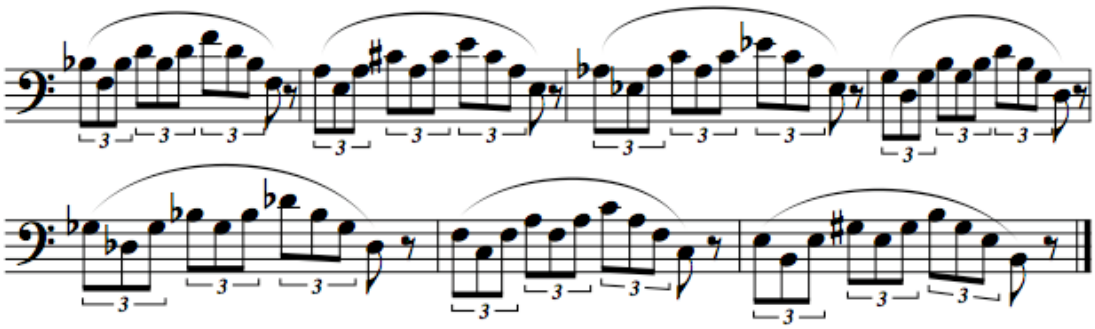
B9 - *Audio Track 8*



Exercises nine and ten introduce slide movements into the lip slur process. The air should never cease between pitches and the slide must be timed precisely. It should move at the last possible second while the embouchure is in transition from one partial to the next.

Figure 11

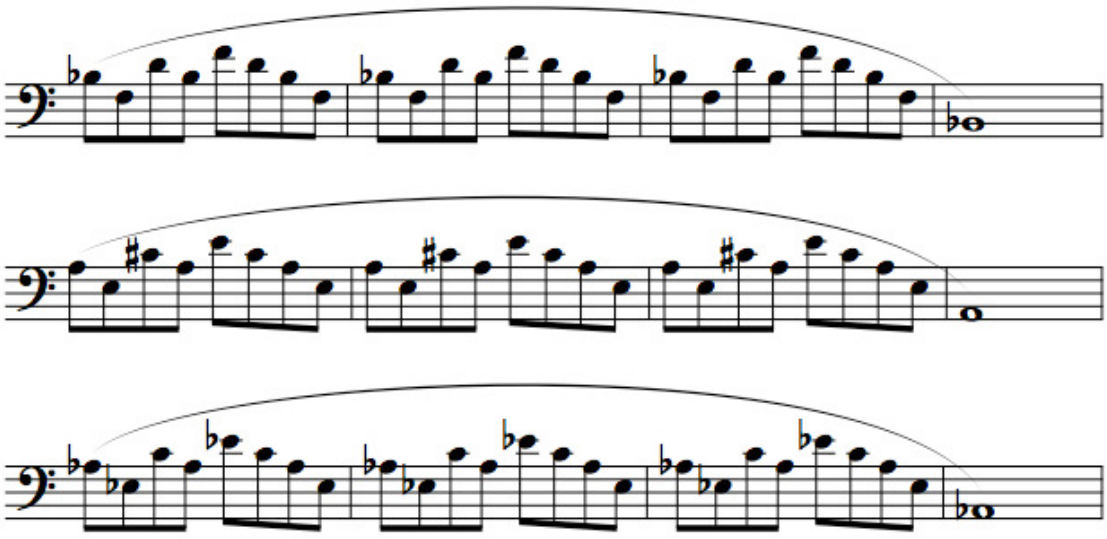
B11 - *Audio Track 9*



Exercise eleven is designed to challenge the trombonist's flexibility. It requires a constant airflow with great agility and embouchure control. It is important that the player's tone not suffer as the exercises become increasingly difficult. The trombonist should avoid the tendency to back off the airflow as the lip slurs become more involved. I often add a crescendo throughout each measure to counteract this tendency.

Figure 12

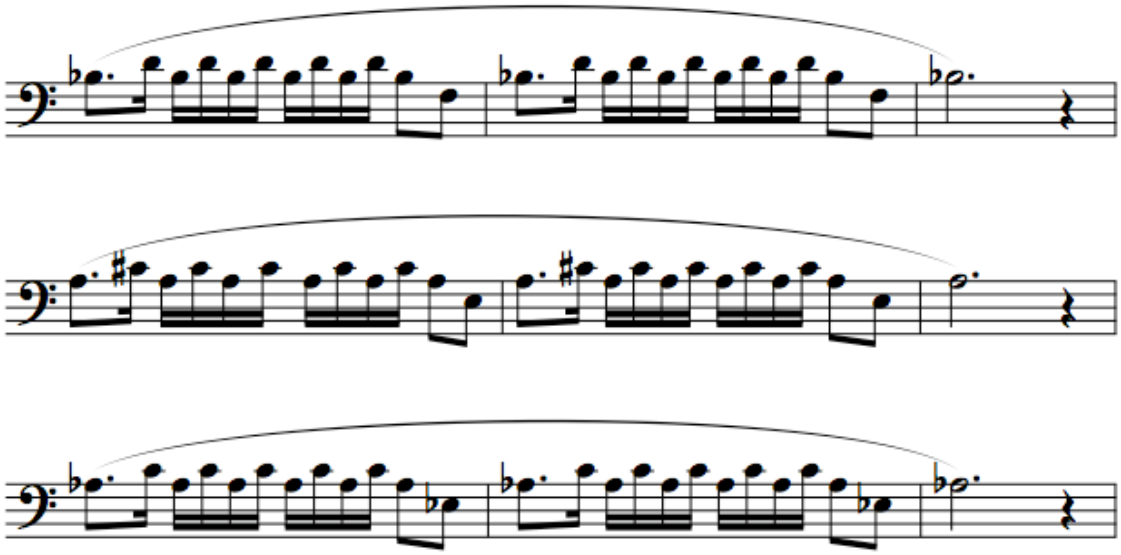
B12 - *Audio Track 10*



There are two points of focus in exercise twelve. First, the slurs are longer. The player must regulate the airflow in order to maintain the sound throughout the active part of the slur and then to sustain the final whole note. Second, this series actually skips partials four and five on the ascending slurs. The trombonist should strive for the cleanest possible connection between each interval without clipping the skipped partials. As with the previous exercises, the airflow must remain constant and the embouchure movements should be as small as possible.

Figure 13

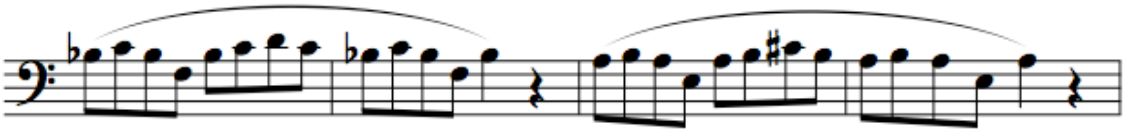
B13 - *Audio Track 11*



Exercises thirteen through fifteen are more advanced. They require total commitment to the airflow and a supremely agile embouchure. These exercises test the player's ability to maintain control of the embouchure corners. The tendency is to move the chin in an attempt to alternate quickly between partials. The goal here is to move between partials with minimal disturbance to the embouchure and to maintain a full resonant tone on every note.

Figure 14

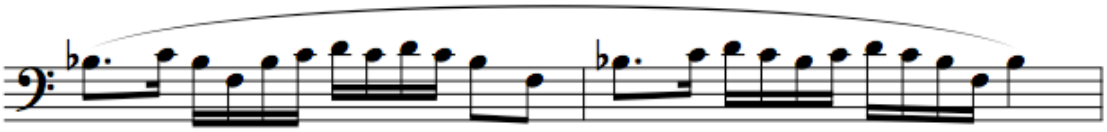
B16 - *Audio Track 12*



Exercises sixteen and seventeen are extended versions of exercises nine and ten and the same guidelines apply.

Figure 15

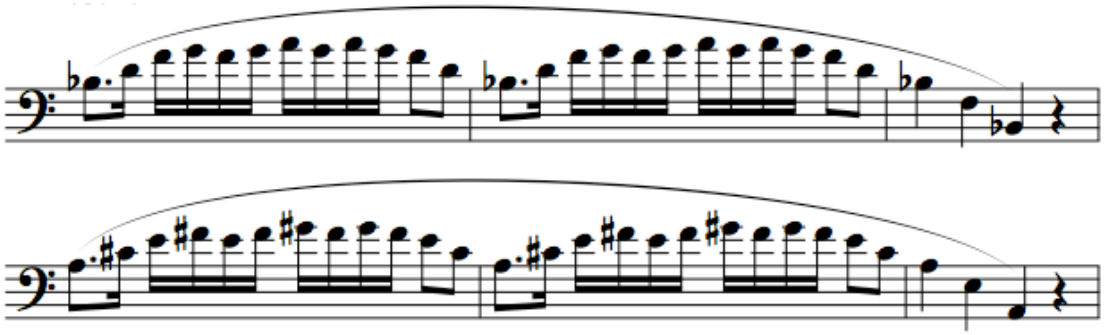
B18 - ***Audio Track 13***



Exercise eighteen again incorporates slide movements and a longer series of slurs challenging the players slide coordination and air management abilities.

Figure 16

B19 - ***Audio Track 14***



The final exercise extends into the seventh and eight partials incorporating slide movements with longer phrases. The upper partials are closer together and are often a source of trouble and inaccuracy for the trombonist. It is essential that the trombonist not sacrifice accuracy for the sake of speed in performing this exercise.

Slide Precision Exercises

The hand slide is the most distinguishing feature of the trombone as it sets the instrument apart from other valved brass instruments. It also presents a unique set of challenges for the performer. There are three primary obstacles inherent to the slide mechanism.

The first is the actual size of movement required to transition from one note to the next. The trombonist is often expected to play passages that require only small finger movements of an inch or less for other brass instruments. These same passages may require the trombonist to maneuver the slide from several inches to more than a foot to move from pitch to pitch. These large movements are difficult to manage and require practice to perfect.

The second obstacle is the fact that adjacent positions are all different lengths. This means that while the difference between pitches in adjacent positions are all half steps, the physical distances between positions are all different. This severely complicates the muscle memory required for slide placement. A half step move from an E in second position to an F in first is a very different move than a half step move from C-sharp in fifth position to a D in fourth.

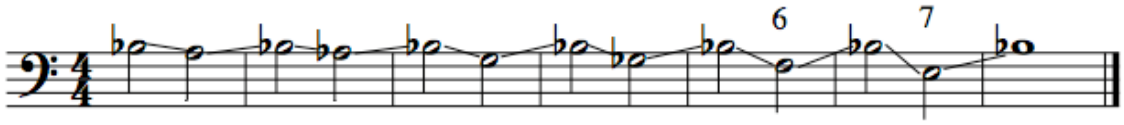
The third obstacle is that the precise placement of each position may differ from one partial to the next. Not all positions commonly referred to as third position are the same. While middle C, the E-flat above, and the A-flat below are all technically in third position, it is common for each of these notes to require a slightly different slide placement. The tendencies for these minor slide adjustments are consistent from one

trombone to the next but the exact slide placement for each position is a little different on all trombones. Using a tuner, the player must become completely familiar with the exact placement of the slide for every pitch on his/her trombone.

These obstacles underscore the need for in-depth study of slide placement. The following exercises are designed to focus the trombonist's attention on slide placement and provide the necessary repetitions to internalize the feeling of moving accurately from one position to another. The most effective method of perfecting slide technique is the glissando exercise. By simply listening to the sound of the glisses between notes, slide transition problems may be identified. For instance, a slow and early slide movement can be heard in that the notes will not be well sustained and the beginnings will not be clear. Inconsistencies in the airflow are also easily detectable in the glissando exercises. The tendency of many players is to back off the air between notes. This produces a change in dynamic and tone quality between positions. These exercises should be considered a starting point for slide technique study. The serious trombonist will improvise patterns increasing in speed and difficulty in order to refine the control and accuracy of the slide technique.

Figure 17

C1 - *Audio Track 15*

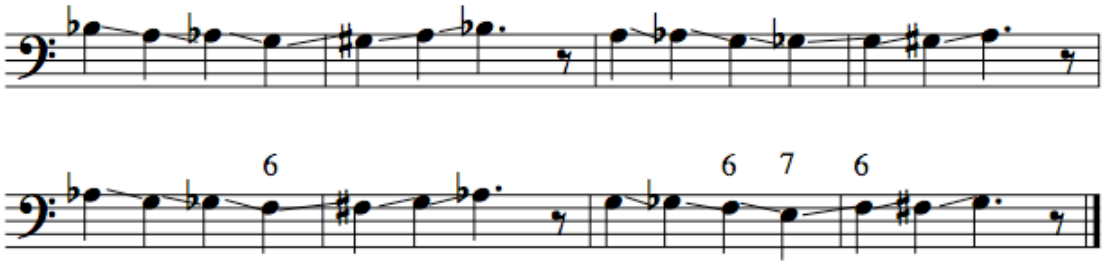


The first three simple slide precision exercises allow the trombonist to train the slide arm, embouchure, and the ear in order to move accurately from first position to each of the

lower six positions. Slide speed is not important in these exercises. In fact, the slide should move fairly slowly allowing the brain to process the feeling of moving to each of the positions. The focus should be on slide accuracy and developing a feel for the exact placement of each position. Proper grip and arm position are also very easily addressed in these exercises. A quality tuner is essential to perfecting slide placement. This exercise should not be played in one breath. The player should breathe when necessary but back up one pitch every breath so that each connection, ascending and descending can be made with a glissando.

Figure 18

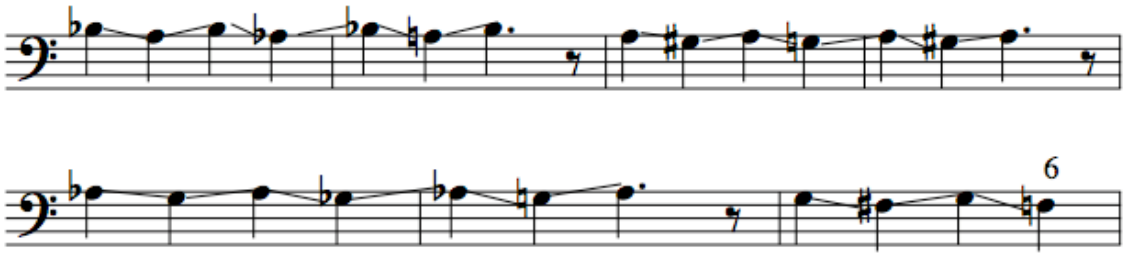
C4 - *Audio Track 16*



The simple patterns in exercises four through six are designed to develop a feel for half steps throughout the length of the trombone. Because the distance between slide positions increases gradually as the horn gets longer, it is important that the trombonist train the slide arm to move accurately through these various positions.

Figure 19

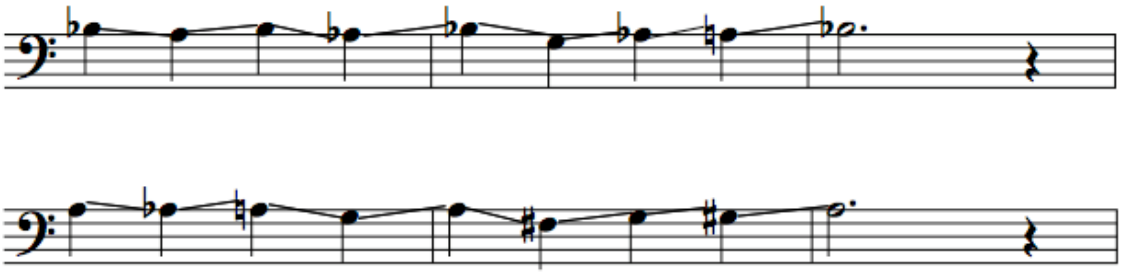
C7 - *Audio Track 17*



A common tendency of many trombonists is to approximate slide movements making the difference between whole steps and half steps difficult to distinguish. Exercises seven through nine utilize a pattern of alternating whole steps and half steps throughout the length of the trombone. This is another exercise that should be played with a tuner to carefully train the player's ear to hear correct intervals.

Figure 20

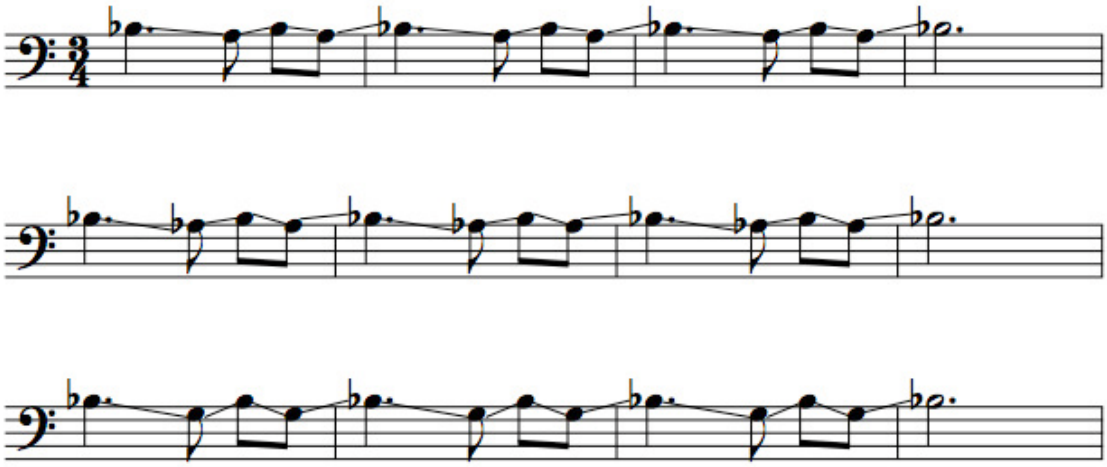
C10 - *Audio Track 18*



Exercise ten combines the half step, whole step exercise with a minor third and chromatic pattern for further practice in slide accuracy.

Figure 21

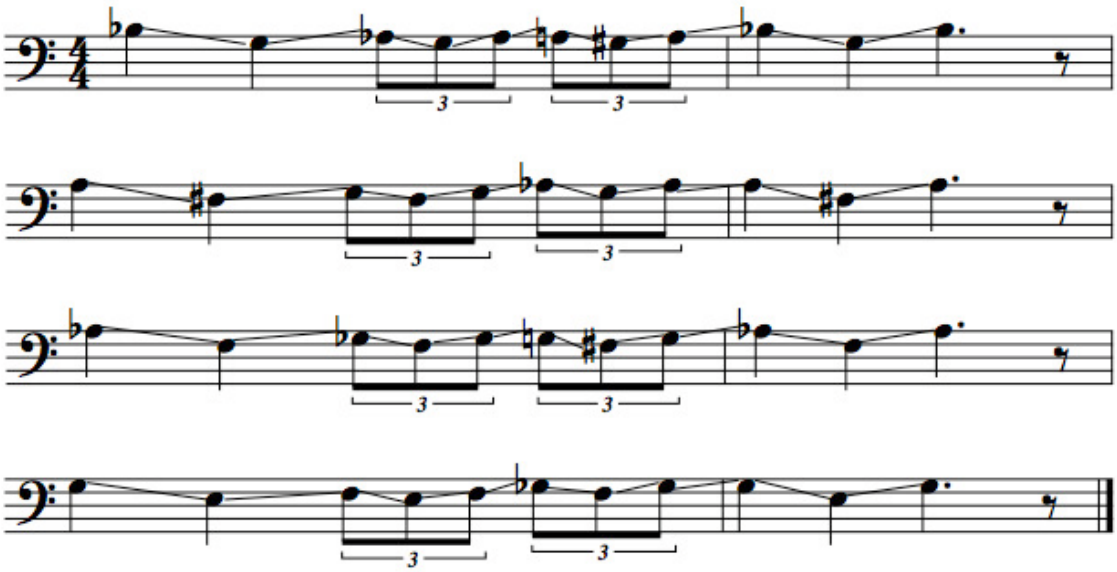
C13 - *Audio Track 19*



Many times alternating slide directions creates jerkiness in the slide motion. The trombonist must make the slide transitions in exercises thirteen through fifteen quickly with no bumps in the slide motion as it changes direction.

Figure 20

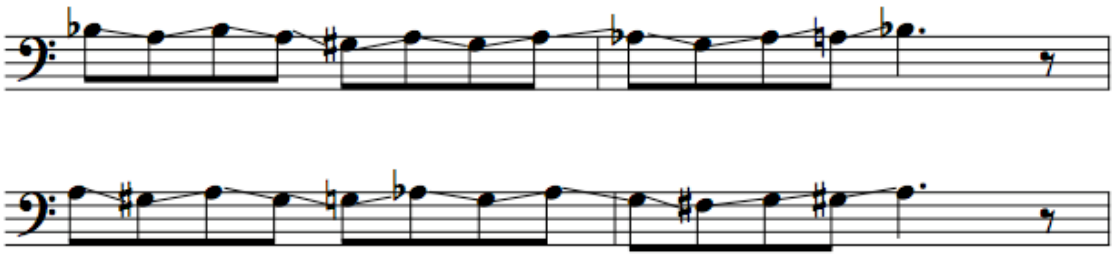
C16 - *Audio Track 20*



Exercises sixteen through eighteen are more complex. These combine minor third glissandi with chromatic passages and alternating slide direction.

Figure 21

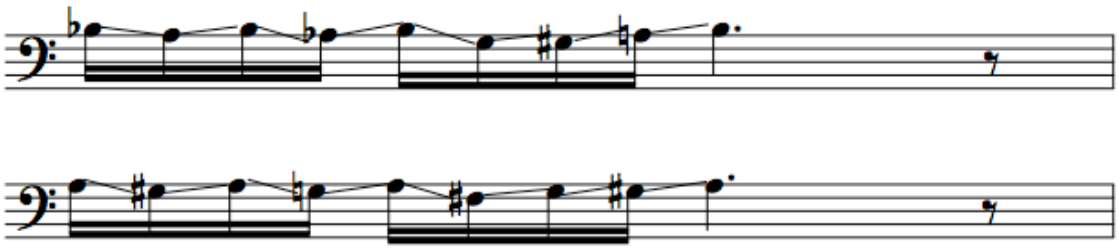
C19 - *Audio Track 21*



Exercises nineteen through twenty-one are designed to provide additional training for the slide arm moving quickly through chromatic passages.

Figure 22

C22 - *Audio Track 22*



Exercises twenty-two through twenty-four include chromatic passages with alternating slide directions and expanding intervals. They also utilize sixteenth notes creating greater technical difficulty.

Articulation Exercises

Clear articulations depend on proper air support, immediate embouchure vibration, and an appropriate use of the tongue. These exercises are intended to establish those principles in that order. There are two basic types of articulations. These are tongued and non-tongued. Obviously tongued articulations use the tongue in coordination with the airflow to initiate pitches. Non-tongued articulations include air attacks and lip slurs.

The first three articulation exercises require specific techniques that will be explained below. Exercises four through twelve should be played assuming the following five articulation scenarios:

1) Non-tongued

2) Slurred/Legato

3) Neutral

4) Marcato

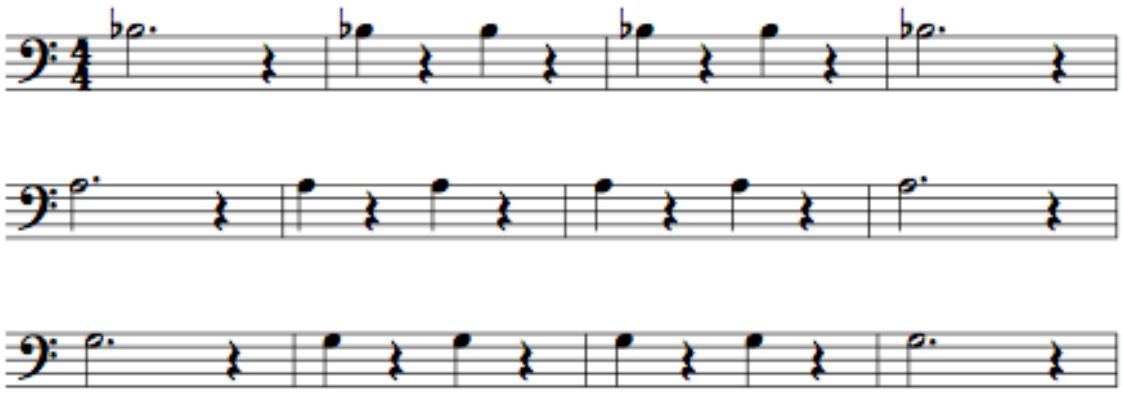
5) Staccato

For the non-tongued articulation the player should completely blow through the patterns maintaining focus on airflow and slide movements. The slide action should be quick but with no bumps or jerks in the movements. The slurred articulation should employ natural slurs when possible along with legato tonguing. I define neutral articulations as a clear tenuto attack. The note lengths should be full with a clear beginning to each pitch. Marcato playing is similar to the neutral articulation only with a stronger attack. Staccato articulations should be spaced with a clear attack on each note.

The patterns contained in these exercises will allow the trombonist to explore and polish a wide variety of articulations. These exercises do not represent all possible articulation scenarios that the trombonist might encounter. As with all of the exercises, it is important to vary the tonalities, dynamics, and ranges of the exercises once the principles have been established.

Figure 23

D1 - *Audio Track 23*

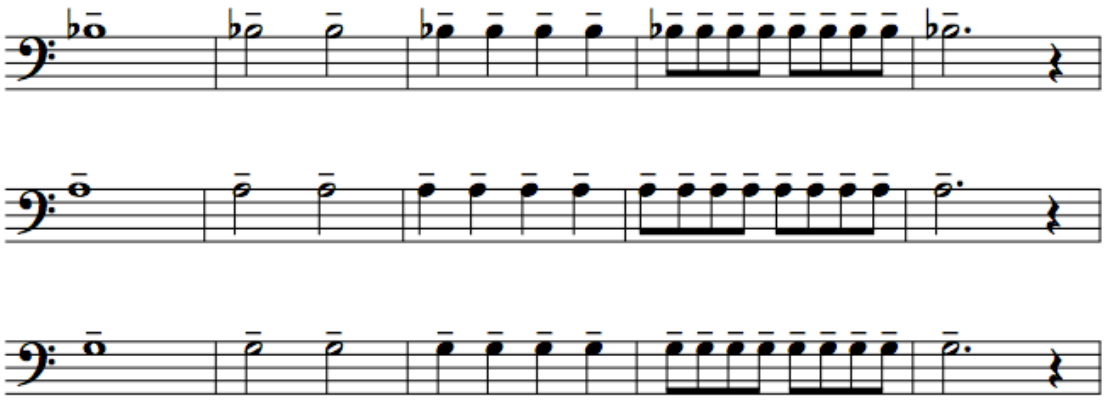


The first articulation exercise focuses on initial attacks. It should be played with no tongue. This allows the player to establish the air as the impetus for starting the note and not the tongue. There are two types of non-tongued articulations. The first utilizes a “ha” syllable. This produces a soft attack because the lips are slightly apart. The second non-tongued articulation is created using the “pa” syllable. This attack is stronger than “ha” because the lips are in contact when the air begins to flow and offer slight resistance at the beginning of the attack. The player should avoid the tendency to gradually increase the air speed as he/she begins the note. The air speed should be as fast at the beginning of the note as it is in the middle and end of the note. The player should also pay particular

attention to the embouchure. The corners should be firm and the embouchure should be set to play the given pitch before the air initiates the tone. This exercise should be played using both the “ha” and “pa” syllables.

Figure 24

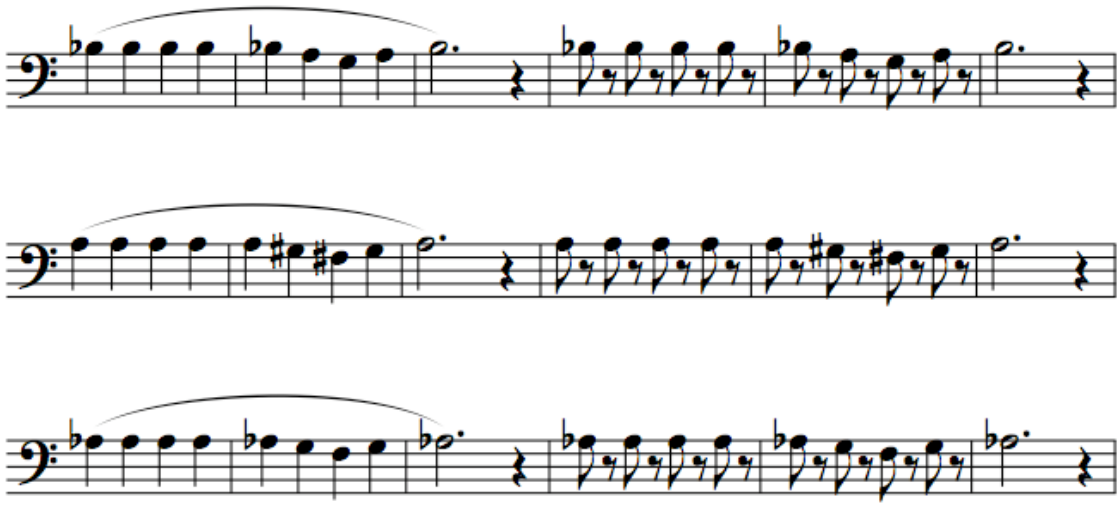
D2 - *Audio Track 24*



The second articulation exercise should be performed using the same airflow that was established in the long tone exercises. It is imperative to ingrain the concept of continual airflow. The technique of multiple notes being articulated on a singular airflow is one of the most important for the trombonist to master. This tenuto exercise calls for the use of a very light tongued articulation. The whole note in the first measure of each line allows the player to establish the proper airflow. The following measures require a light tongue and a continuation of the air column set up in the first measure.

Figure 25

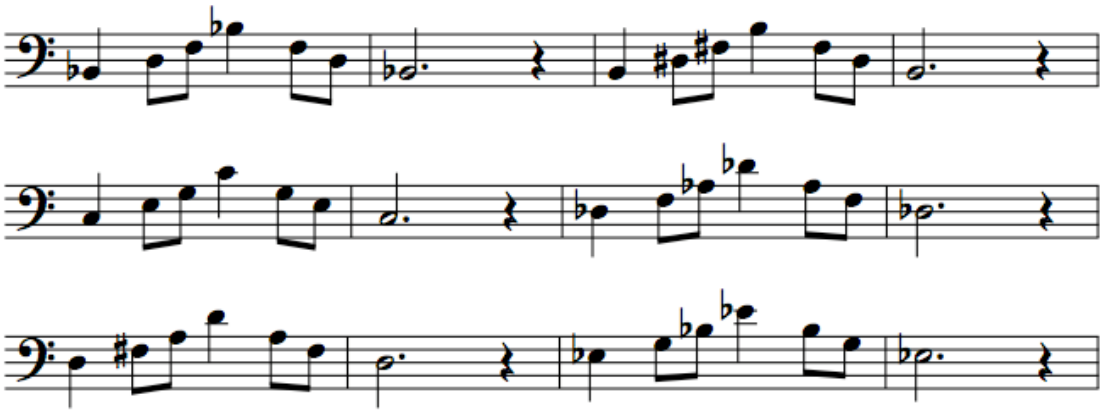
D3 - *Audio Track 25*



Articulation exercise three juxtaposes two very different articulations. Its primary purpose is to highlight the difference in timing the slide movement with the tongue stroke in legato and separated playing styles. In measure two the tongue and slide should move simultaneously. In measure five the slide should move during the eighth rests and be in place prior to the articulation. Measures one and four allow the player to establish the desired articulation before transitioning between notes. Because the space between notes in measures four and five is quite large, the air must stop and restart between notes. The player should not breathe after every note. Nor should the air be stopped or held back by the tongue. A simple release of each note using an open-ended *tah* or *dah* syllable for each attack is sufficient.

Figure 26

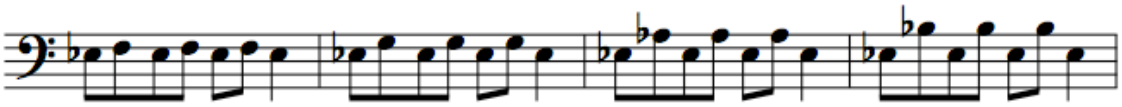
D4 - *Audio Track 26*



Articulation exercise four is a simple arpeggio pattern. This is the first exercise to be played in the five articulation scenarios listed above. The embouchure movements and tongue must be timed accurately to articulate across partials. Also, the slide movements must move in correct synchronization depending on the type of articulation used.

Figure 27

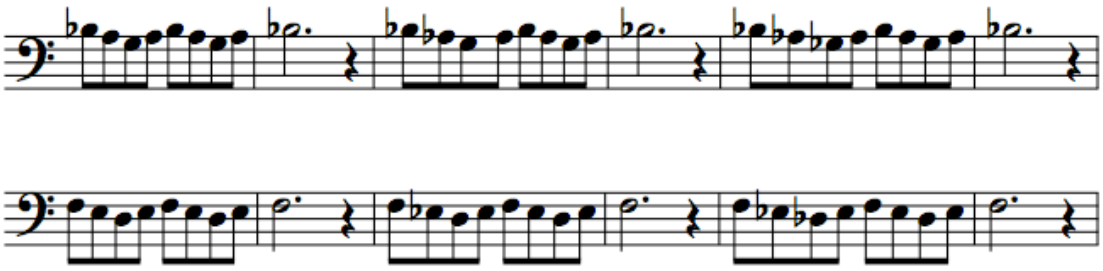
D5 - *Audio Track 27*



Exercise five focuses on expanding intervals within a diatonic context. As the player applies the five articulation scenarios to this pattern, it is important to maintain a steady embouchure with no extraneous movements.

Figure 28

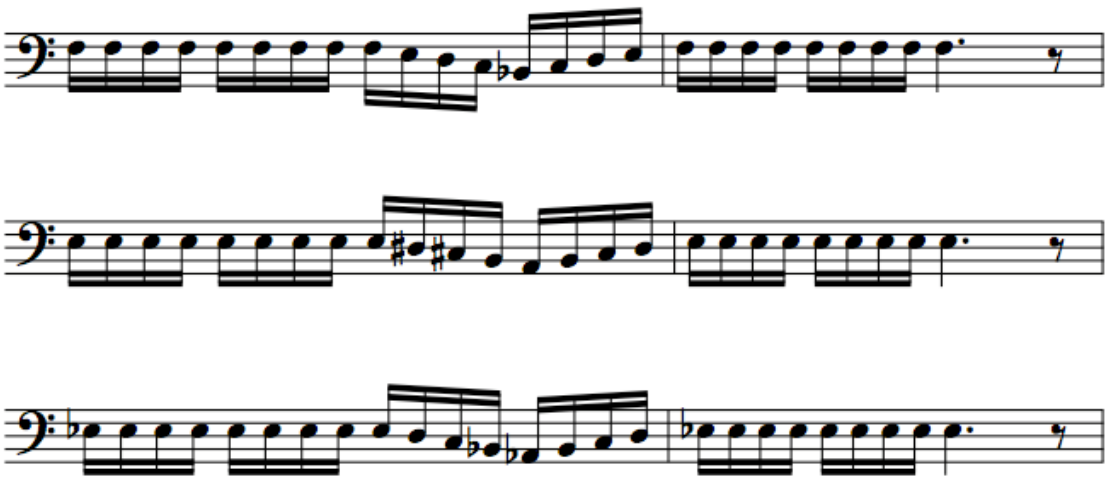
D7 - *Audio Track 28*



Exercises seven through nine focus on slide precision as much as articulation. The tendency to gloss over half steps and whole steps with no attention to accuracy creates many pitch and articulation deficiencies. The three note patterns in these exercises alternate the sequence of half and whole steps. The sequence begins in the first measure with a half step move followed by a whole step and then back up. The third measure begins with the whole step followed by a half step and back up. The fifth measure consists of all whole steps. Once the player has cycled these patterns through seventh position and down through various partials, the air, embouchure, slide arm, and tongue are trained to work in exact coordination to produce a variety of articulations.

Figure 29

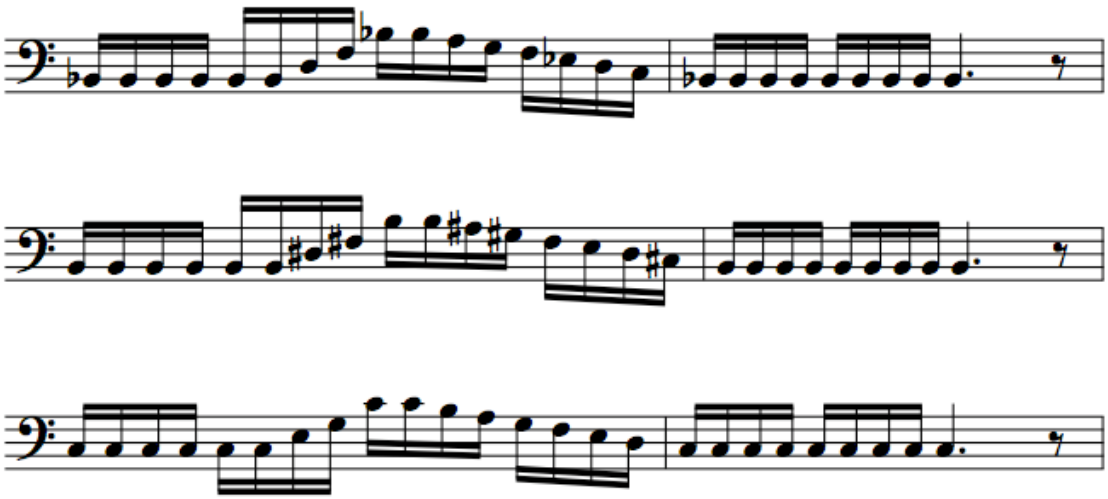
D10 - *Audio Track 29*



Exercises ten and eleven are made up of partial diatonic scales. These exercises begin and end with repeated sixteenth notes. The theory behind this exercise is that the repeated notes will allow the player to establish the desired articulation before introducing the slide movements. The concluding sixteenth notes round out each line of the exercise as it began. Exercise ten utilizes descending scales moving into the low range whereas eleven contains ascending scales gradually moving up in range. The goal throughout should be to perfect the articulations on the repeated sixteenths and then perform the scale passage so that it sounds identical to the repeated notes.

Figure 30

D12 - *Audio Track 30*



Exercises twelve and thirteen contain complete arpeggios and scales once again framed by repeating sixteenth notes. The goal of these exercises is similar to exercises ten and eleven. In this case arpeggios introduce intervals into the process and the complete scales provide a wider pitch range for the exercise.

Conclusion and Suggestions for Future Research

Having studied, practiced, and taught trombone technique for more than twenty years; I have had the opportunity to observe a number of players from various backgrounds and of various skill levels. Many trombonists, including my students and myself, exhibit similar flaws in trombone technique. After noticing some of the same problems time and again, I began to wonder how this could be. The fact that so many students and even professionals struggle with similar difficulties led me to surmise that there must be common reasons for such common problems. If there are in fact common reasons for common problems, then there must also be a common solution. After much consideration and study I have arrived at the conclusion that the causes of most deficiencies in trombone performance can be traced to one of four fundamental components, and therefore the solutions to these deficiencies are also to be found in the fundamental components.

I believe that producing music with a trombone is not difficult if the player focuses on the basic fundamental tasks that lead to success. A full and resonant tone is always desired and that is a simple matter of generating vibration within the embouchure by moving air through the lips. Once this process has been established the embouchure must be developed to produce various pitches and to transition smoothly between those

pitches. The next step is to train the slide arm to maneuver the slide in a way that accommodates the specific pitches being played and that is consistent with the timing of those notes. Finally, the last element of this process is the manner in which the tongue, air, and embouchure work together to characterize the beginning, body, and ends of the notes, producing musical phrases. I have reduced this process to what I call, four fundamental components of trombone performance technique. Those components are:

1) Breathing and Air Support

2) Embouchure Control and Flexibility

3) Slide Precision and Timing

4) Articulation.

The order that I have chosen for these components is also significant. The player should recognize that each component relies on the skills developed in the previous component(s). Regardless of the ability level of the trombonist, his/her success depends on mastery of these four components. Trombone players, who achieve high levels of performance on the trombone, do so by executing the fundamentals of these four components correctly and consistently.

With these premises in mind, I set out to achieve three goals in this dissertation project. First, I needed to determine whether or not my ideas regarding the four fundamental components were accurate and consistent with established methods of trombone performance and pedagogy. By studying the available relevant literature I discovered that there were precedents for my assertions. This was not at all surprising considering the authors of the primary literature, along with the teachings of their

students, have helped to shape many of my ideas about the trombone and how it should be approached.

In addition to a study of the related literature, I also conducted a survey of experienced trombone teachers and performers. This served two purposes. First, I wanted to establish additional evidence that the assertions behind my four fundamental components were sound. I believed that the best way to accomplish this was to clearly state these assertions and then record the reactions of experts in the field of trombone performance and pedagogy. Also, there were sections designed to test the notion that there are common deficiencies among trombonists. The survey fulfilled both of these purposes. The principles of the four fundamental components met with widespread approval and for the most part the assumption of common deficiencies was also substantiated. The combination of the survey responses and the results of the literature review demonstrate that my notion of common deficiencies based on fundamental flaws is in fact a reality that needs to be addressed.

The last goal of the project was to design viable solutions to the common problems encountered in developing trombone technique. I created four sets of musical exercises that corresponded with the four fundamental components of trombone technique. I included a section that discusses the different types of exercises and what they are designed to accomplish. I have also produced an audio CD that demonstrates the correct method of performing these exercises. These exercises do not constitute the solution to all technical difficulties encountered by trombonists. It is the concepts the

exercises seek to establish that are the real solutions to common trombone technique issues.

In completing this dissertation, I have identified a couple of topics that deserve some additional study and scrutiny. The issue of timing the slide movements from one note to the next in various articulations styles seems to be a source of some disagreement. I would be interested in using a sound spectrum to analyze the space created by articulations in various styles and the implications this would have on slide transition timings. If it can be established that there are significant differences in the spaces between notes of various articulation styles, then the obvious conclusion is that the tongue should move at different points within the articulation process depending on the amount of space between notes.

Another potential issue involves a closer examination of the embouchure. In the literature review, I cited an article by Lloyd Leno (1971) from *The Instrumentalist*, in which he conducted a study of trombone embouchures using clear glass mouthpieces and high-speed photography. In this study Leno discovered several correlations between changing pitch, and the size and shape of the aperture. This was a very interesting study as it has great implications in support of the concepts that I promote in this project. While this study was a nice effort, it is very dated and a repeat study using current technology would be valuable. There have been some significant advances in technology since 1971. I see the potential for a new study based on the same premise that utilizes modern means of observation including digital photography and ultra high-speed video that can be played back very slowly, demonstrating embouchure movements between pitches. A new

study could involve a decibel meter to insure that volume is controlled and does not skew the results of the pitch analysis. Also, a study of how changing dynamics affect the embouchure's size and shape would also be helpful. All of this applied to a larger number of subjects of varying skill-levels could create tremendous insight into the workings of the trombone embouchure.

In closing, this dissertation has noted the existence of common, fundamental flaws in trombone performance technique. It has created a method of addressing those flaws by reducing trombone technique to four fundamental components that have proven to fit within the mainstream of trombone pedagogy. It has prescribed solutions for developing sound fundamentals that will, over time, eradicate common flaws and lead to greater technical proficiency in trombone performance. Finally, it has provided an approach to trombone technique that allows the player to focus on simple technical goals. Once these goals are met and internalized, higher levels of musical expression will be attainable due to the confidence resulting from a dependable grasp of the physical tasks associated with trombone performance. Greater musical expression is, after all, the ultimate objective of technical development.

Appendix A - Long Tone Exercises

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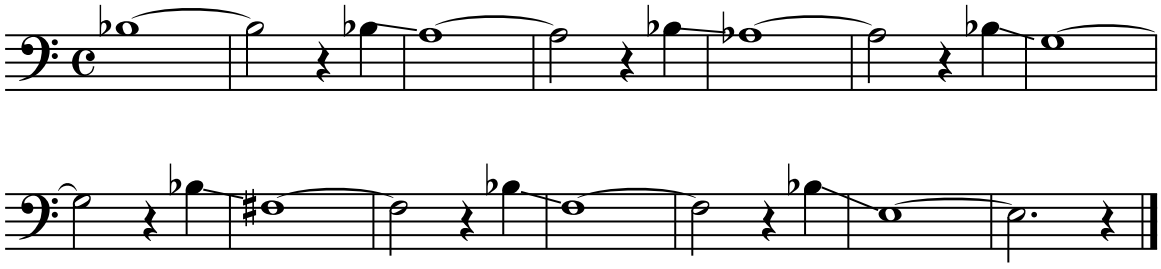

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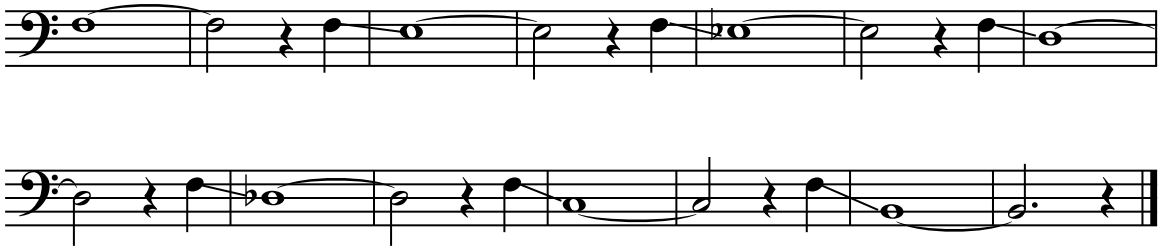

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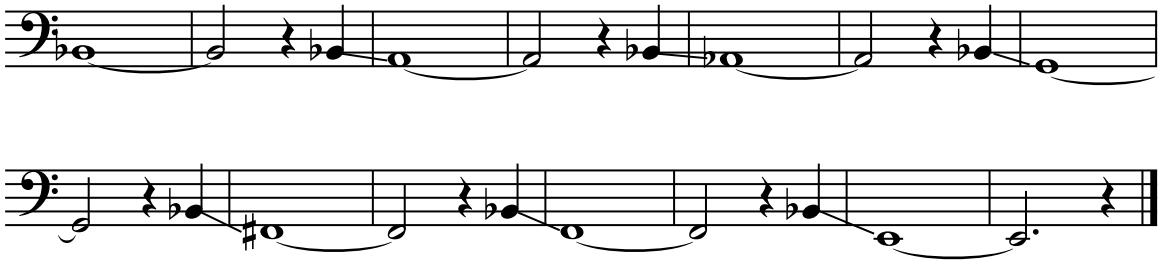

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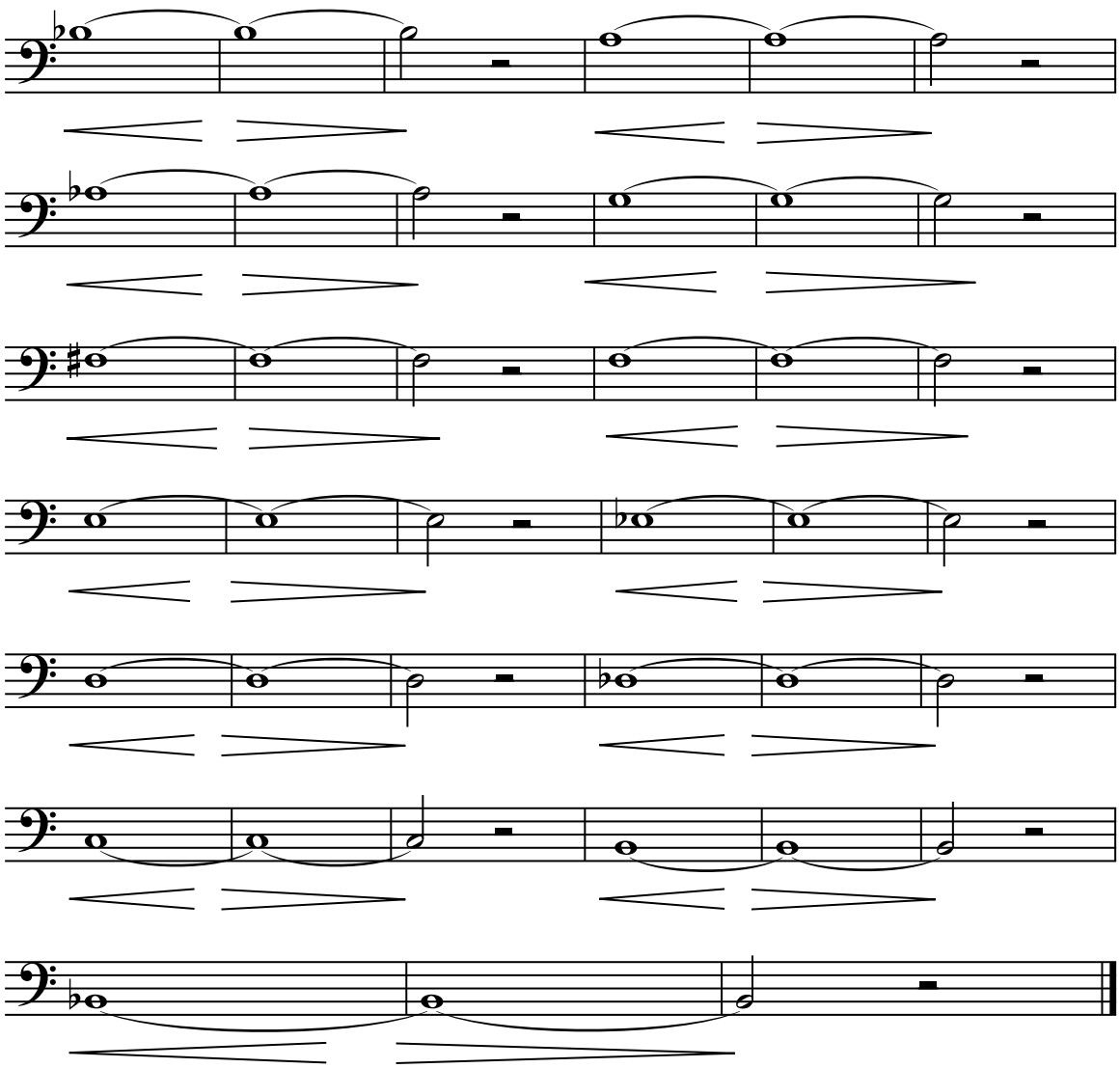

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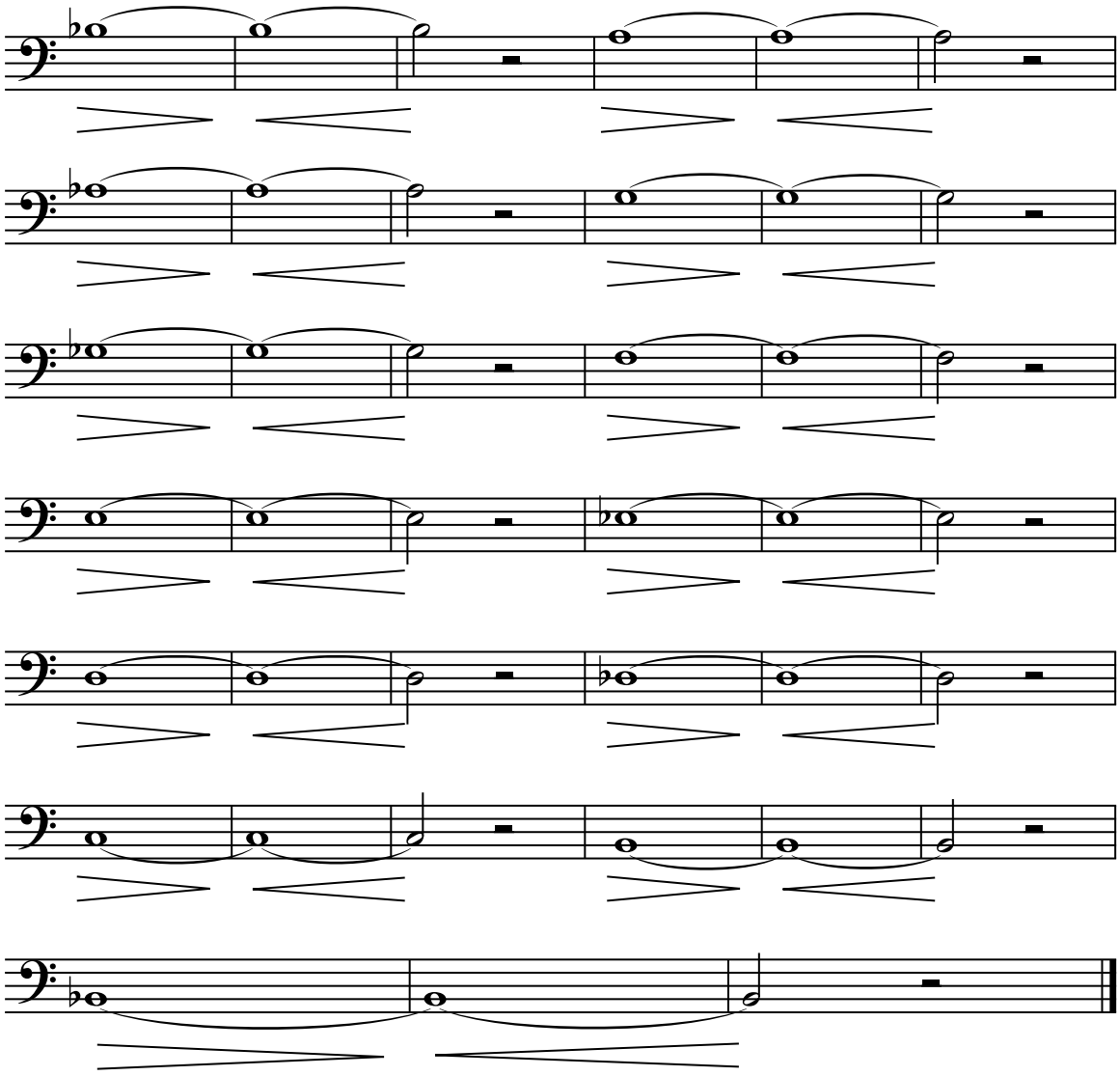

Appendix B - Flexibility Exercises

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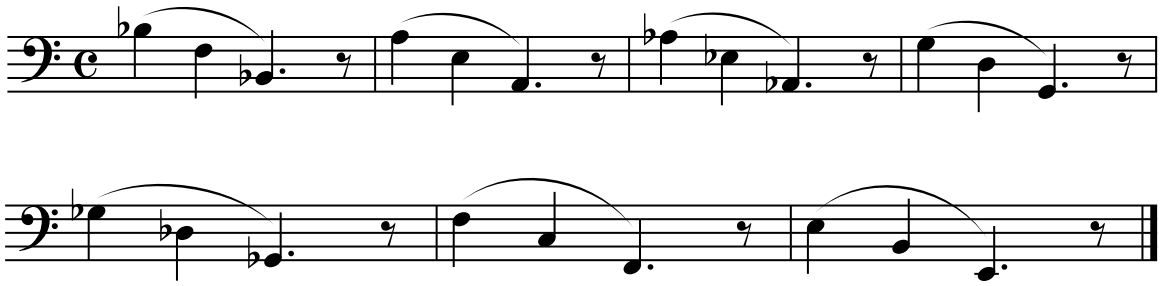

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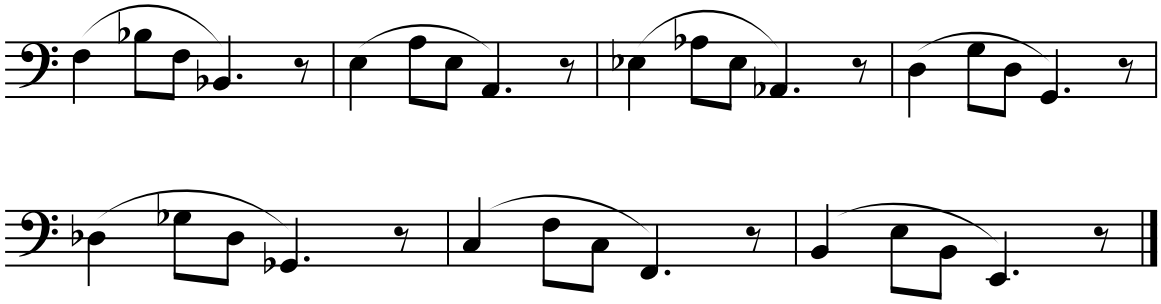

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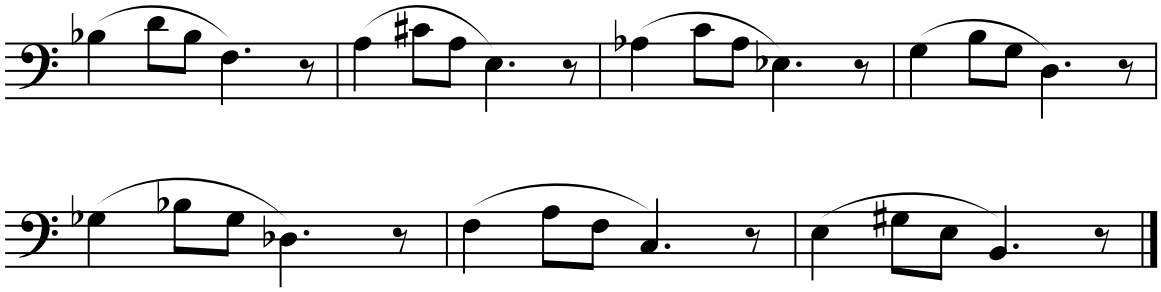

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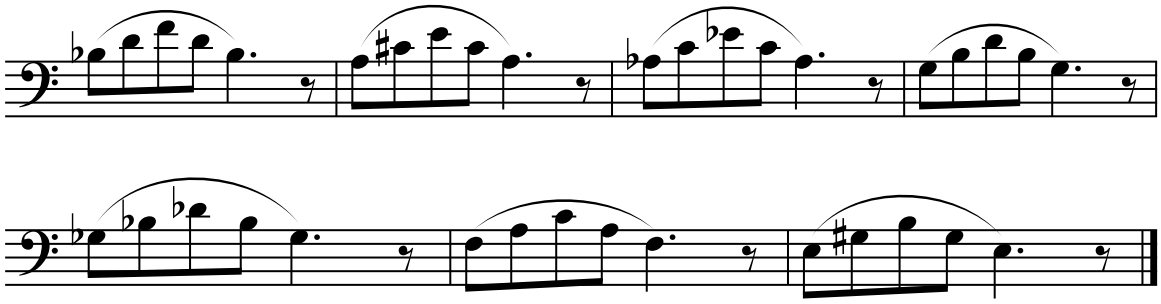

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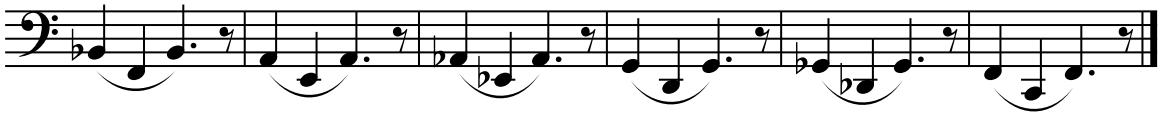

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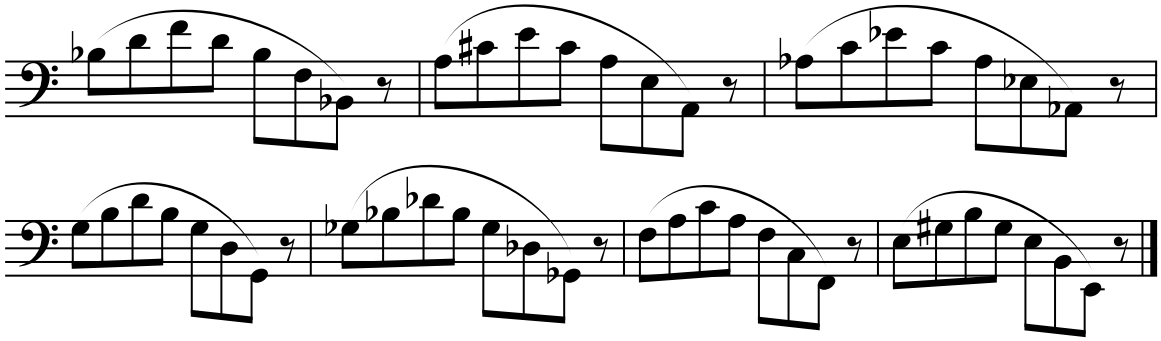

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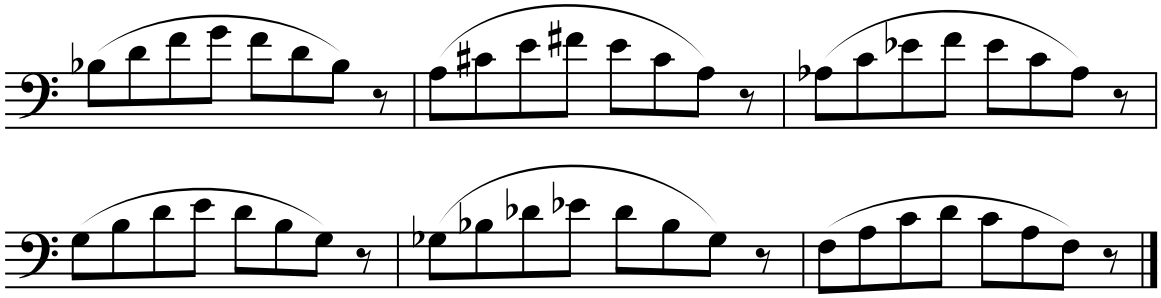

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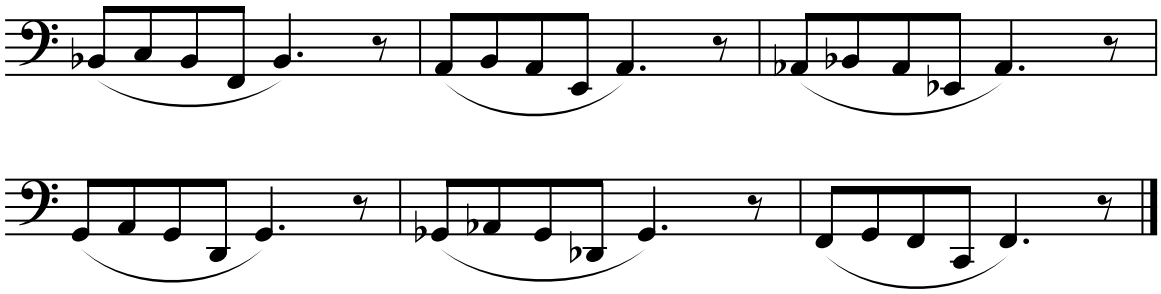

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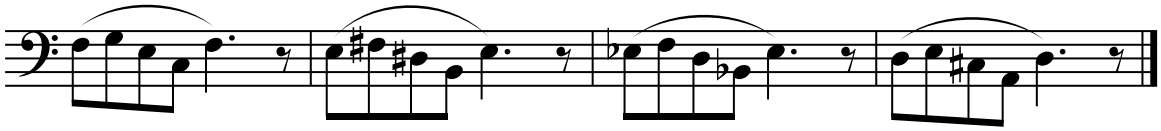

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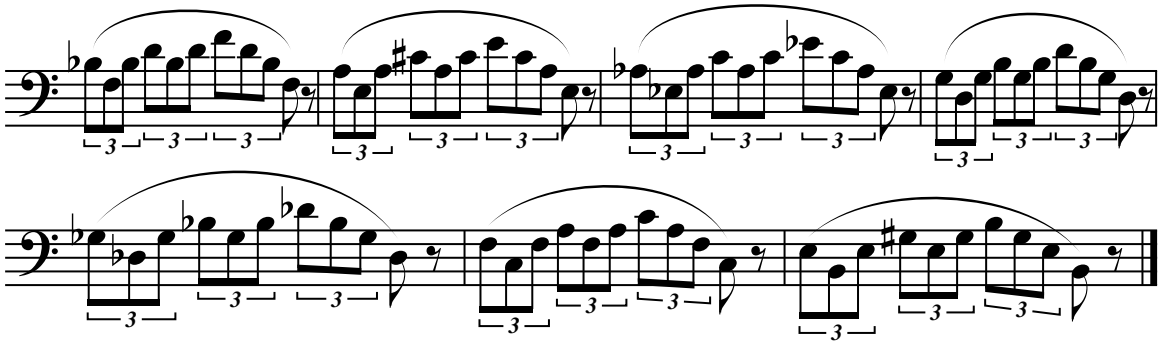

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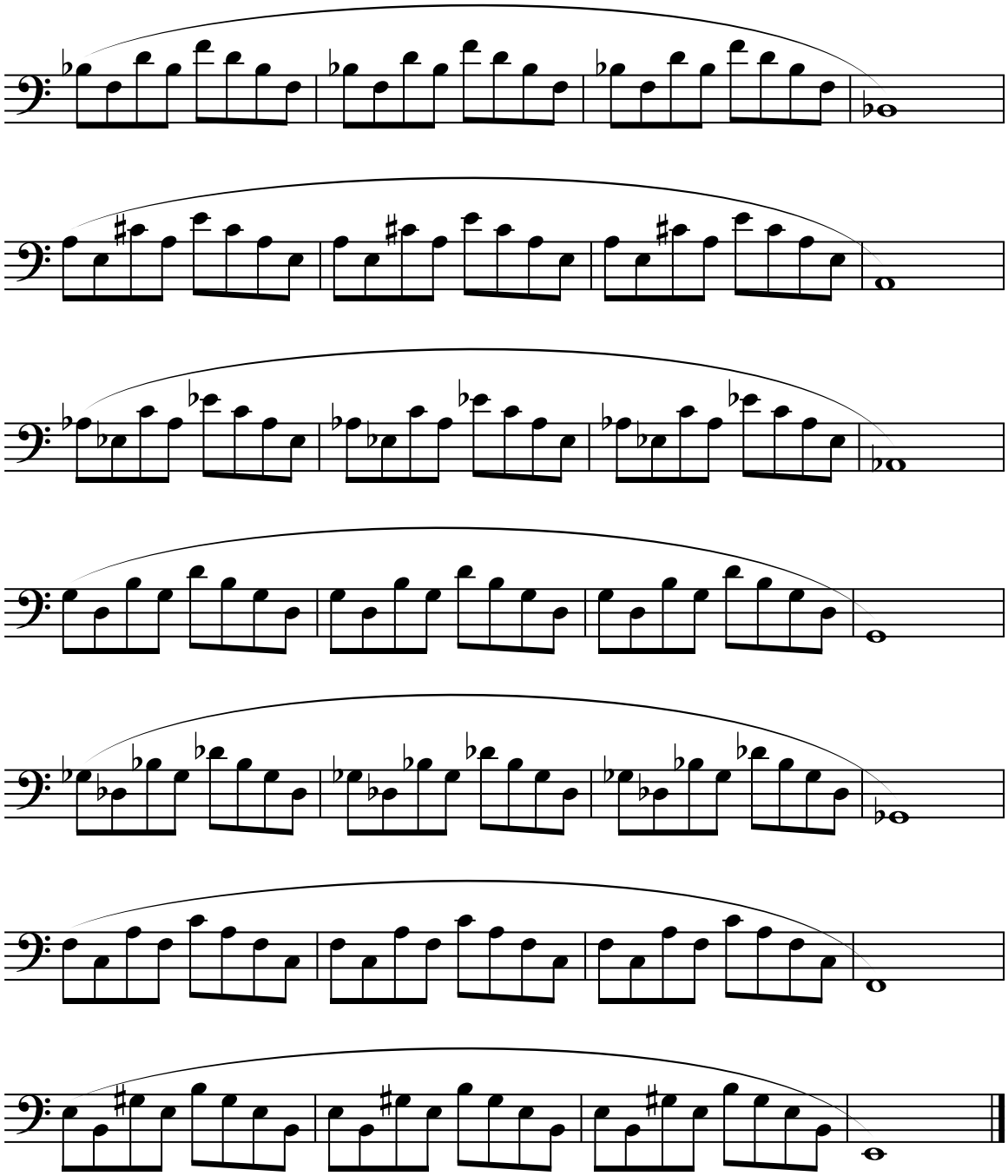

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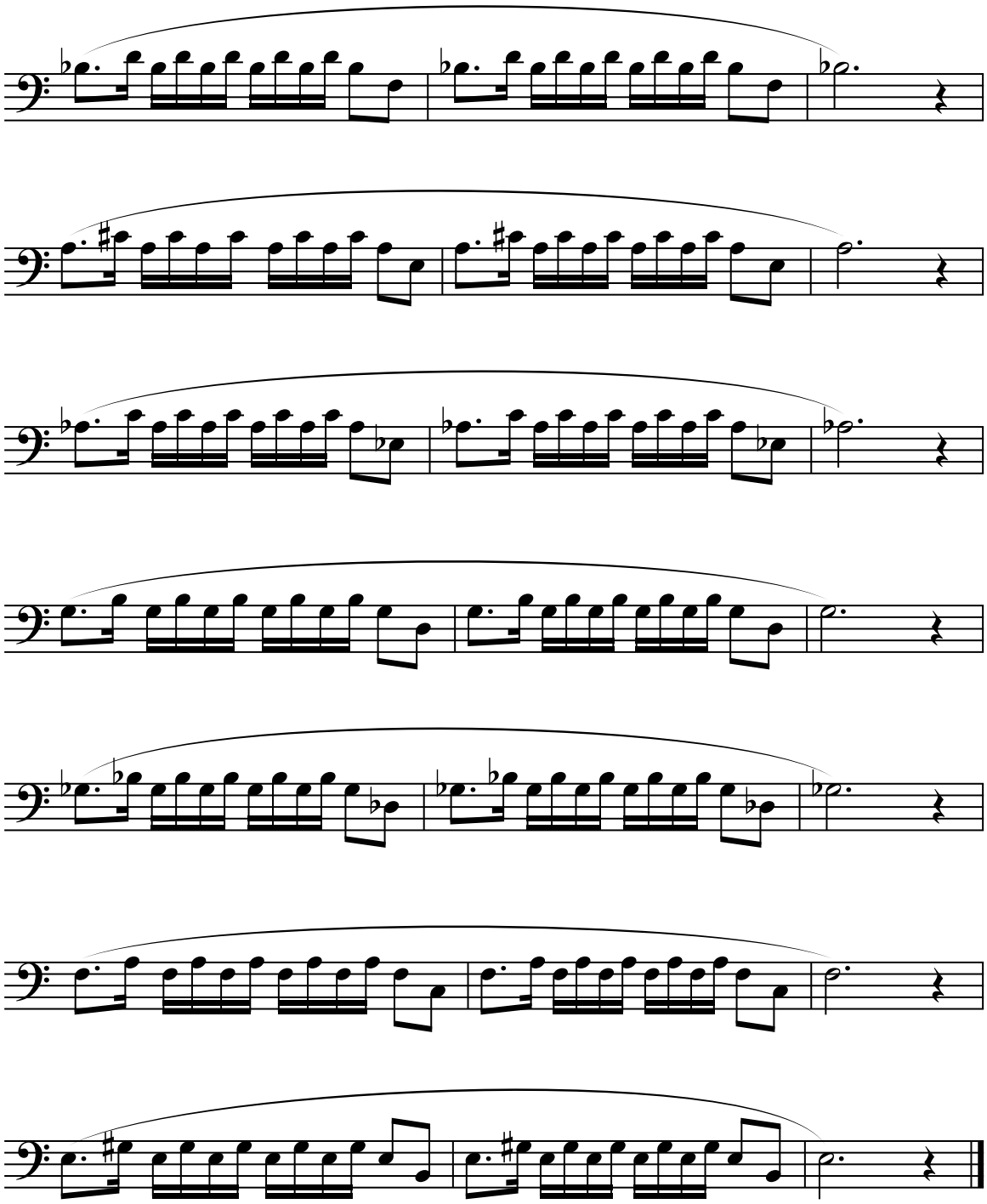

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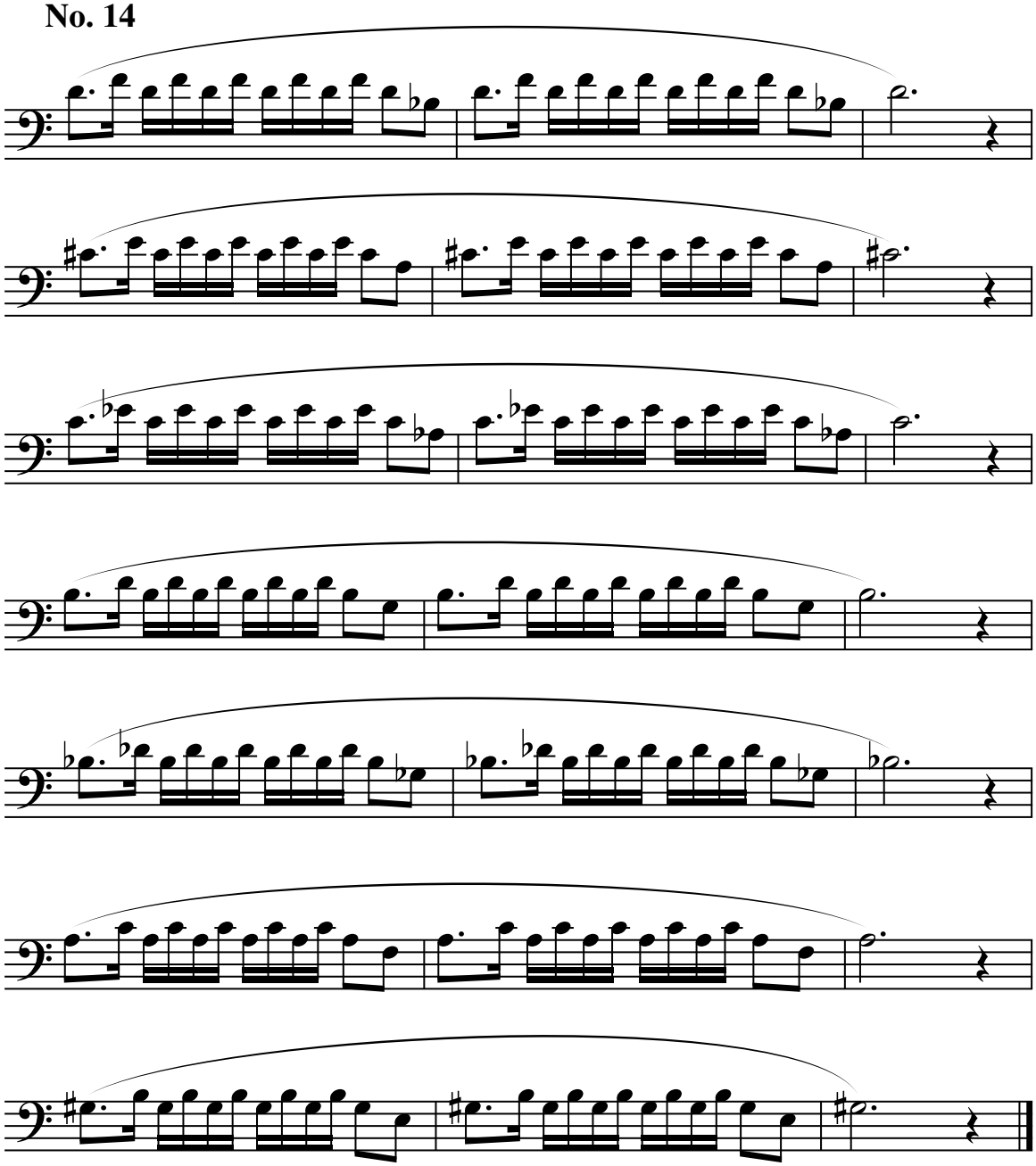

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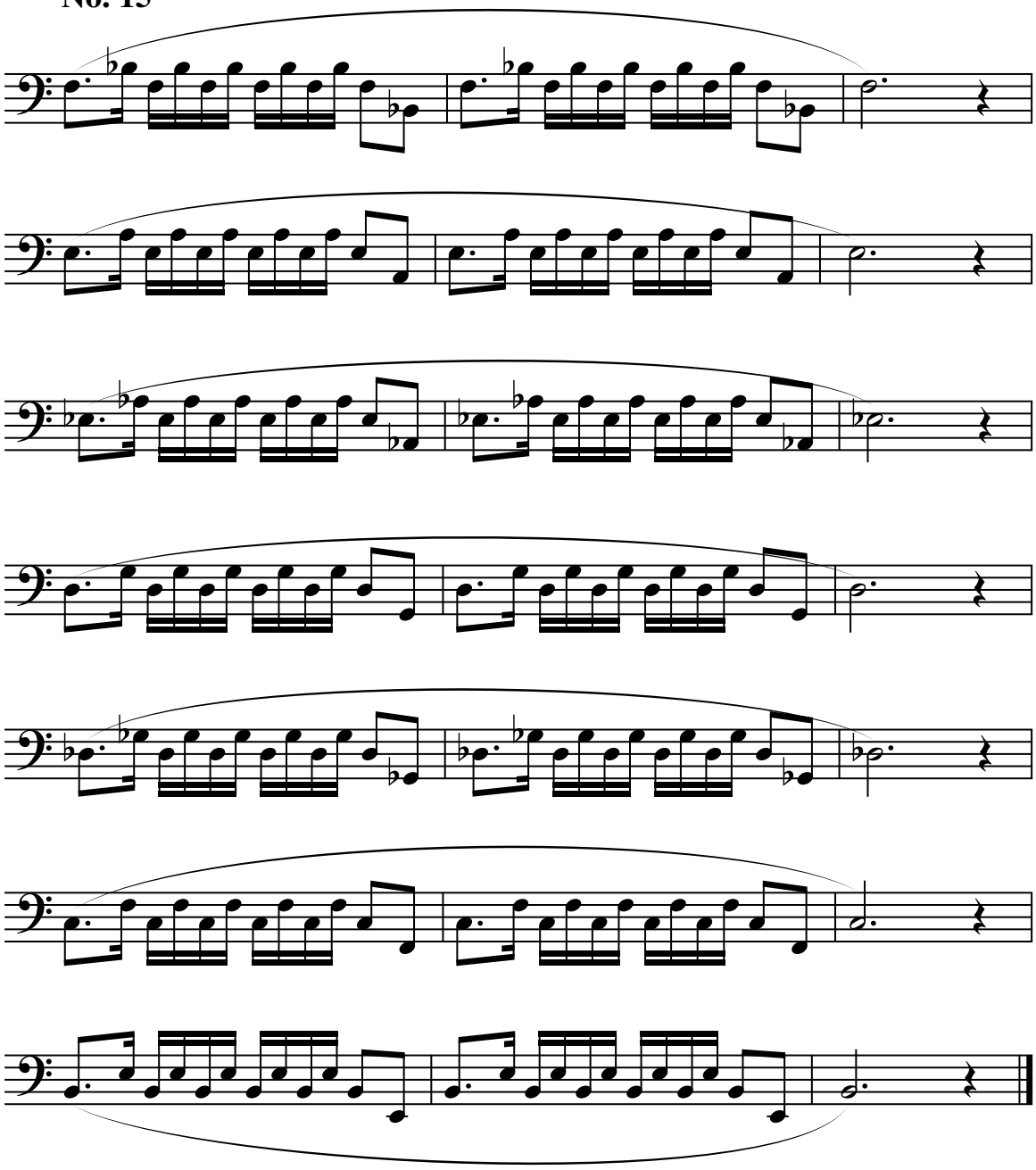

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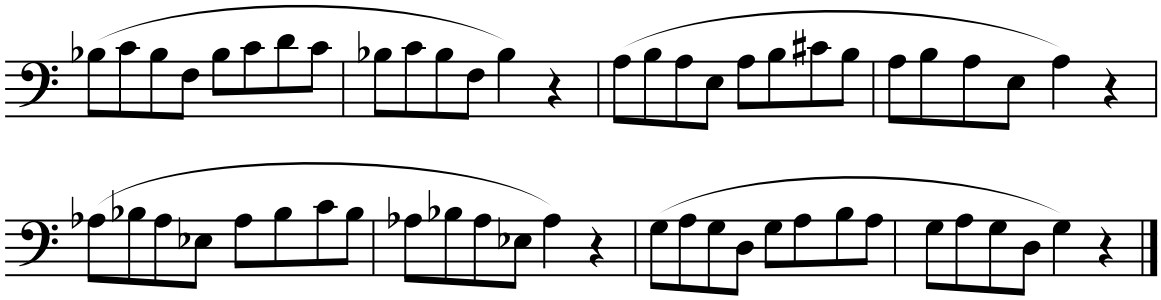

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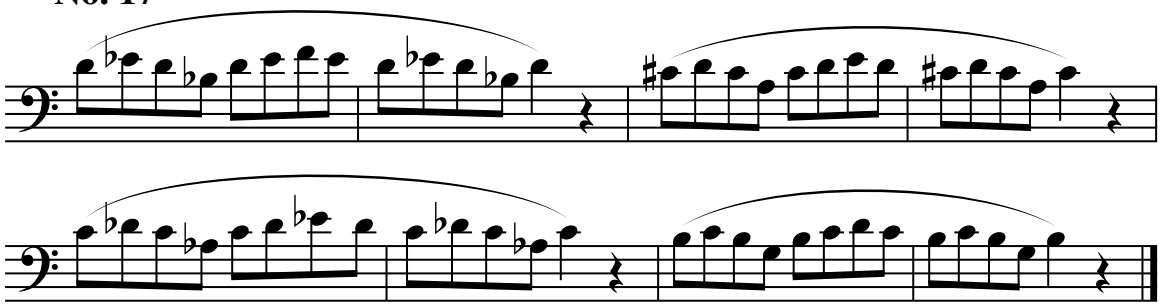

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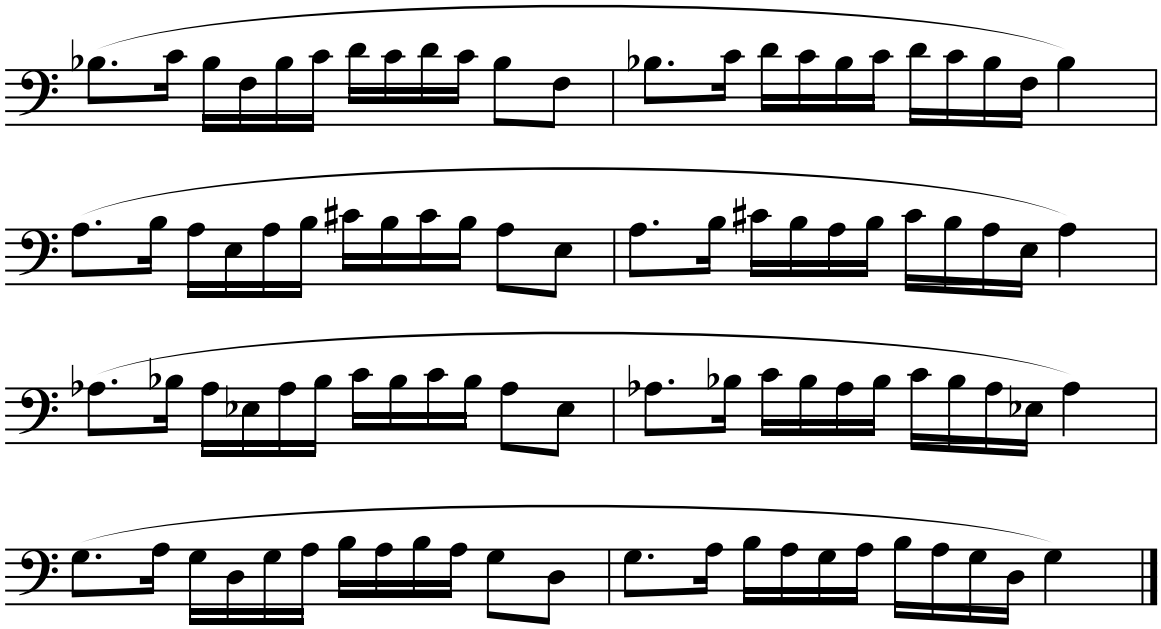

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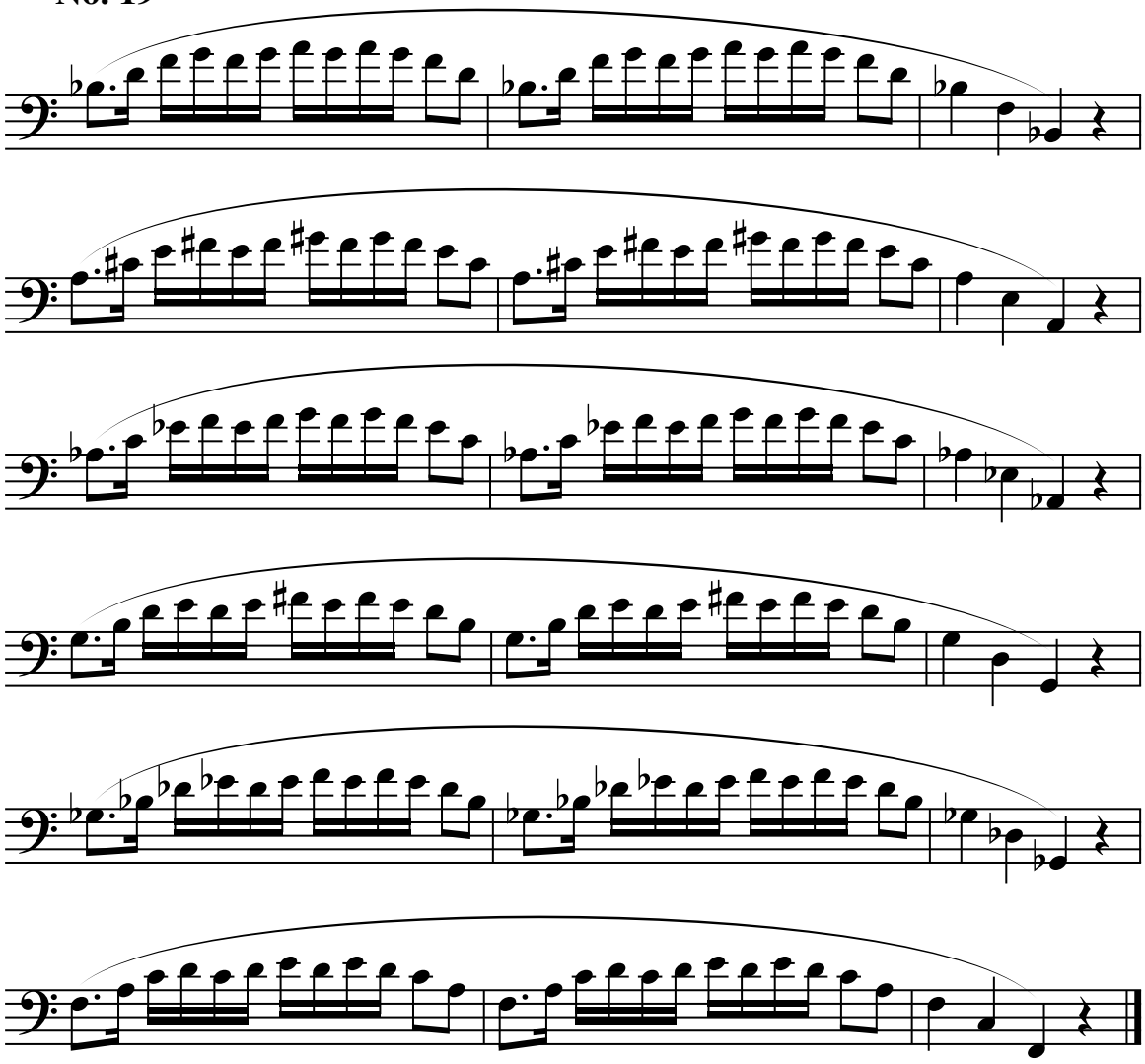

Appendix C - Slide Precision Exercises

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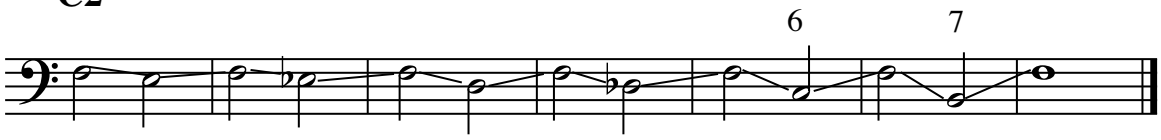

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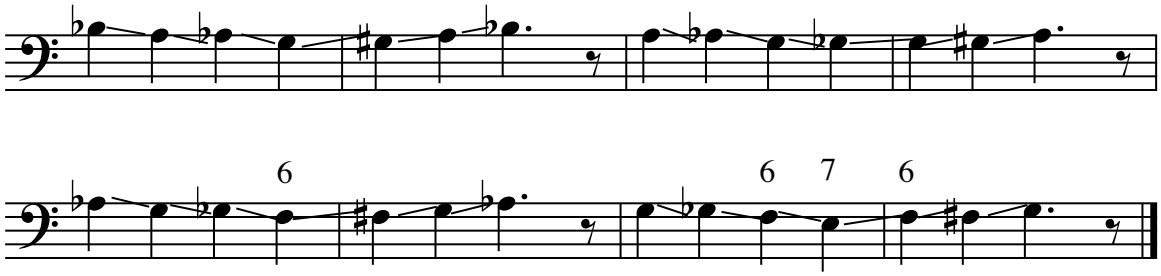

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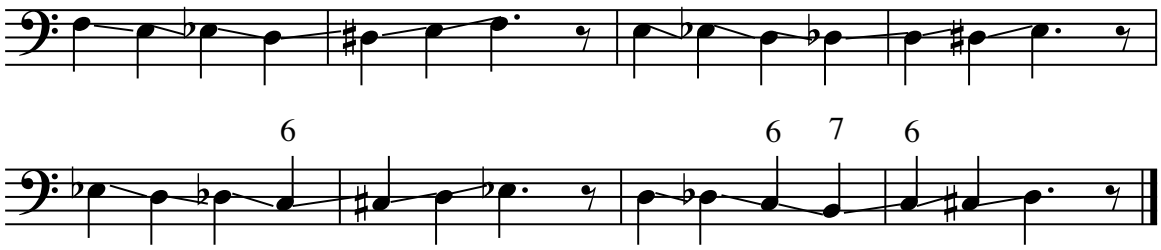

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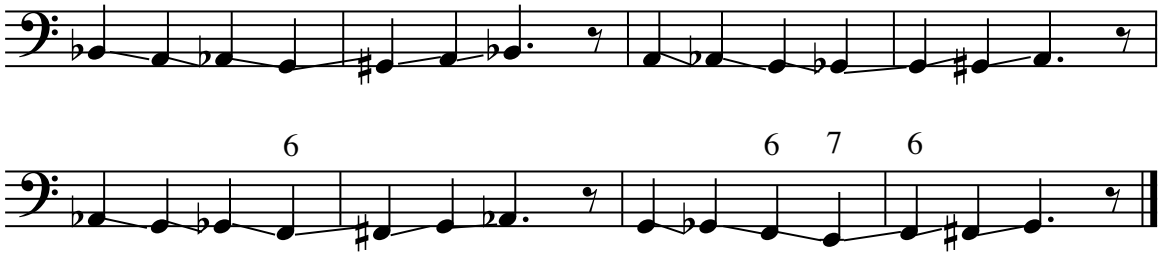

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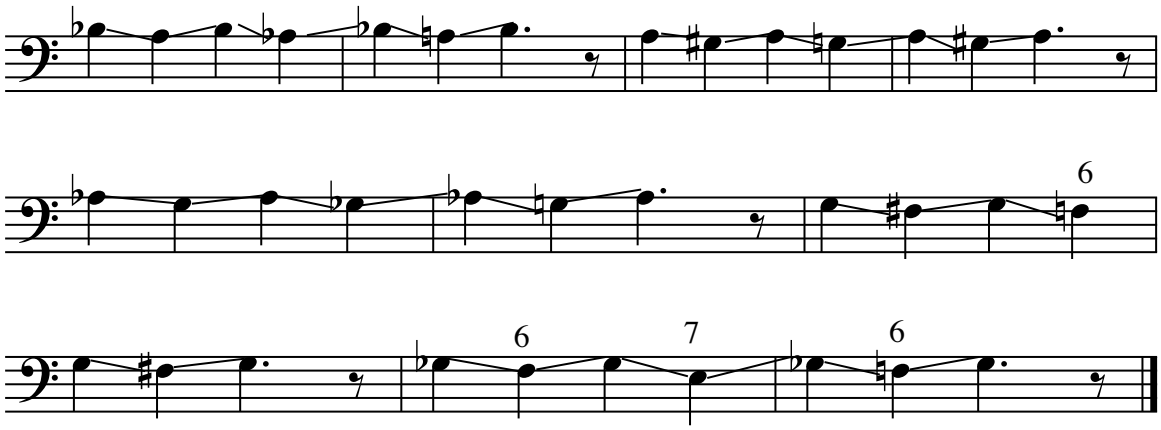

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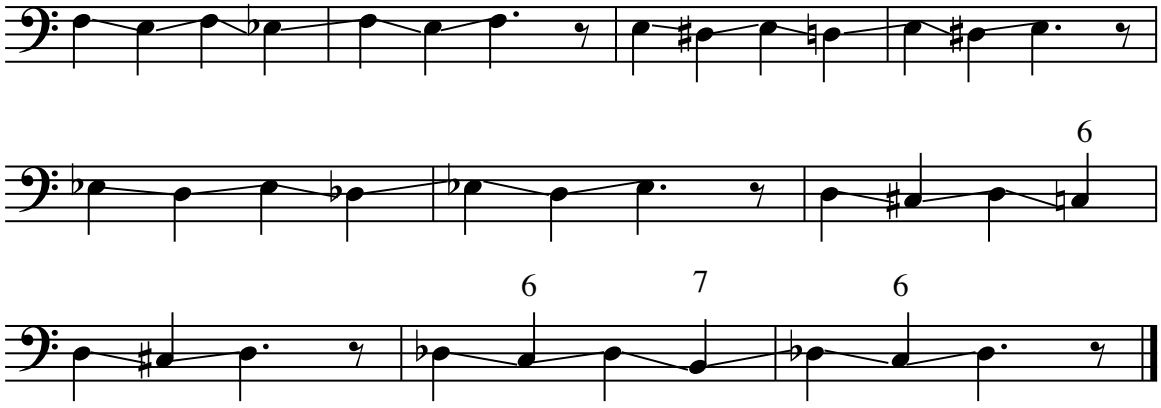

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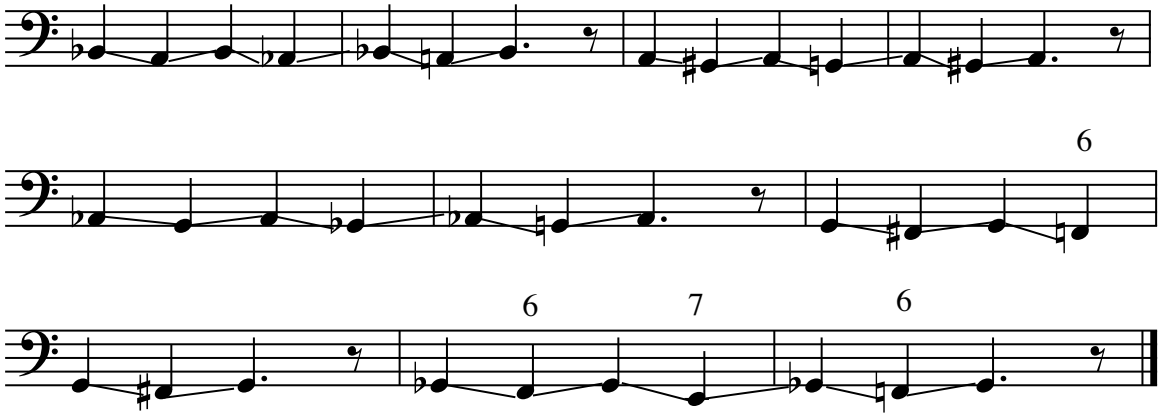

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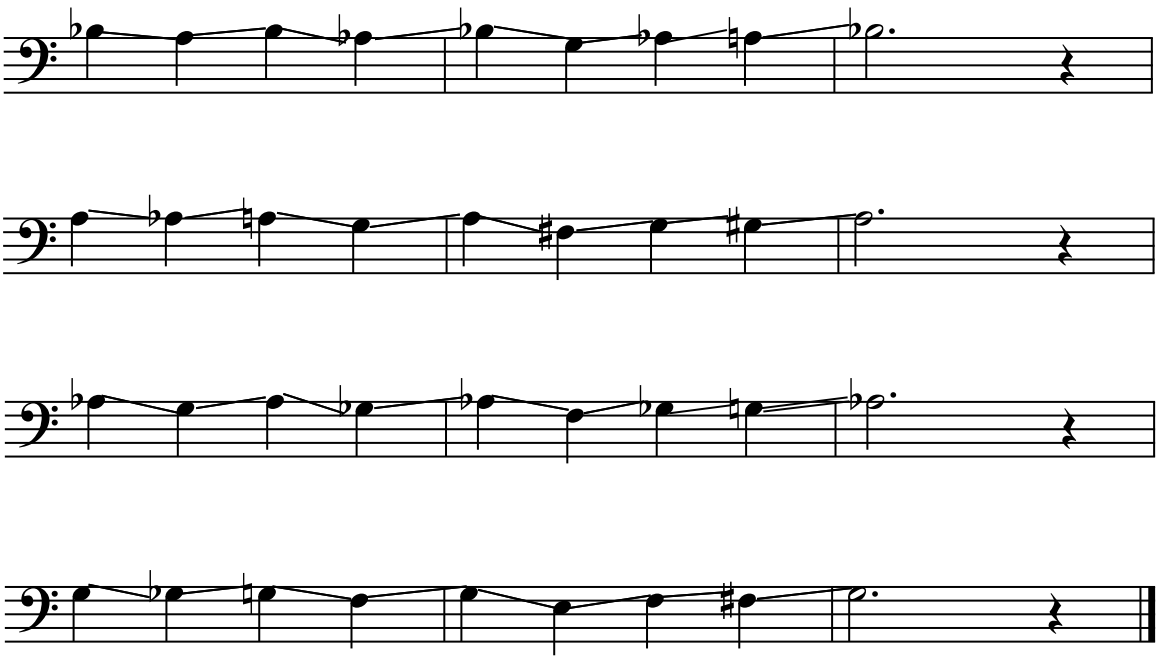

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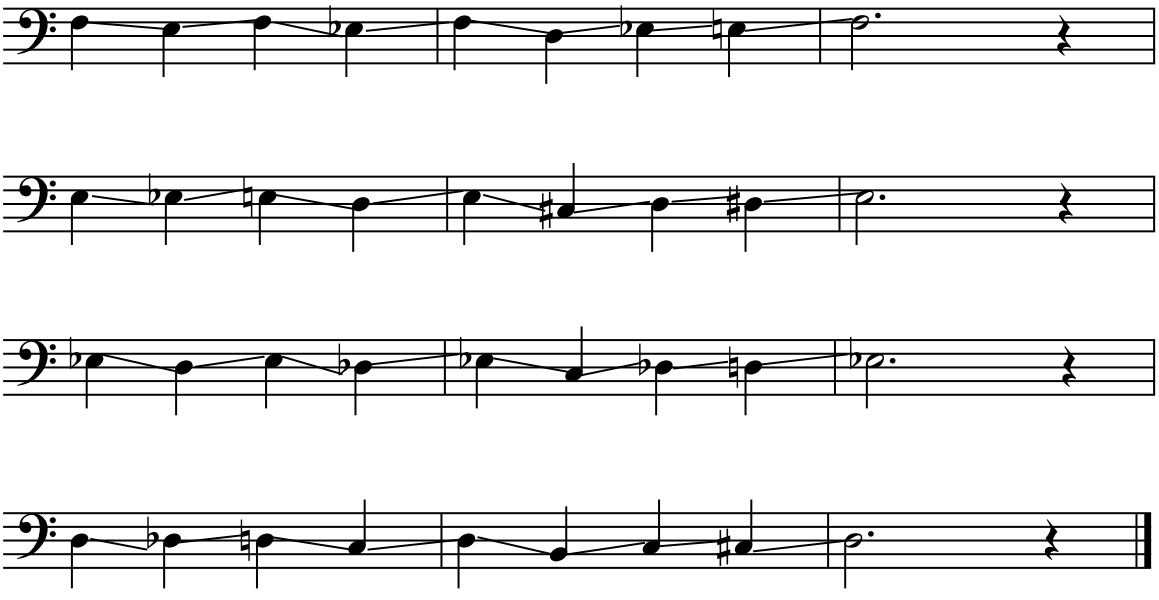

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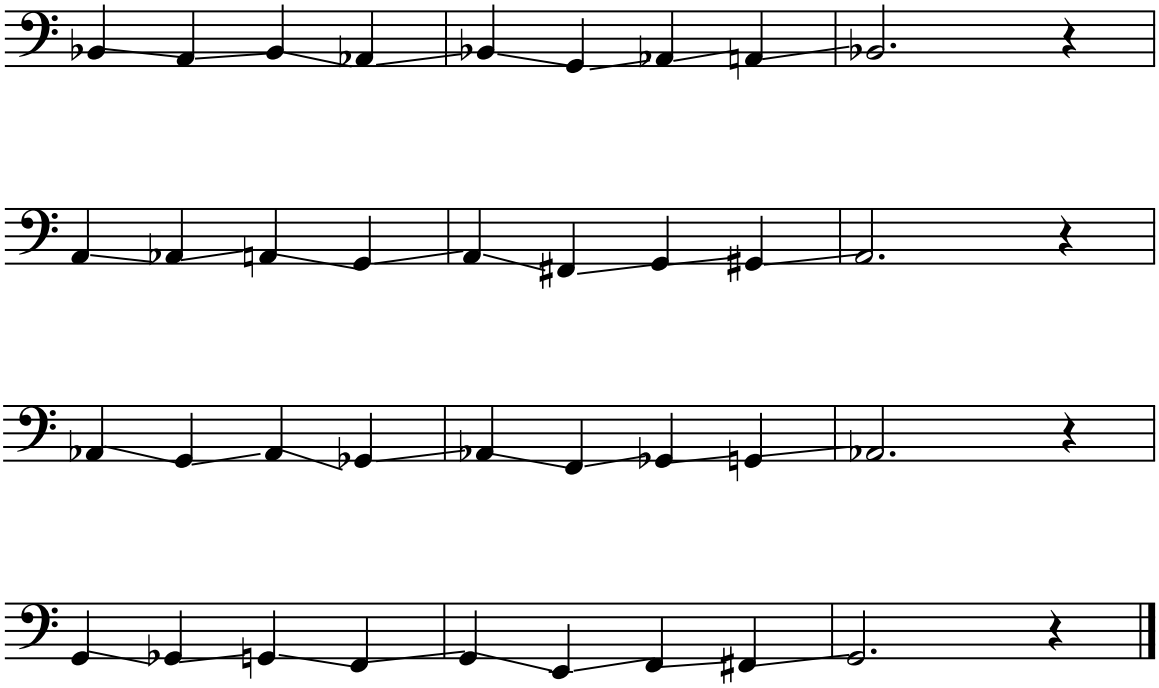

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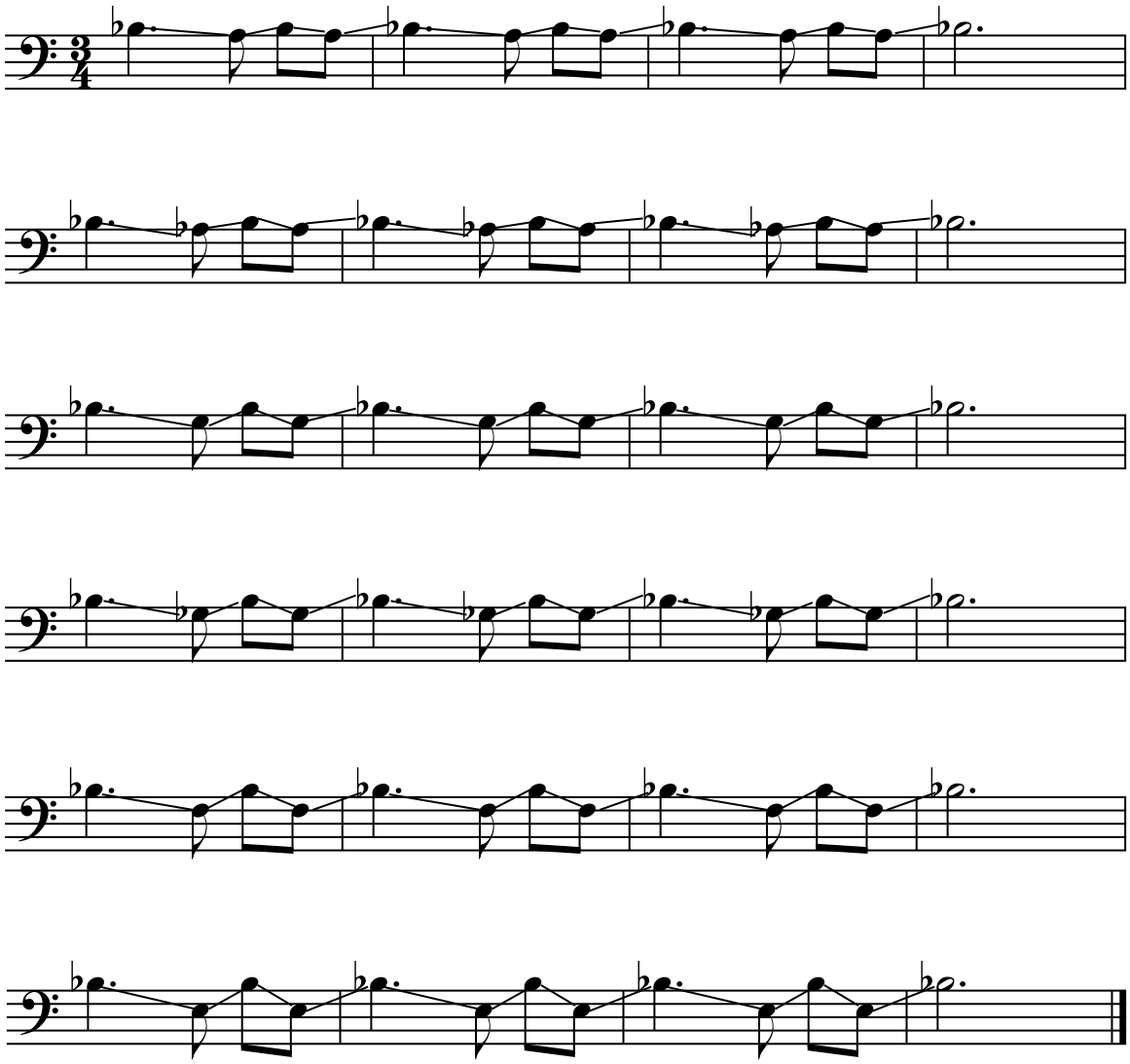

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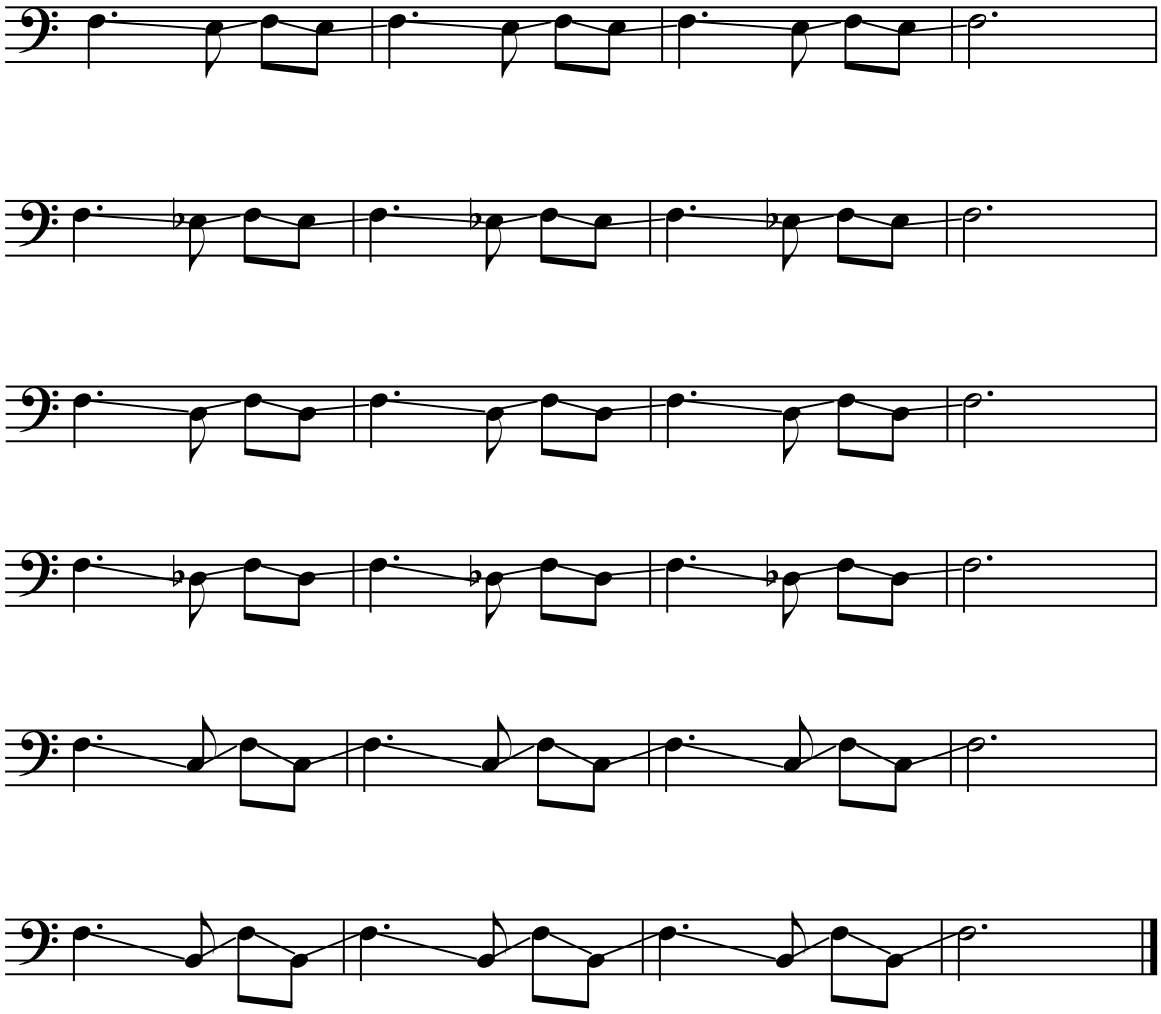

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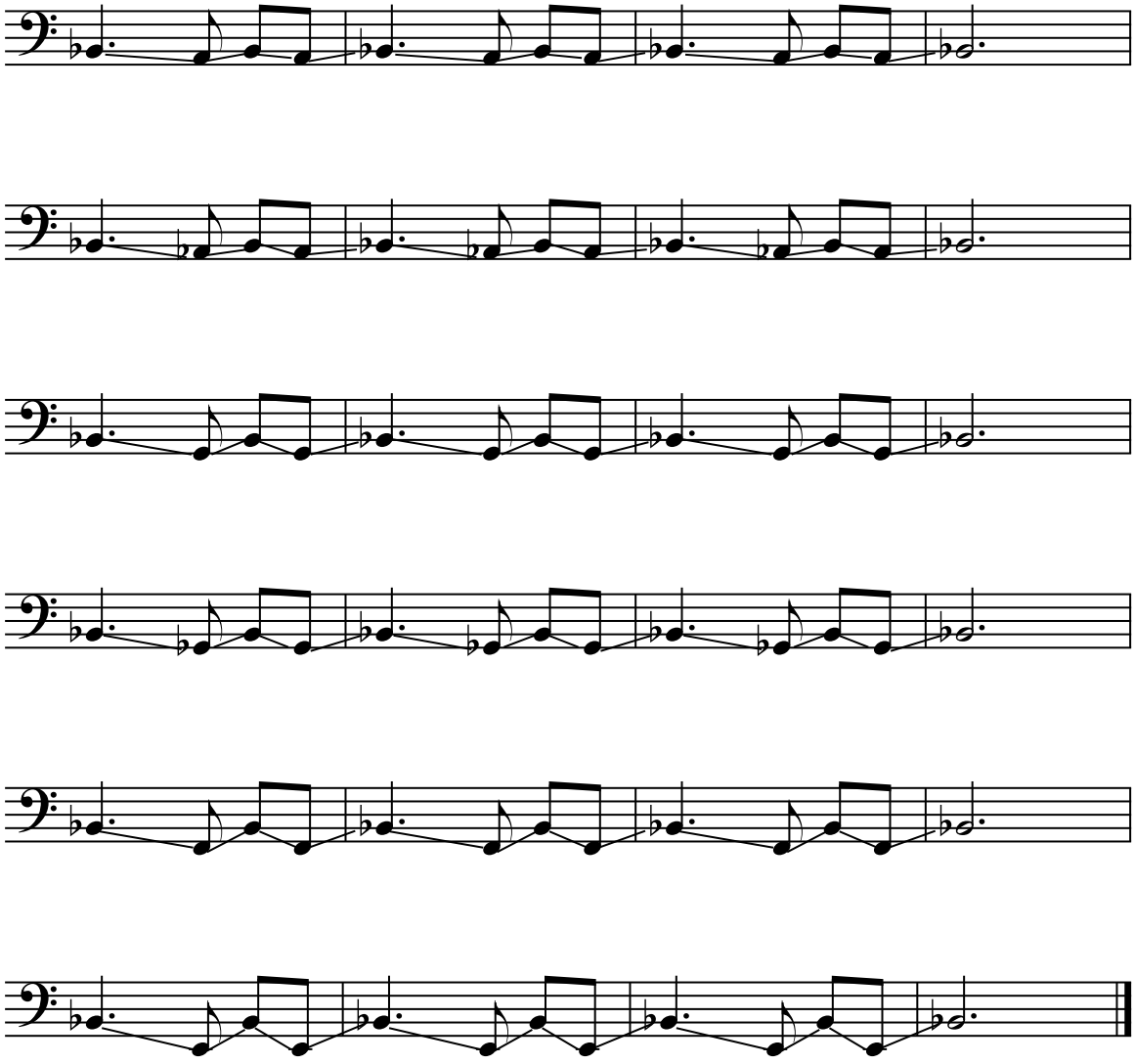

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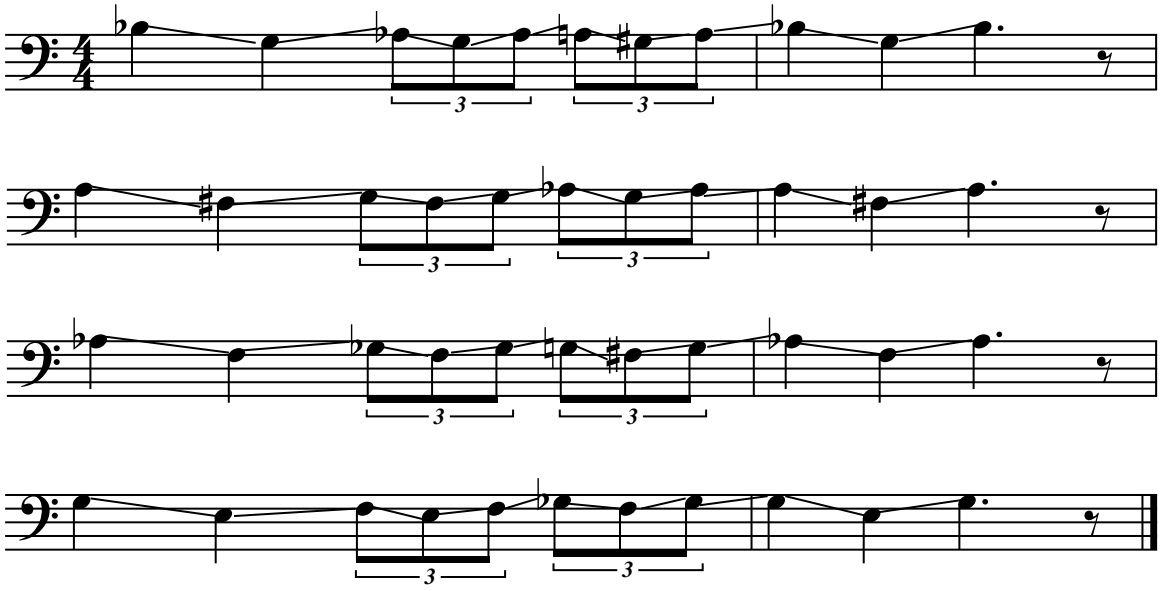

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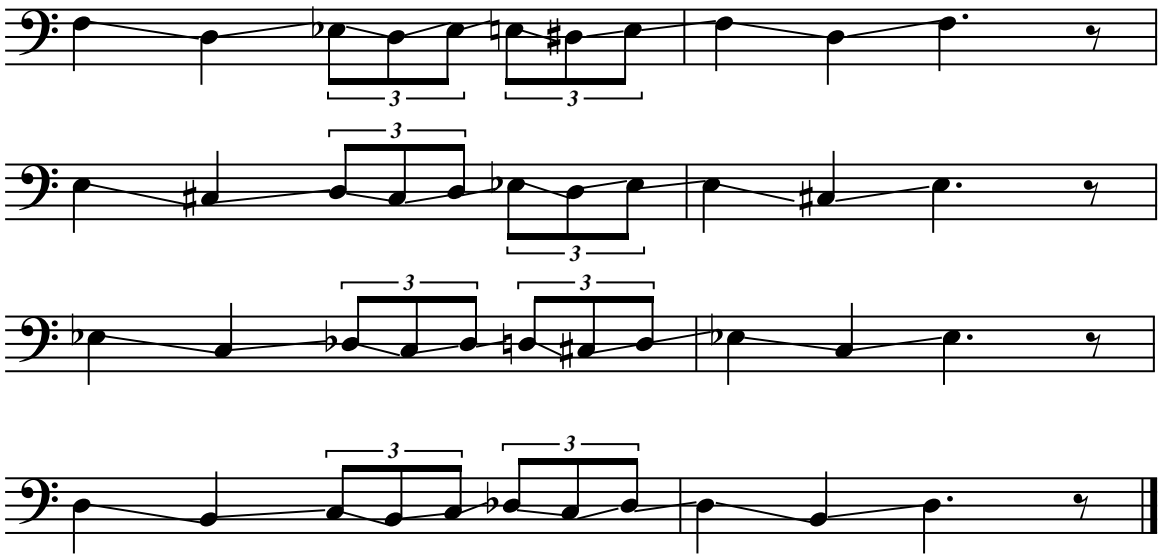

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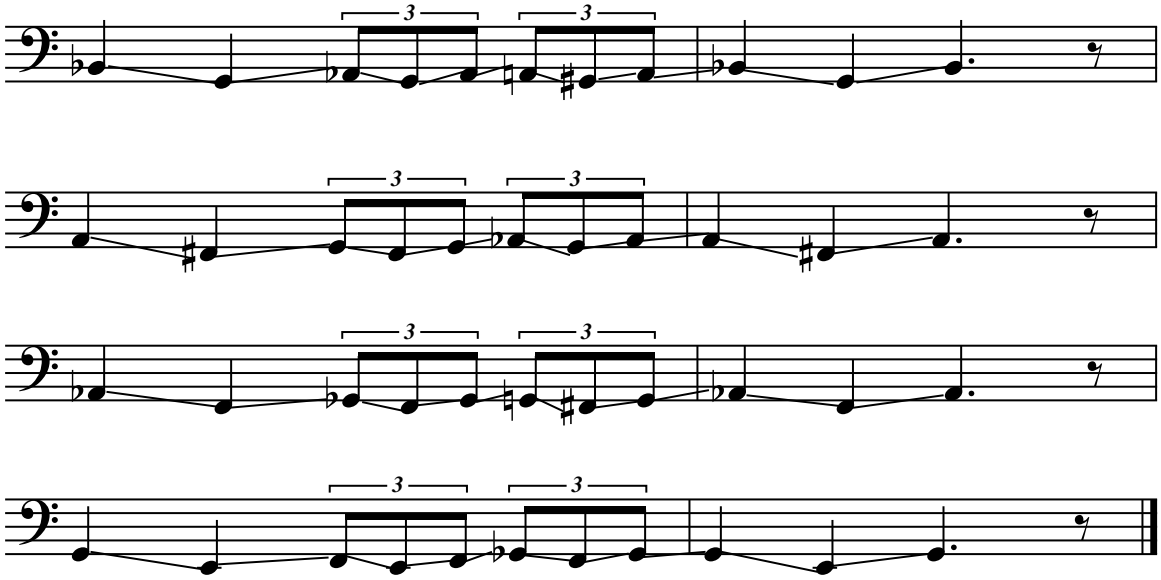

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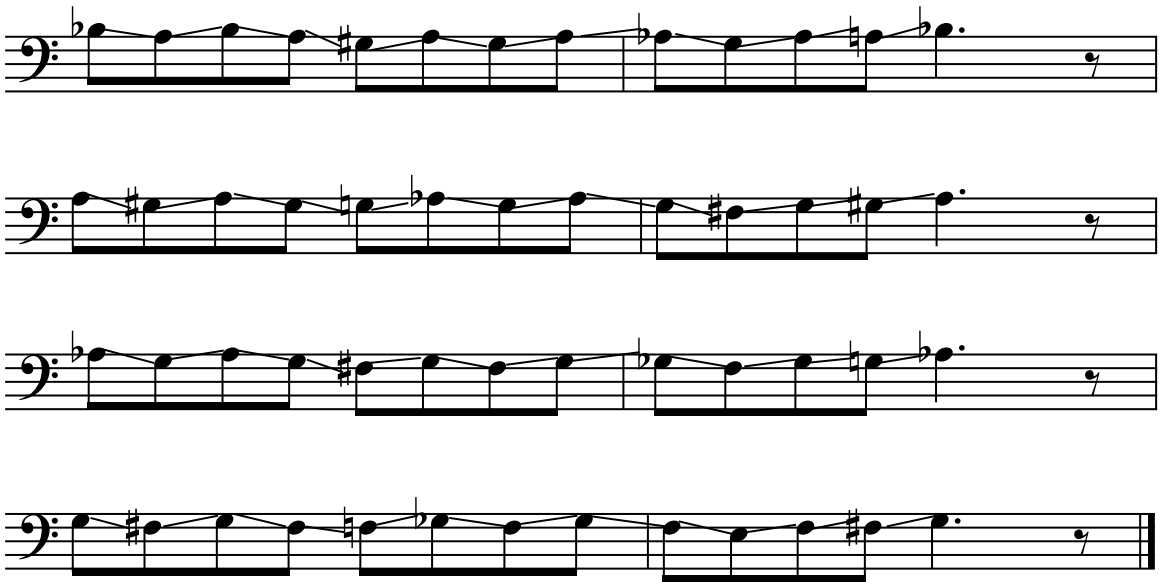

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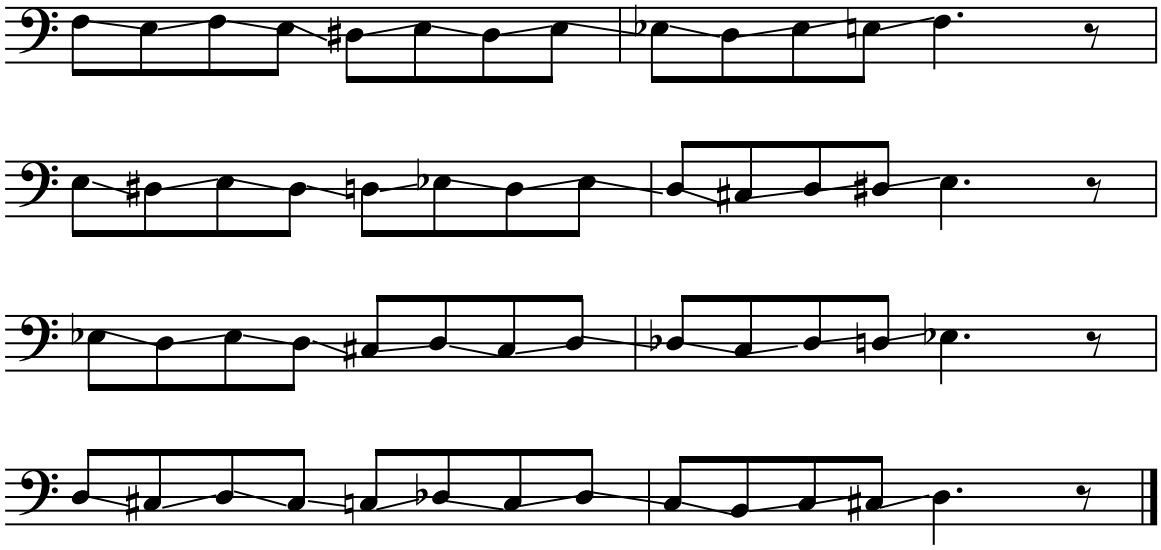

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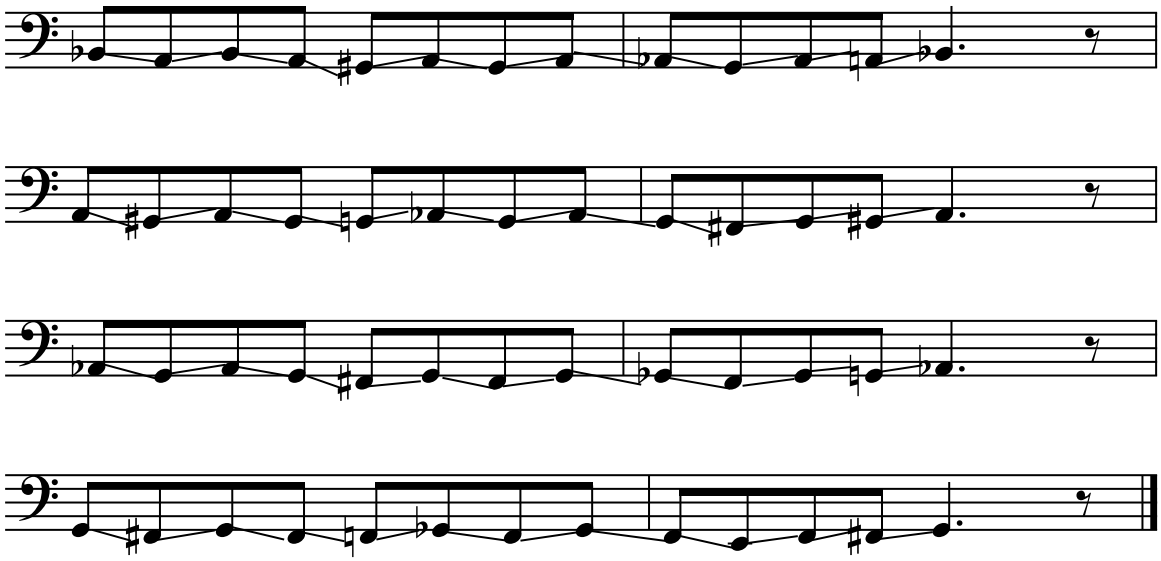

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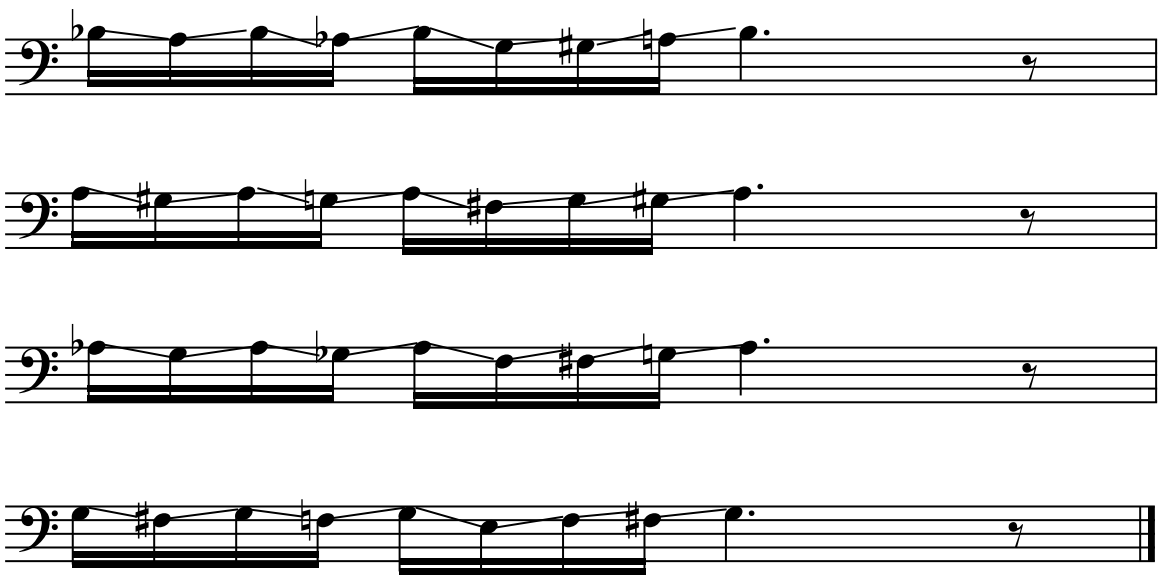

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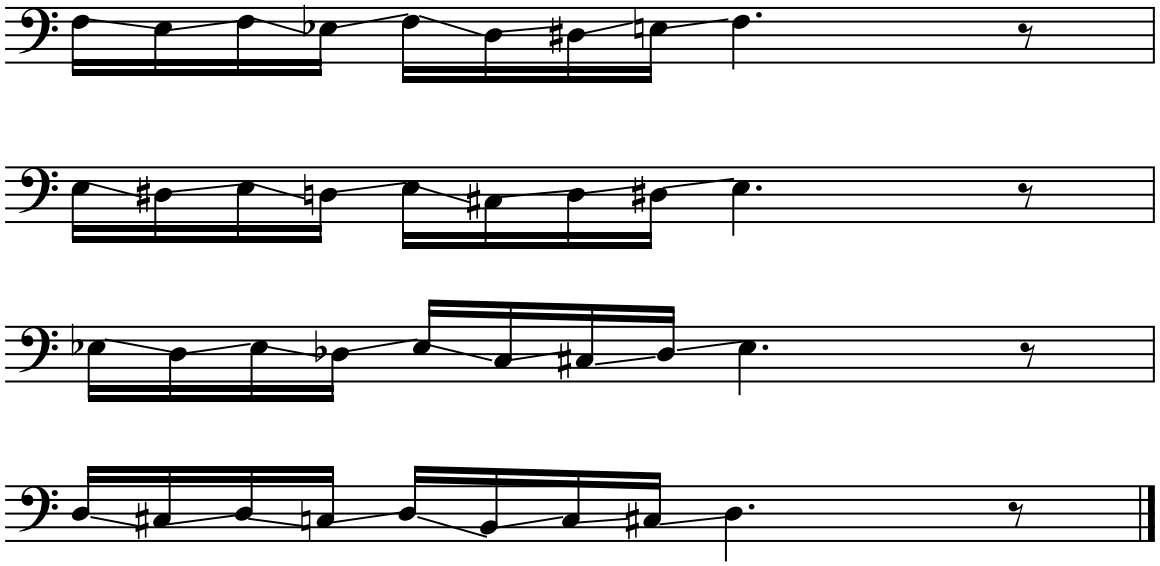

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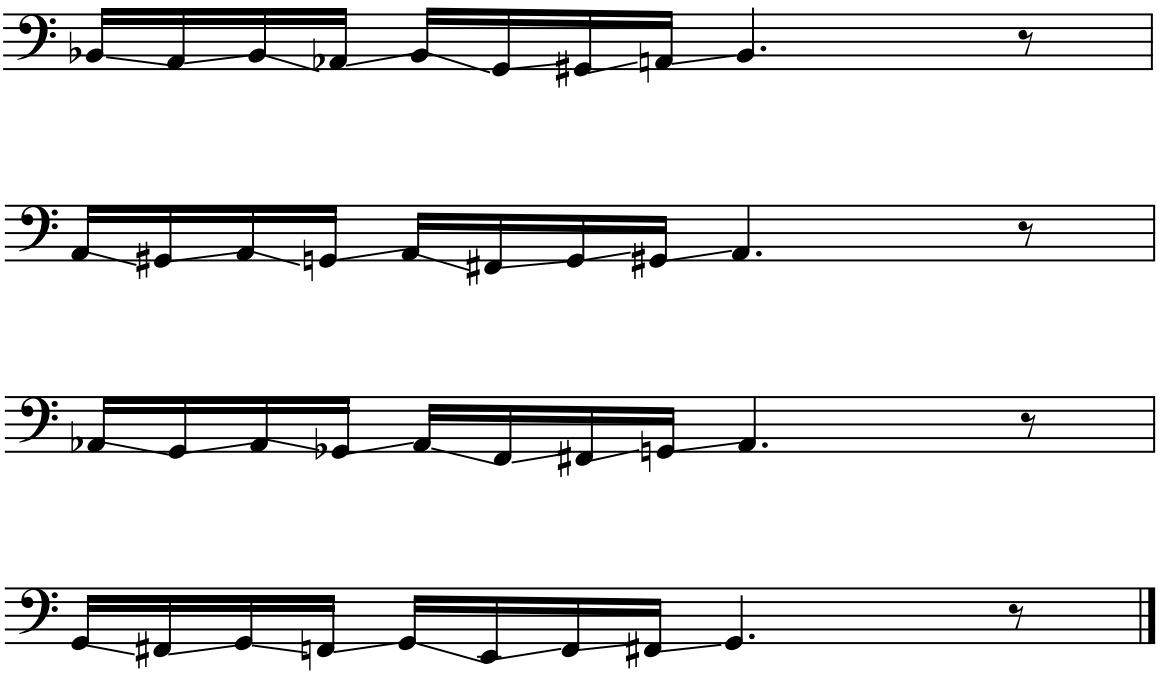
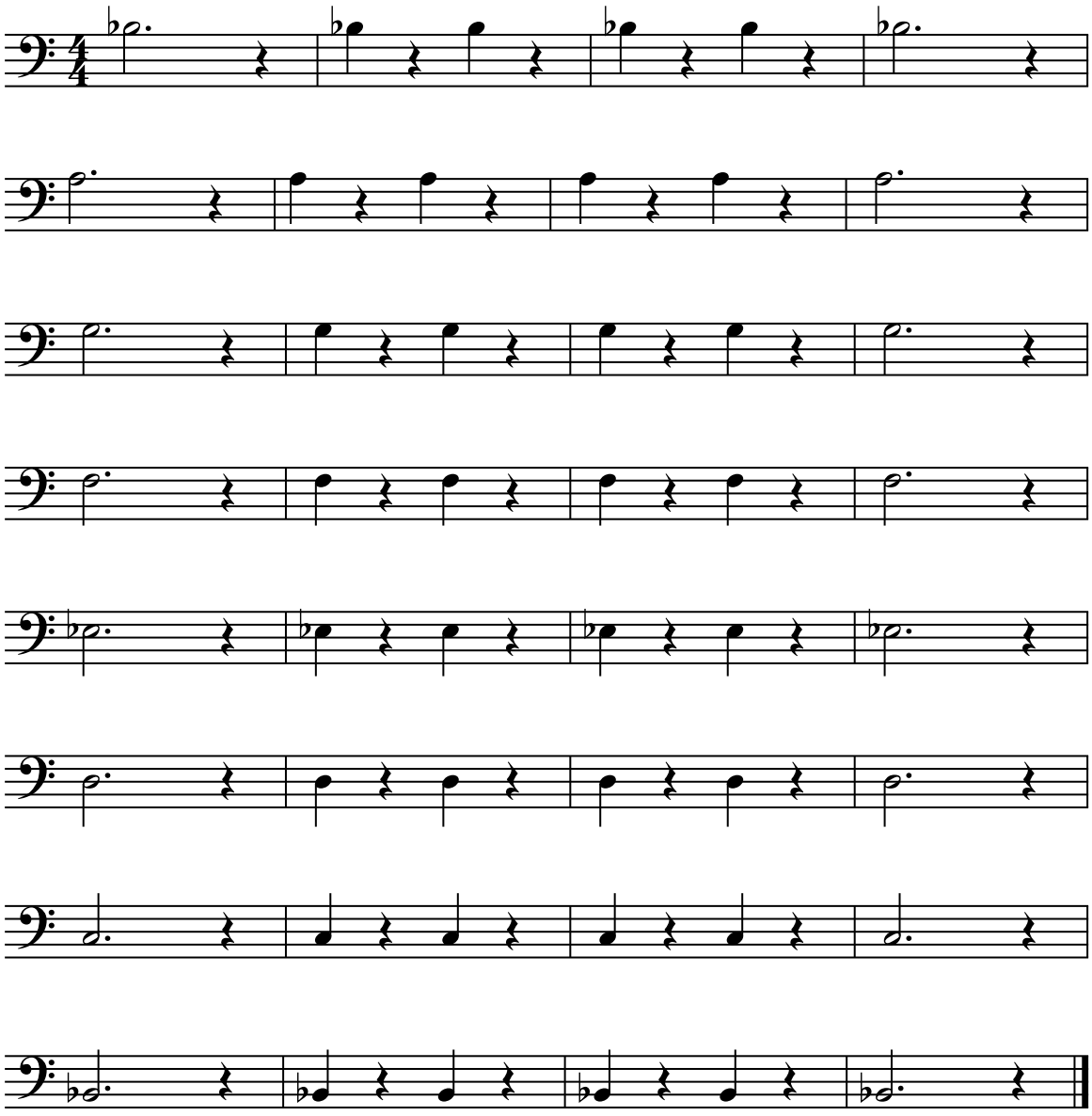


Appendix D - Articulation Exercises

D1



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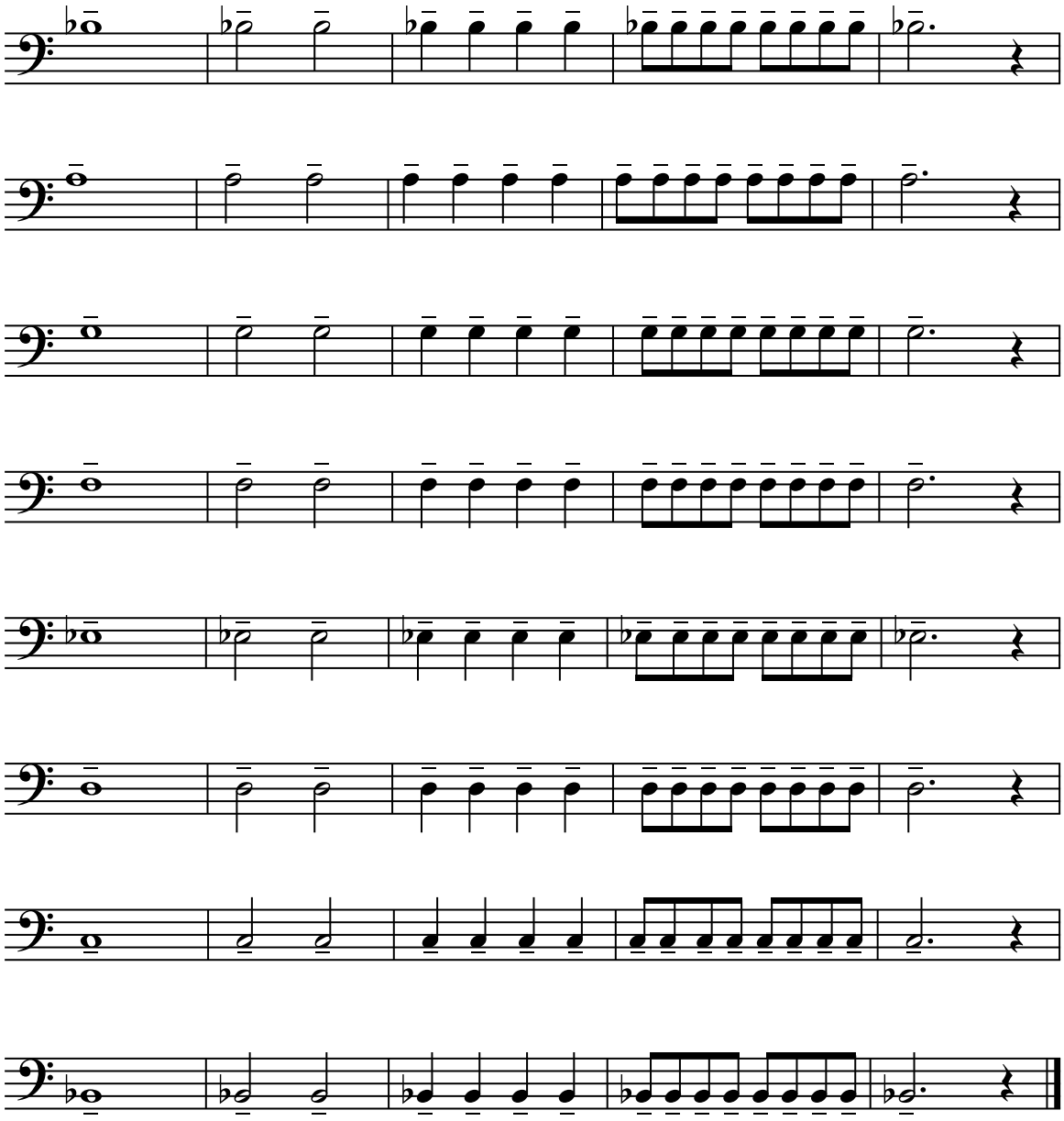

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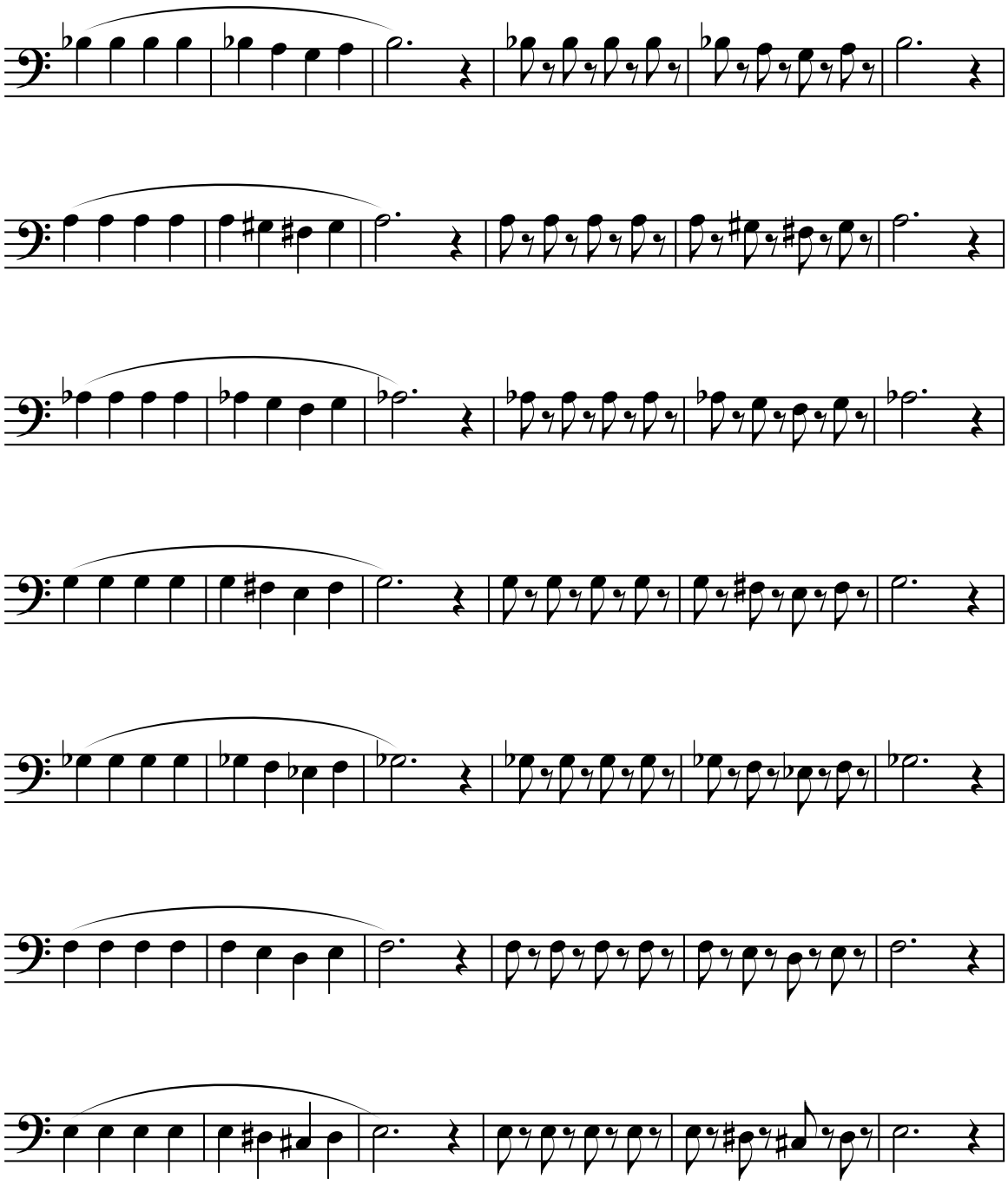

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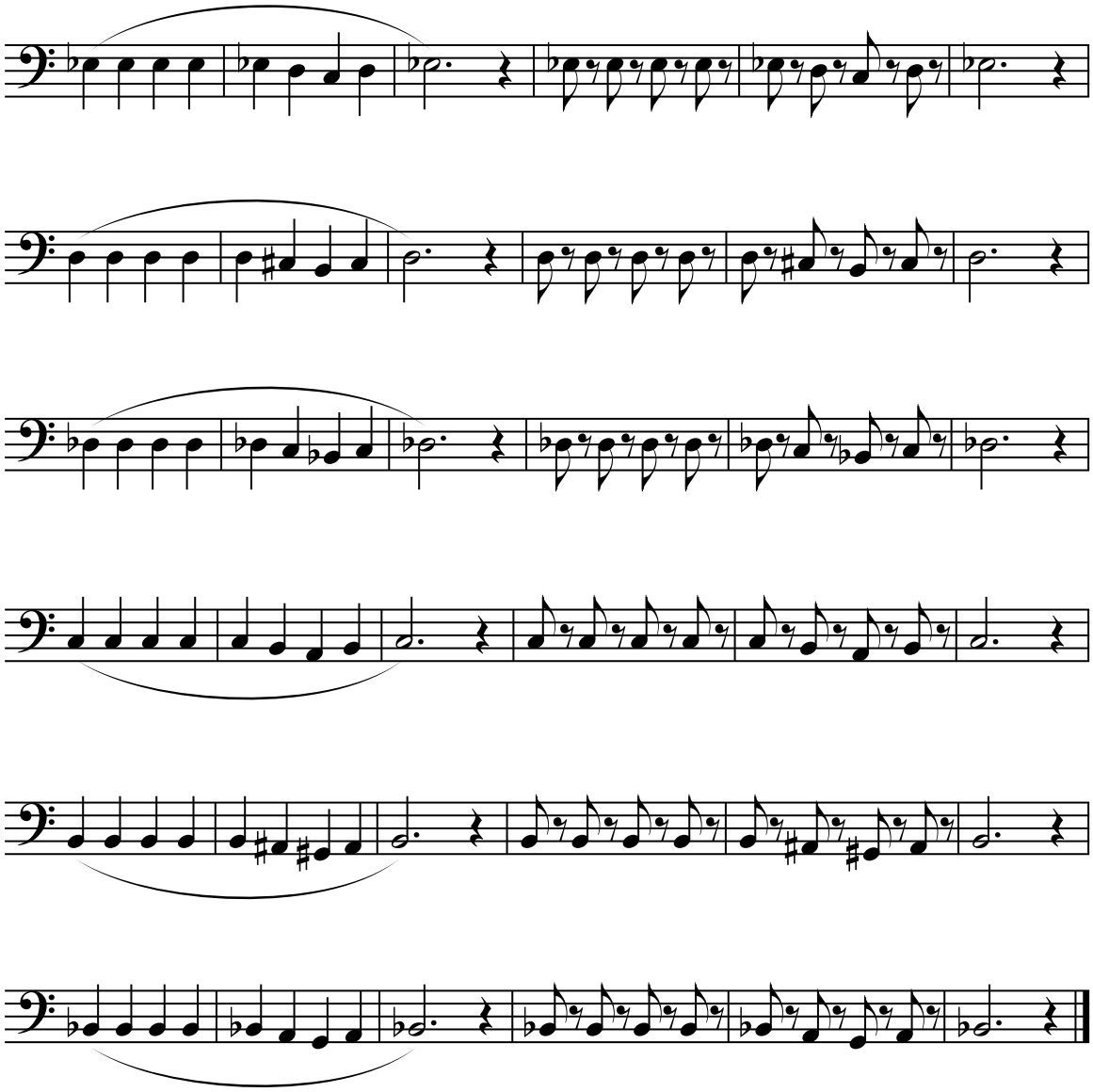

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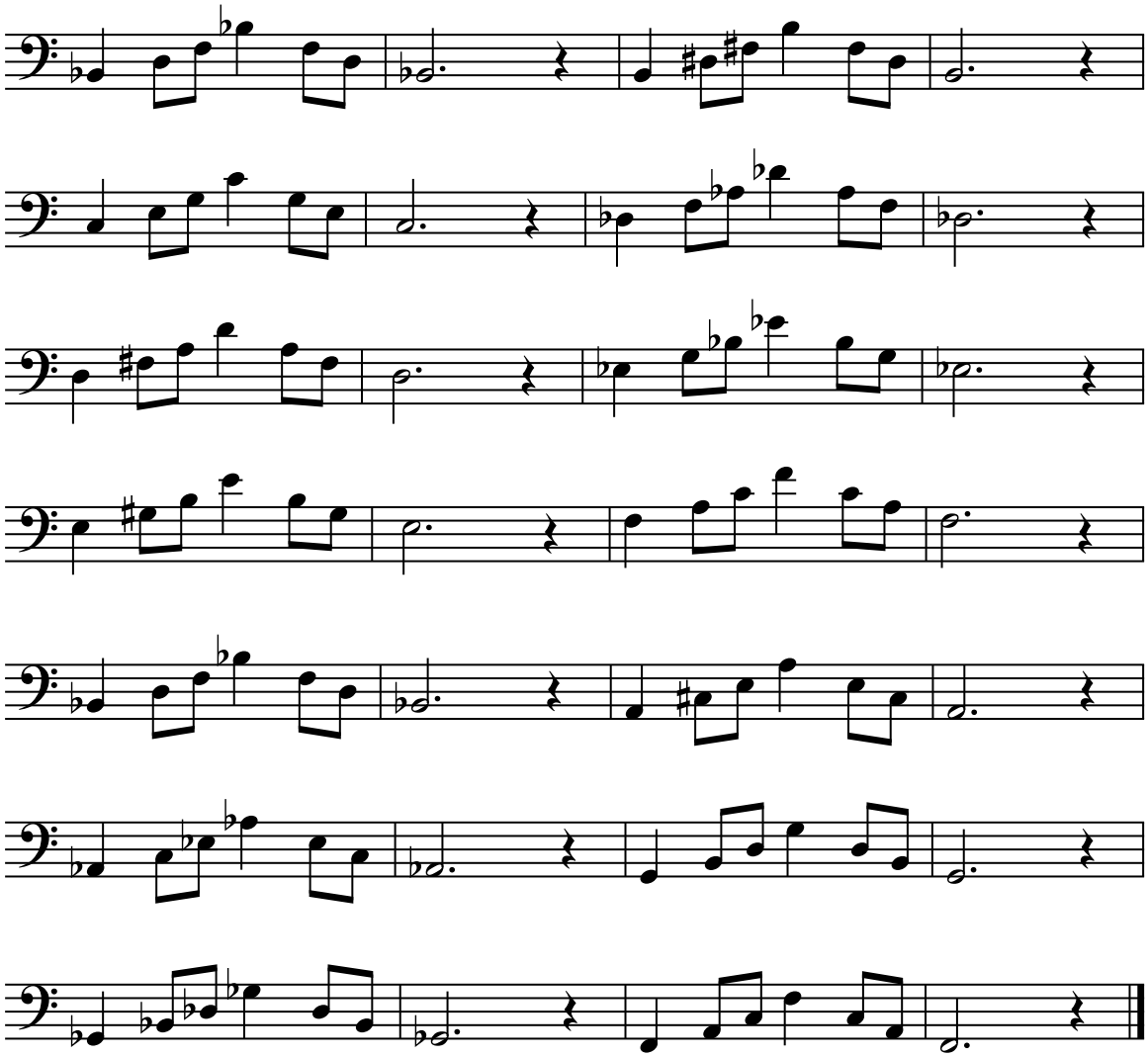

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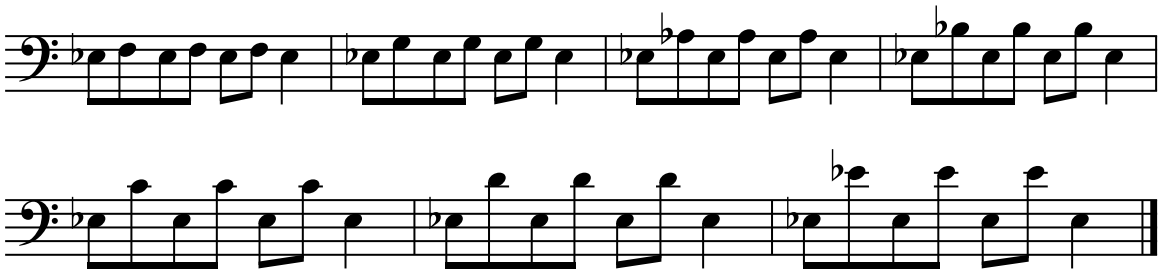

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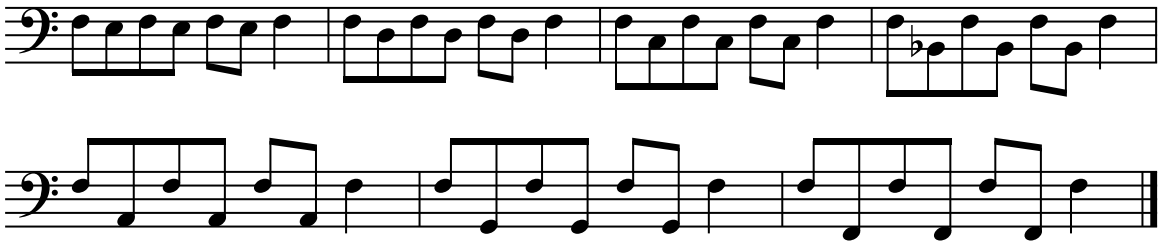

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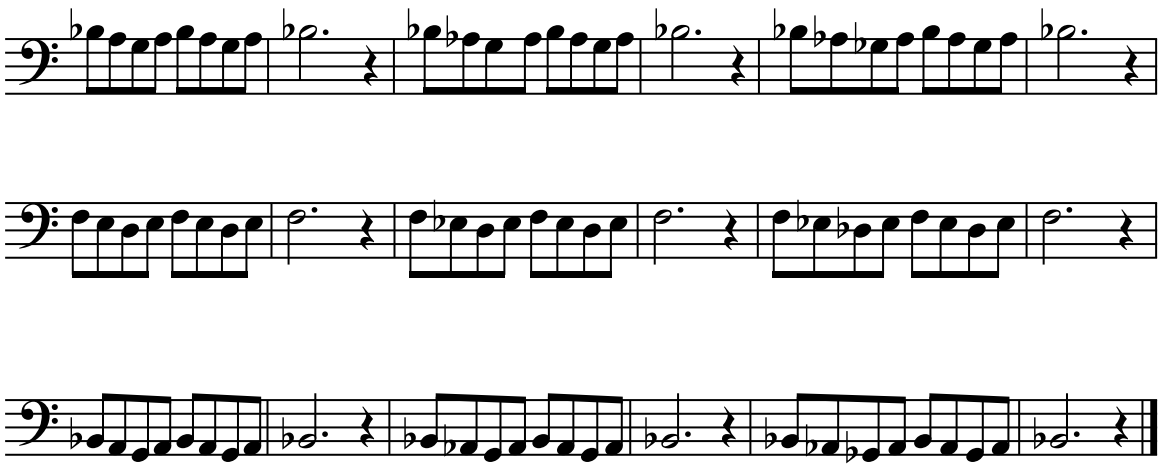

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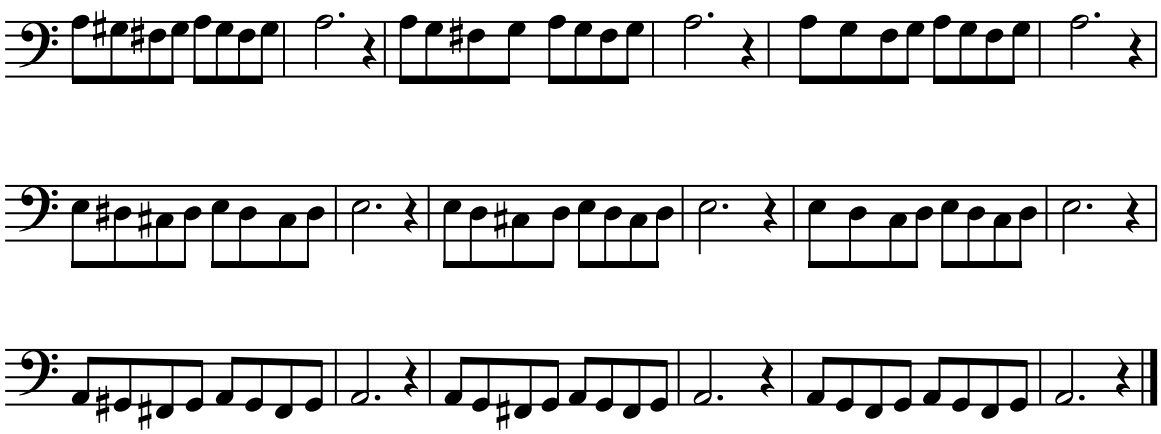

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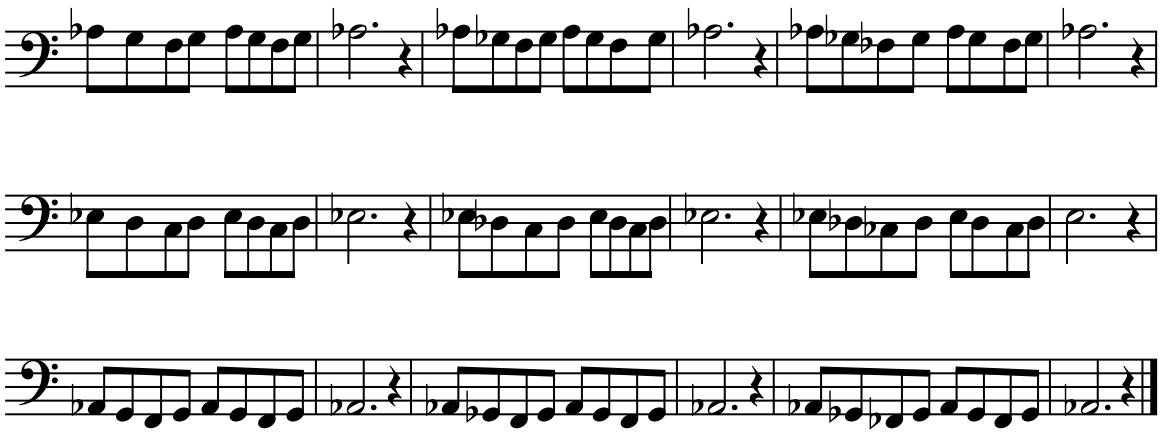

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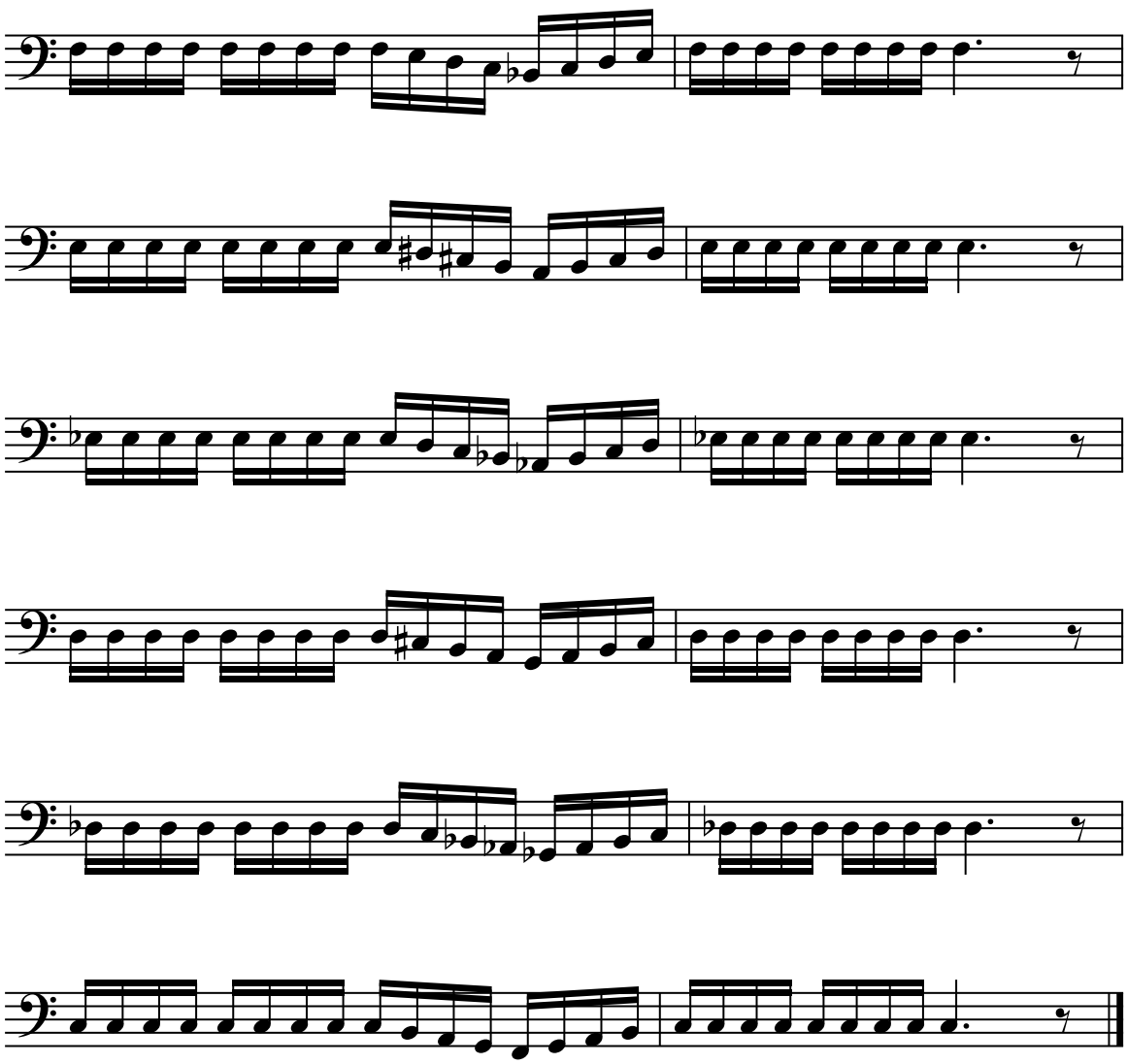

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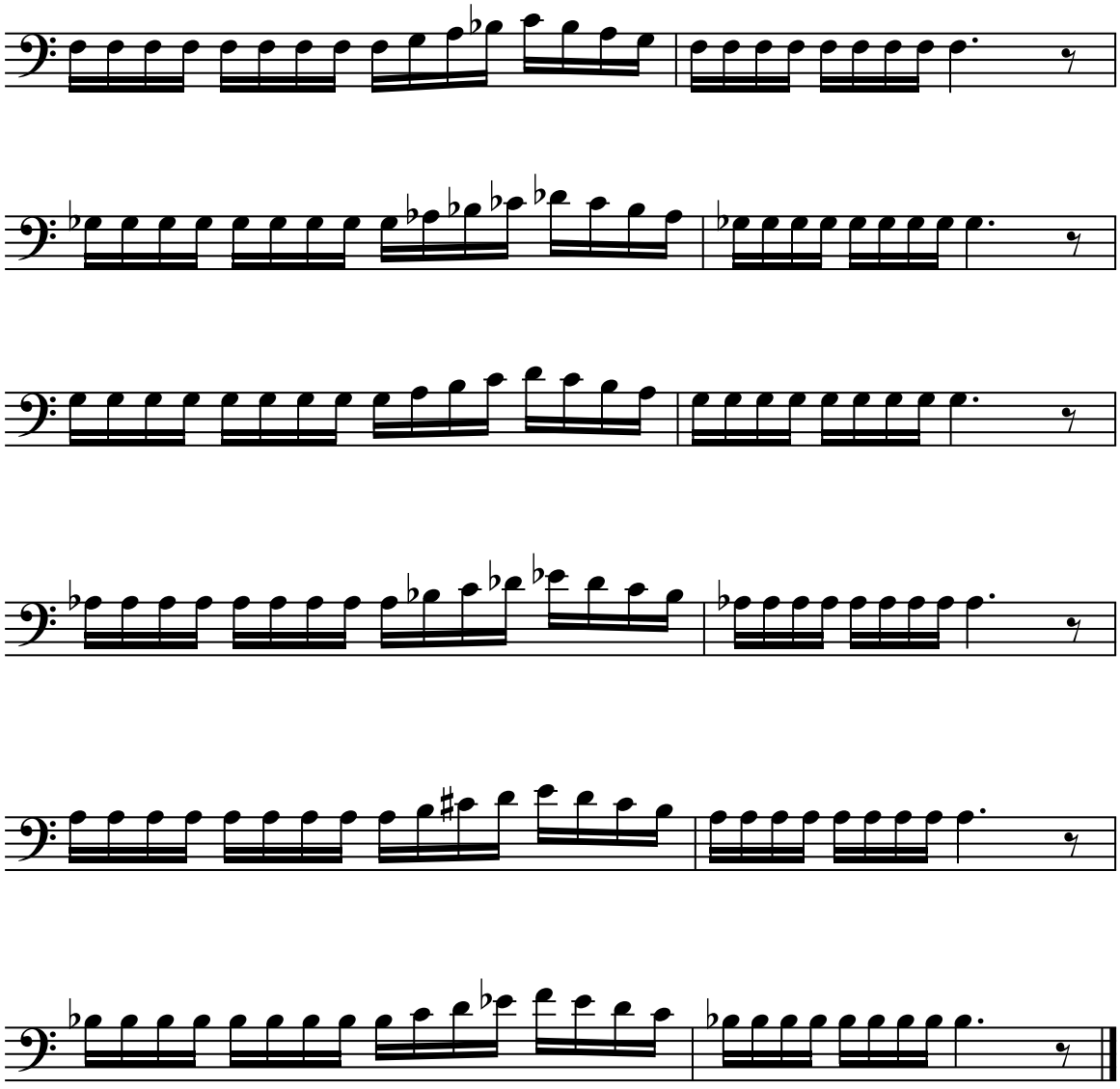

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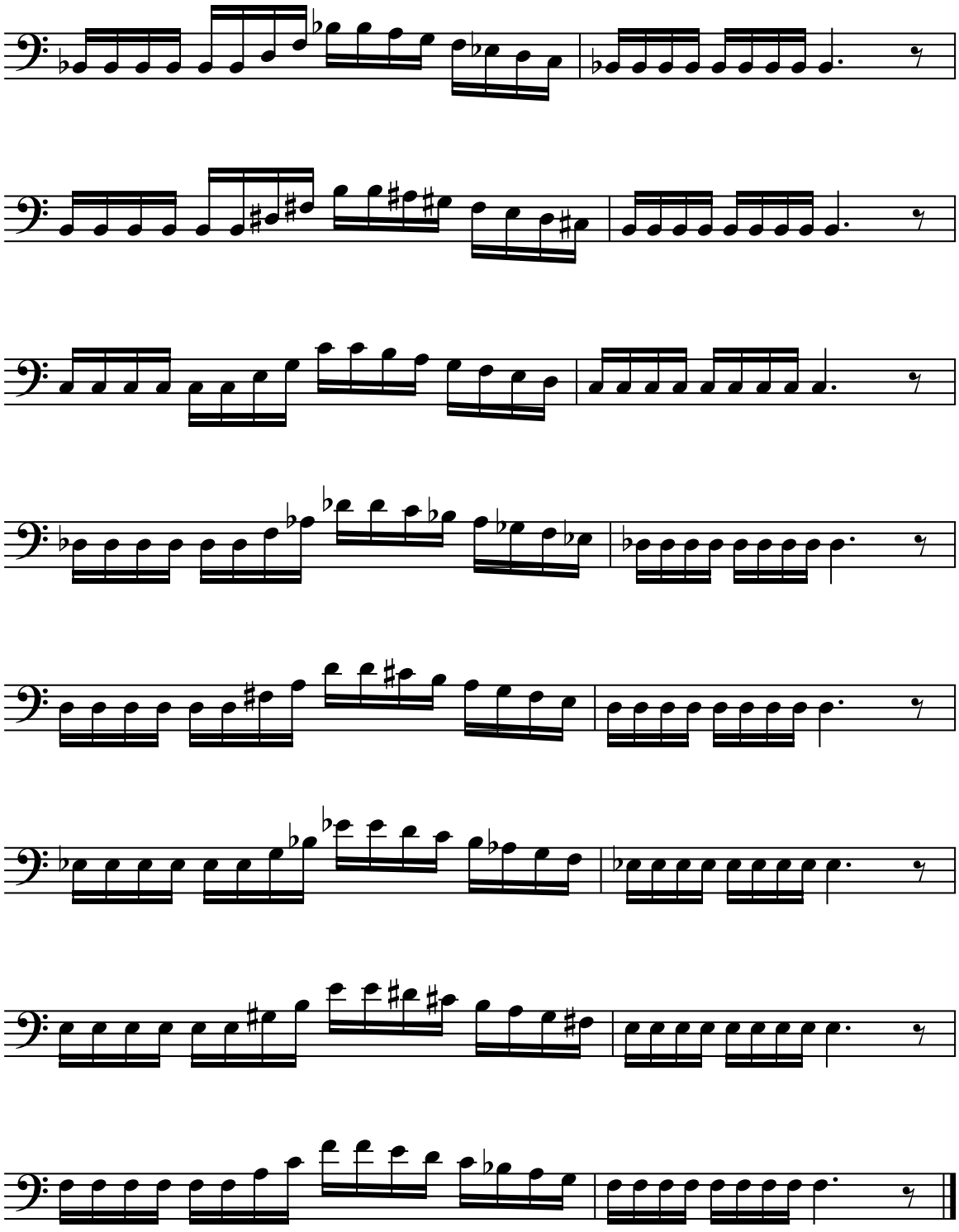

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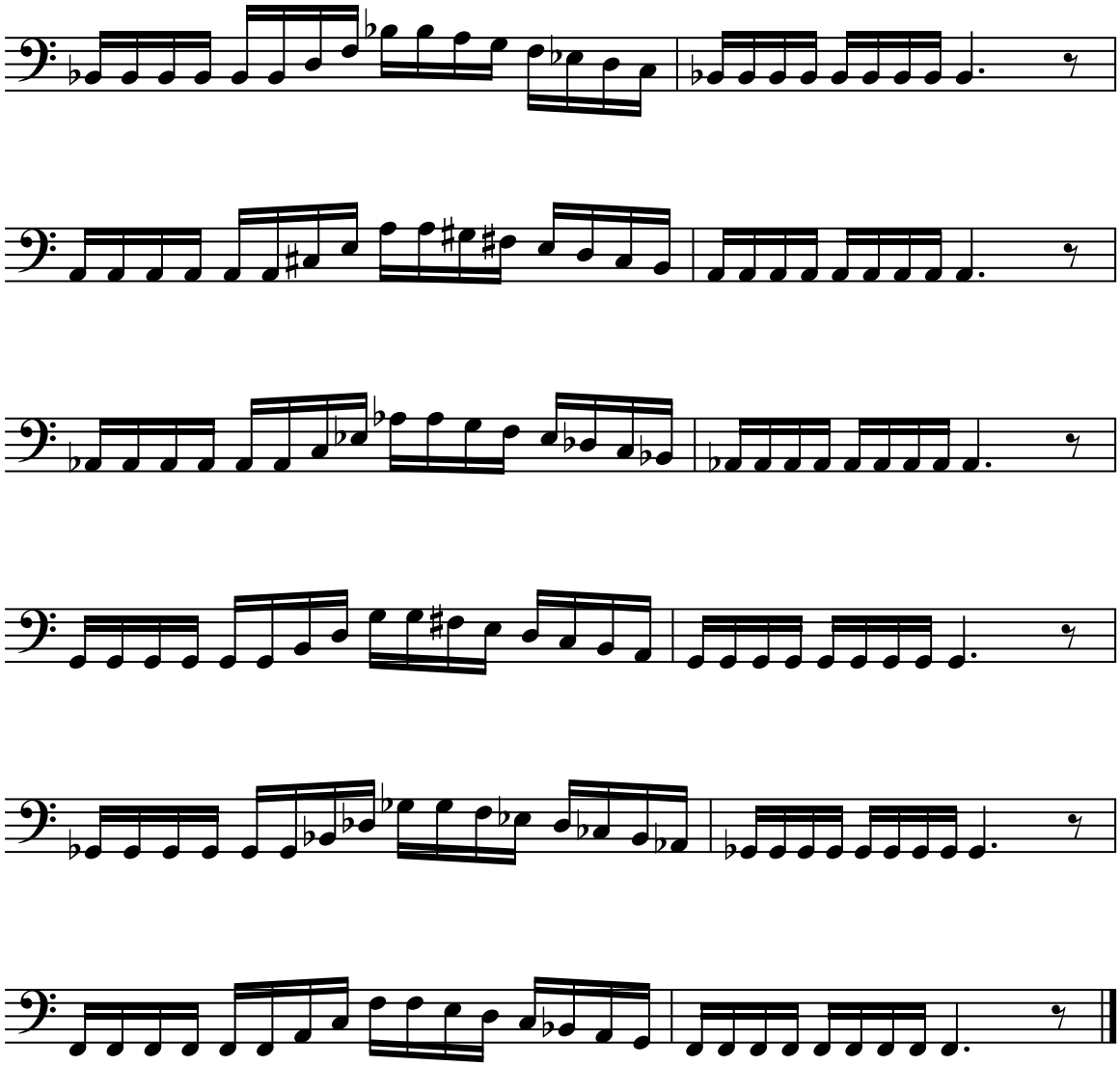
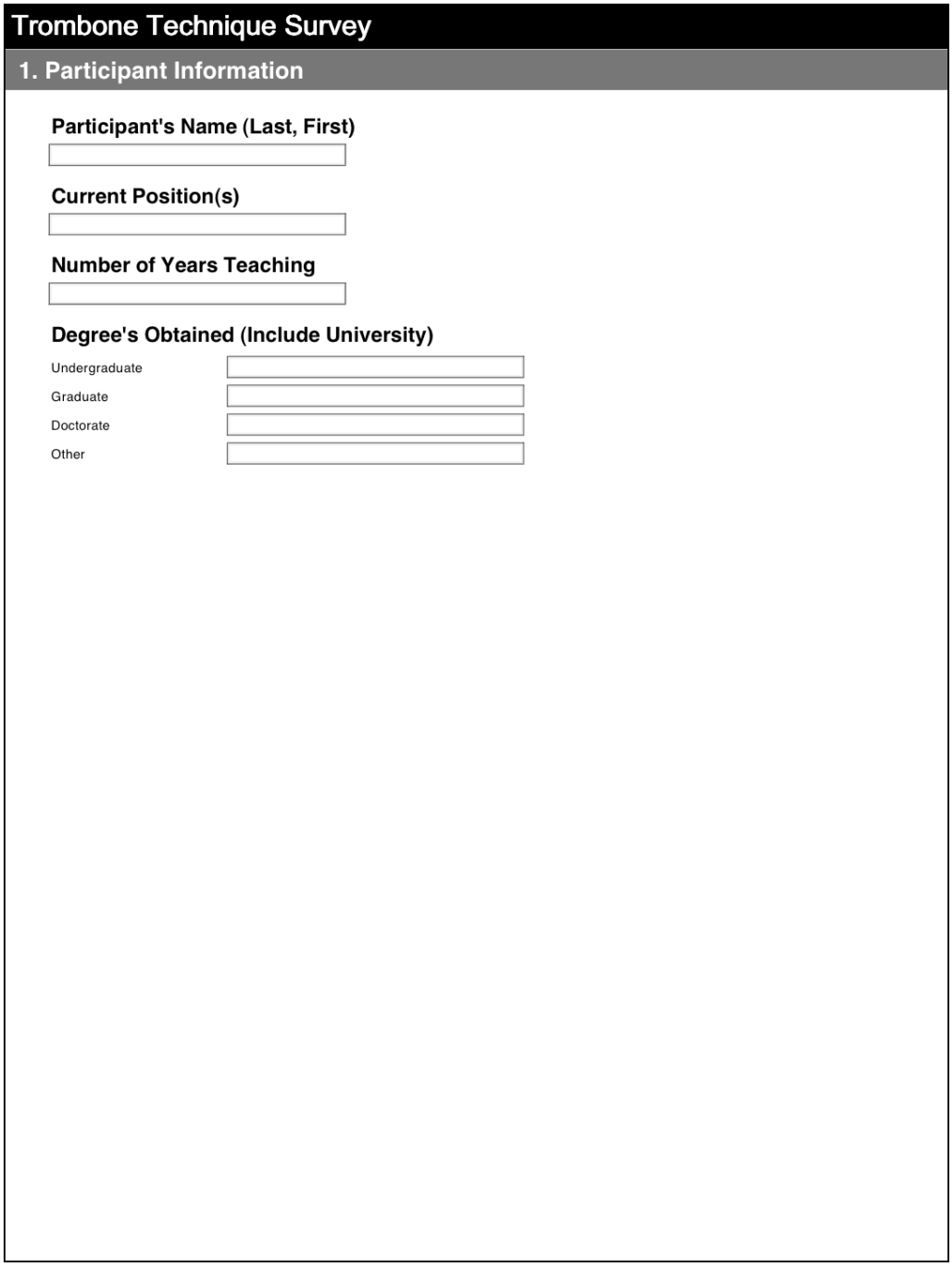


Appendix E - Survey and IRB Approval Statement



Trombone Technique Survey

1. Participant Information

Participant's Name (Last, First)

Current Position(s)

Number of Years Teaching

Degree's Obtained (Include University)

Undergraduate

Graduate

Doctorate

Other

Trombone Technique Survey

2. Instructions and Consent

Instructions

I have divided this survey into four sections, with each section focusing on a separate component of trombone performance technique. Those components are:
1) Breathing and Air Support
2) Embouchure Control and Flexibility
3) Slide Precision and Timing
4) Articulation.

There are two pages per section. On the first page of each section, you will find a series of statements that summarize the basic premises that I have established as foundational for this dissertation, as well as my own personal development and teaching method. As experienced performers and teachers of trombone performance technique, I am interested in your reaction to these statements. Each statement has a set of responses designed to quantitatively determine the survey participants' level of agreement or disagreement. You will also find a response text box following each statement. Please fill free to use this space to comment on, explain or clarify your responses. For each one consider the following:
1) Are you familiar with the concepts contained within these statements?
2) Do these statements reflect your understanding of proper trombone performance technique? If not, why not?
3) For each component of trombone technique, are there other points of consideration that you believe must be addressed? If so, please elaborate.
4) These statements should not be viewed as a challenge to your personal approach to trombone pedagogy if you disagree with them. Please be as honest as possible in your reaction to each statement. I welcome and encourage differing opinions.

On the second page of each section you will find a series of deficiencies that I have observed in the students that I've taught. In an attempt to identify the extent to which these deficiencies are impacting trombone performance technique at large, I am asking you to recall how frequently you have noticed these deficiencies in your students. At the bottom of each page is a text box that may be used for clarification or to include an additional deficiency related to that section that I have not mentioned.

Trombone Technique Survey

Consent - Trombone Technique Survey

Study Purpose and Rationale

The purpose of this study is to solicit reactions to my assertions regarding the fundamentals of trombone performance technique. The rationale behind this survey is to determine if the current, common understanding of trombone performance technique (if there is a common understanding) supports or rejects these assertions.

Inclusion/Exclusion Criteria

The participants will be selected based on their established reputations in the area of trombone performance technique. This survey is private in that I have not opened it up to participants whose teaching or performance reputation is unfamiliar to me.

Participation Procedures and Duration

The completion of this survey should not take more than about 45 minutes.

Data Confidentiality or Anonymity

Both the objective and subjective questions will be collected and stored through the online survey program. The responses to the survey will not be anonymous and some responses may be quoted in the dissertation. In this case I intend to provide proper citation for such quotes. Any information provided by the participants will remain the intellectual property of that participant and will not be used beyond scope of this dissertation project.

Storage of Data

The data will be stored online and eventually transferred to my dissertation project.

Risks or Discomforts

I know of no risks or discomforts associated with this survey.

Who to contact should you experience any negative effects from
participating in this study:

Adam Johnson 765-282-3547

Benefits

Participation in this survey could lead to a better understanding of trombone performance technique.

Voluntary Participation

Your participation in this study is completely voluntary and you are free to withhold your permission for any reason without penalty or prejudice from the investigator.

IRB Contact Information

For one's rights as a research subject, you may contact the following:
Research Compliance, Sponsored Programs Office
Ball State University, Muncie, IN 47306
(765) 285-5070
irb@bsu.edu

Study Title

Trombone Technique Survey

Trombone Technique Survey

Consent

I agree to participate in this research project entitled, "Trombone Technique Survey." I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my consent to participate. I understand that I will receive a copy of this informed consent form to keep for future reference.

To the best of my knowledge, I meet the inclusion/exclusion criteria for participation (described on the previous page) in this study.

Do you agree to the previous statement of consent?

- ◯ Agree
- ◯ Disagree

Trombone Technique Survey

3. Breathing and Air Support

Airflow, and by extension breathing, is the most important concern in proper tone production on the trombone.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

The air may be considered the fuel that creates vibration in the embouchure.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

With the exception of extreme articulations and accents, or drastic leaps in range, airflow should remain constant.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Due to variations in the size of the aperture of the lips, the speed of the airflow should be faster in the upper range than in the lower range.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

4. Breathing and Air Support - Common Deficiencies

Rate each of the following technical deficiencies based on how frequently you encounter this problem in your students' playing.

Under-breathing

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Over-breathing

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

High-breathing (Shallow-breathing)

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Restricting Air Flow (Tight Throat)

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Trombone Technique Survey

Holding Air (Valsalva Maneuver)

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Use the space below to comment on these deficiencies or to mention other deficiencies that you have encountered.

Trombone Technique Survey

5. Embouchure Control and Flexibility

Every note played on the trombone must be created by buzzing the lips at the desired pitch frequency.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

The portion of the embouchure that vibrates within the mouthpiece should remain as relaxed and supple as possible.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

The vibrating portion of the lips increases (widens) for lower pitches and decreases (narrows) for higher pitches.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

The muscles at the corners of the mouth provide the necessary control of the vibrating portion of the embouchure and should remain firm but not clinched.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

The corners should be anchored downward, never drawn up as this creates a thinning of the lip material in the vibrating portion of the embouchure.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

6. Embouchure Control and Flexibility - Common Deficiencies

Rate each of the following technical deficiencies based on how frequently you encounter this problem in your students' playing.

Improper Mouthpiece Placement

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Rolling Lips In (Over Teeth)

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Rolling Lips Out (Into Mouthpiece)

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Smiling (Embouchure Corners Pulled Up)

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Trombone Technique Survey

Puffing Cheeks or Lips

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Use the space below to comment on these deficiencies or to mention other deficiencies that you have encountered.

Trombone Technique Survey

7. Slide Precision and Timing

The movement of the slide from one position to the next, should be quick but never abrupt or jerky.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Wrist, hand and finger movement should be minimized so that the primary hinge in the slide arm is at the elbow, thus creating fewer points of variability in slide placement.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

The timing of the slide movement between notes is different in legato playing than in more separated or articulated playing due to the difference in the amount of space (time) between notes.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

8. Slide Precision and Timing - Common Deficiencies

Rate each of the following technical deficiencies based on how frequently you encounter this problem in your students' playing.

Inconsistent Slide Grip

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Loose Wrist Action (Floppy Wrist)

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Poor Slide Timing (Moving Slide Too Early or Late)

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Jerky Slide Action

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Trombone Technique Survey

Use the space below to comment on these deficiencies or to mention other deficiencies that you have encountered.

Trombone Technique Survey

9. Articulation

Defined simply, an articulation is the manner in which a note begins.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Air, not the tongue, creates vibration and thus a musical tone.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

The tongue's function in articulation is to help characterize the manner in which the air impacts the vibrating portion of the embouchure.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Articulations occur when the tongue drops, allowing the air to impact the lips.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Other (please specify)

Trombone Technique Survey

With the exception of extreme secco articulations the tongue creates articulations by briefly interrupting an otherwise constant airflow.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Generally speaking, notes should never be stopped by the tongue.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree
- ◯ No Opinion

Optional Comment, Explanation or Clarification

Trombone Technique Survey

10. Articulation - Common Deficiencies

Rate each of the following technical deficiencies based on how frequently you encounter this problem in your students' playing.

Pulsing Airflow on Each Note

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Tonguing in Teeth or Lips

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Tonguing Too Late

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Tonguing Too Early

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Trombone Technique Survey

Tonguing Too Slow

- ◯ Extremely Common
- ◯ Common
- ◯ Uncommon
- ◯ Extremely Uncommon
- ◯ Never Encountered

Use the space below to comment on these deficiencies or to mention other deficiencies that you have encountered.

BALL STATE UNIVERSITY

Institutional Review Board

DATE:	July 9, 2010
TO:	Adam Johnson, DA
FROM:	Ball State University IRB
RE:	IRB protocol # 175984-1
TITLE:	Trombone Technique Survey
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
DECISION DATE:	July 7, 2010
EXPIRATION DATE:	
REVIEW TYPE:	Exempt Review

The Institutional Review Board has approved your New Project for the above protocol, effective July 7, 2010 through . All research under this protocol must be conducted in accordance with the approved submission.

Editorial Notes:

1. The IRB recommends that you add the amount of time (45 min.) required of particiapnts to complete the study to your informed consent form.

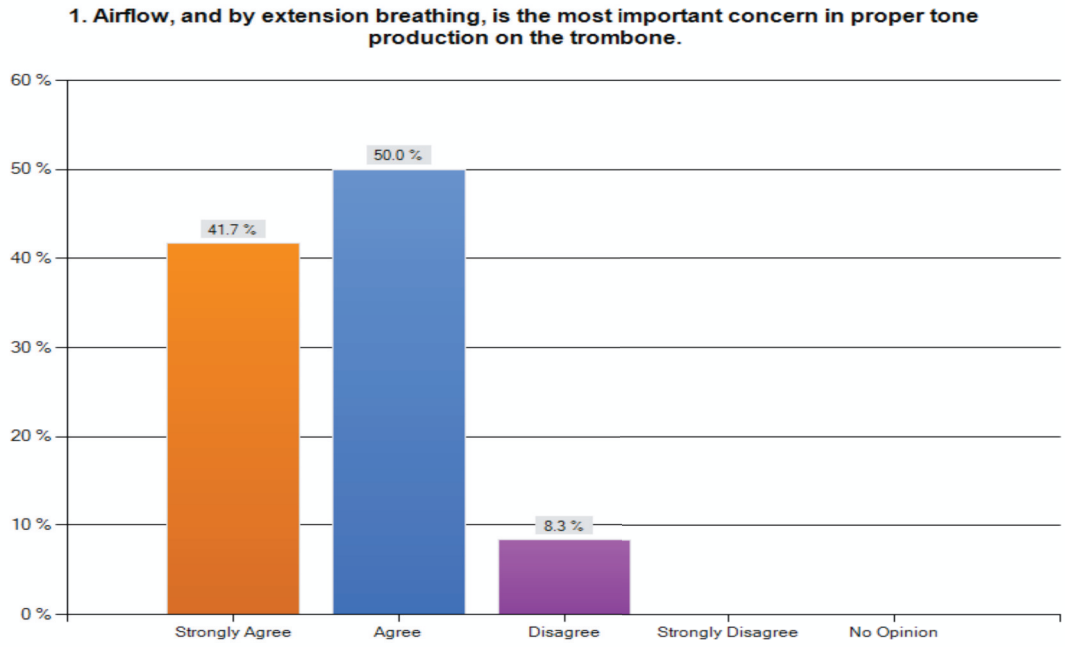
As a reminder, it is the responsibility of the P.I. and/or faculty sponsor to inform the IRB in a timely manner:

- when the project is completed,
- if the project is to be continued beyond the approved end date,
- if the project is to be modified,
- if the project encounters problems, or
- if the project is discontinued.

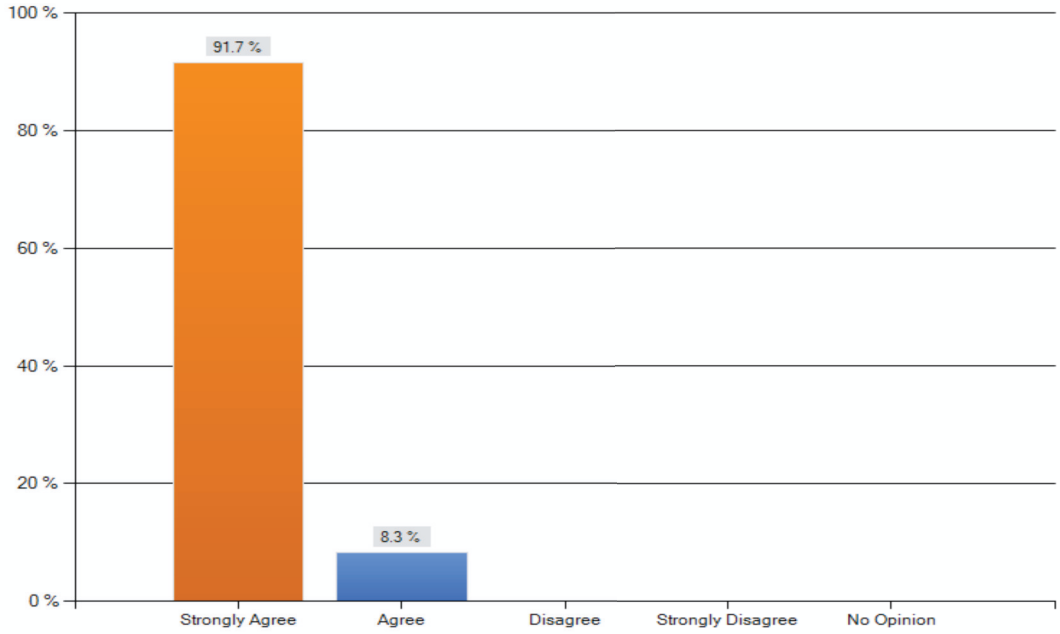
Any of the above notifications should be addressed in writing and submitted electronically to the IRB (http://www.bsu.edu/irb). Please reference the IRB protocol number given above in any communication to the IRB regarding this project. Be sure to allow sufficient time for review and approval of requests for modification or continuation. If you have questions, please contact Chris Mangelli at (765) 285-5070 or cmmangelli@bsu.edu.

Appendix F - Quantitative Survey Results

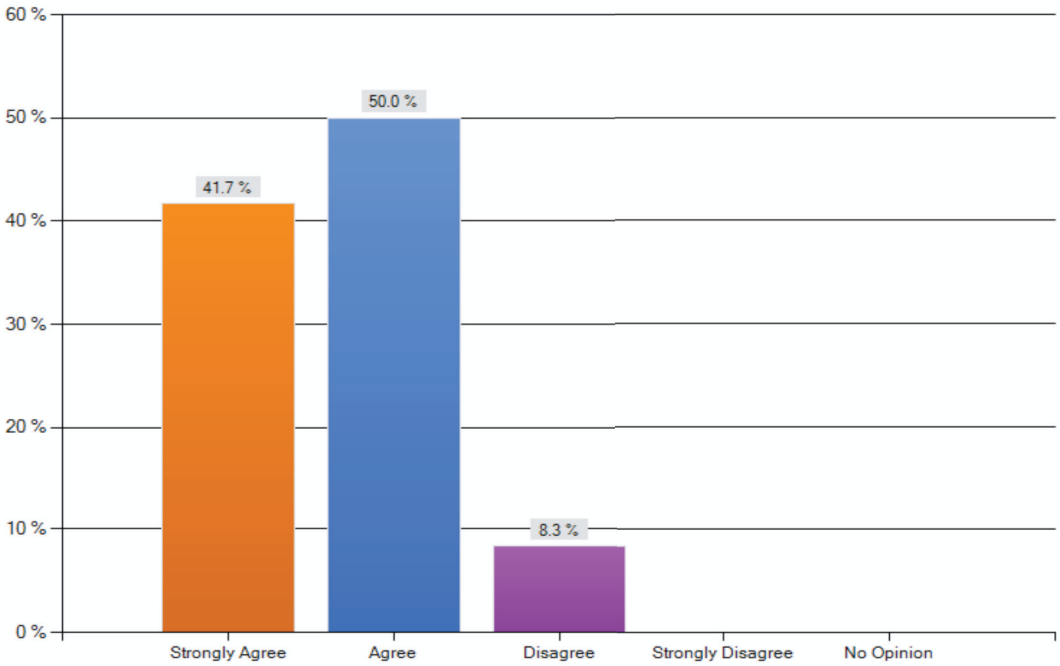
Breathing and Air Support Statements



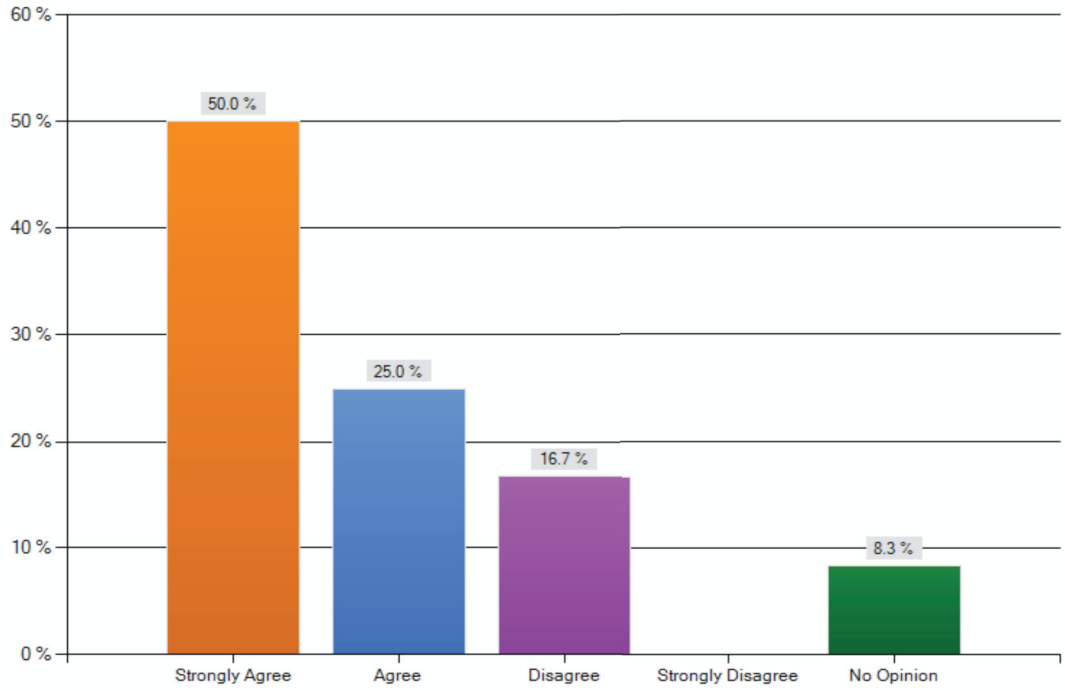
2. The air may be considered the fuel that creates vibration in the embouchure.



3. With the exception of extreme articulations and accents, or drastic leaps in range, airflow should remain constant.

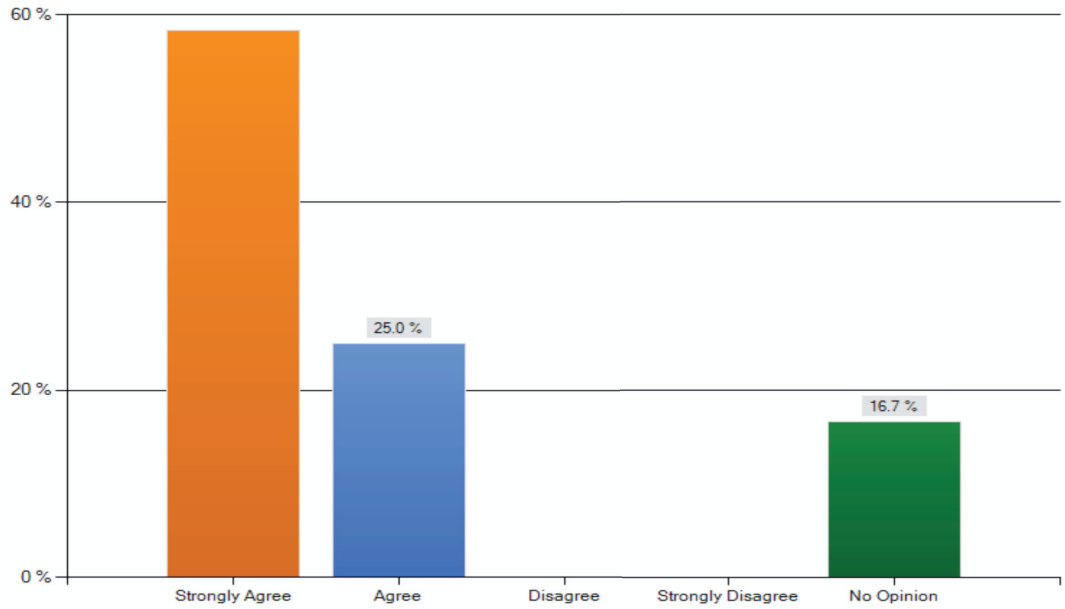


4. Due to variations in the size of the aperture of the lips, the speed of the airflow should be faster in the upper range than in the lower range.

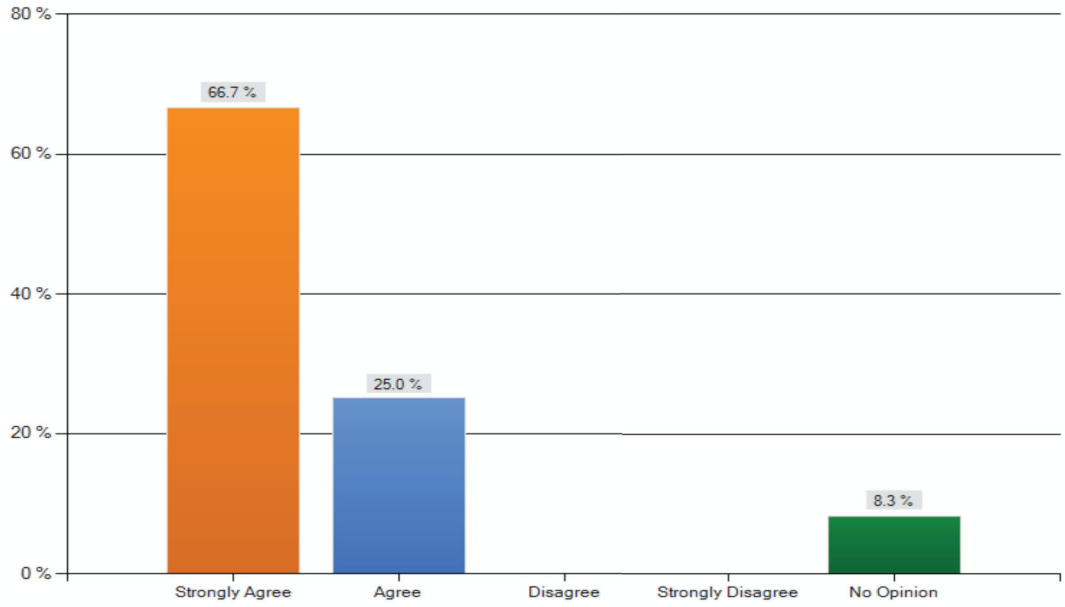


Embouchure Control and Flexibility Statements

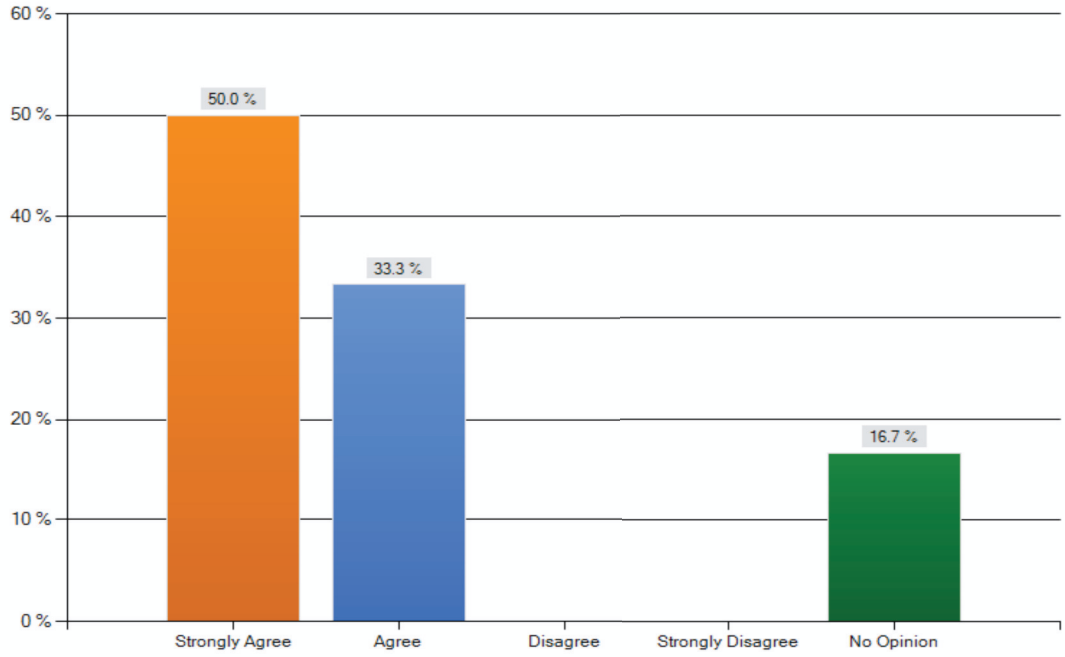
1. Every note played on the trombone must be created by buzzing the lips at the desired pitch frequency.



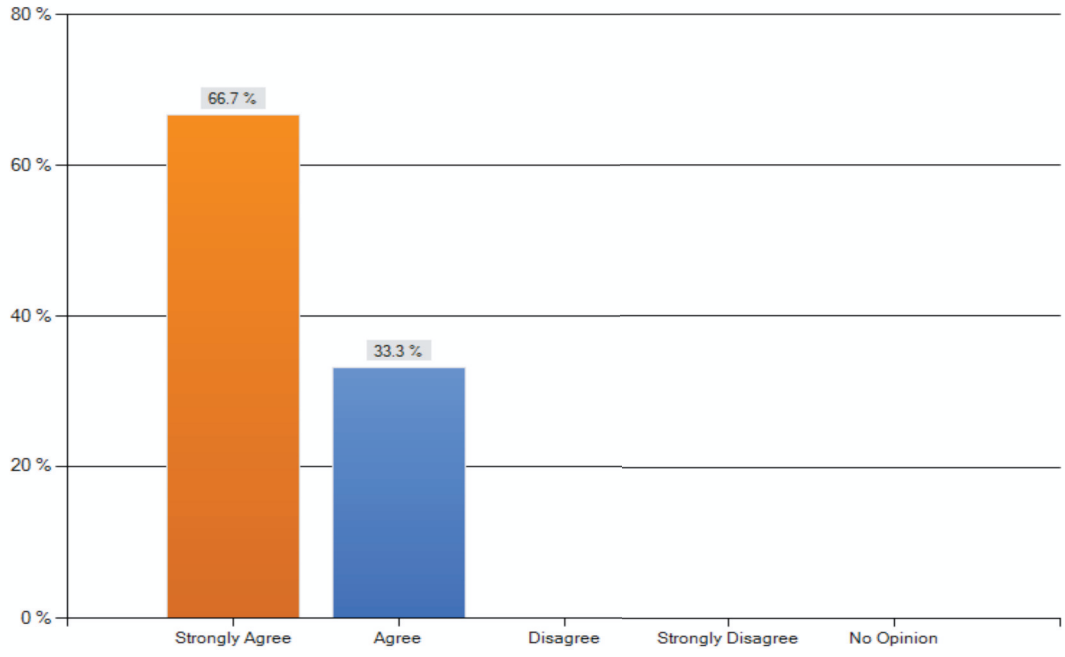
2. The portion of the embouchure that vibrates within the mouthpiece should remain as relaxed and supple as possible.



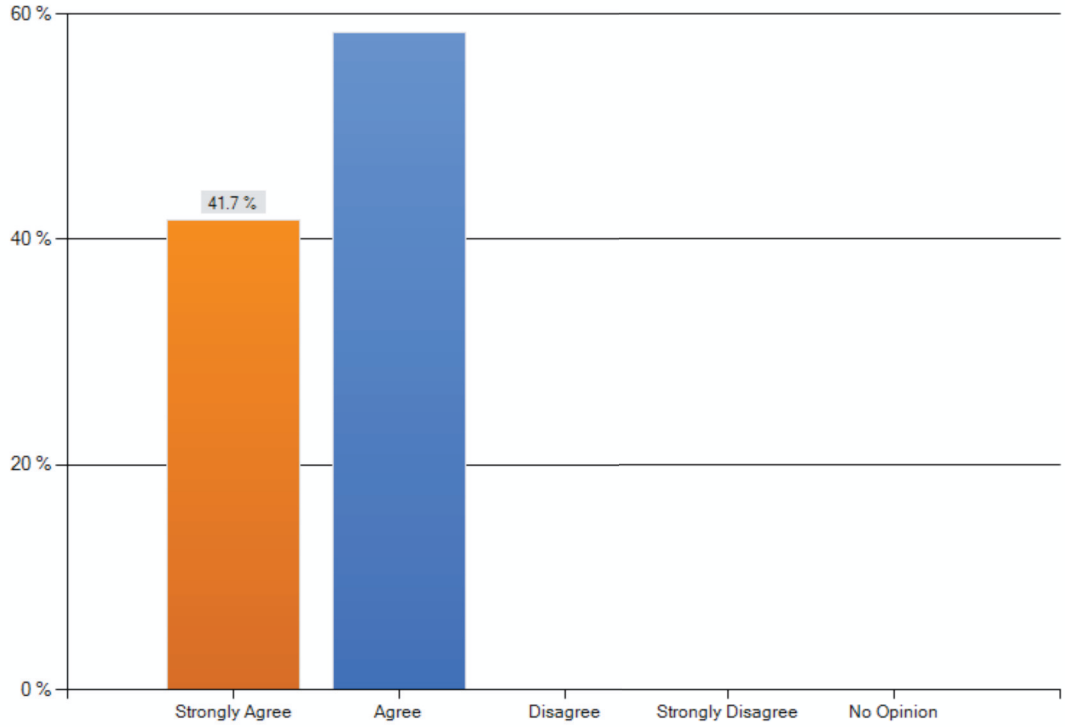
3. The vibrating portion of the lips increases (widens) for lower pitches and decreases (narrows) for higher pitches.



4. The muscles at the corners of the mouth provide the necessary control of the vibrating portion of the embouchure and should remain firm but not clinched.

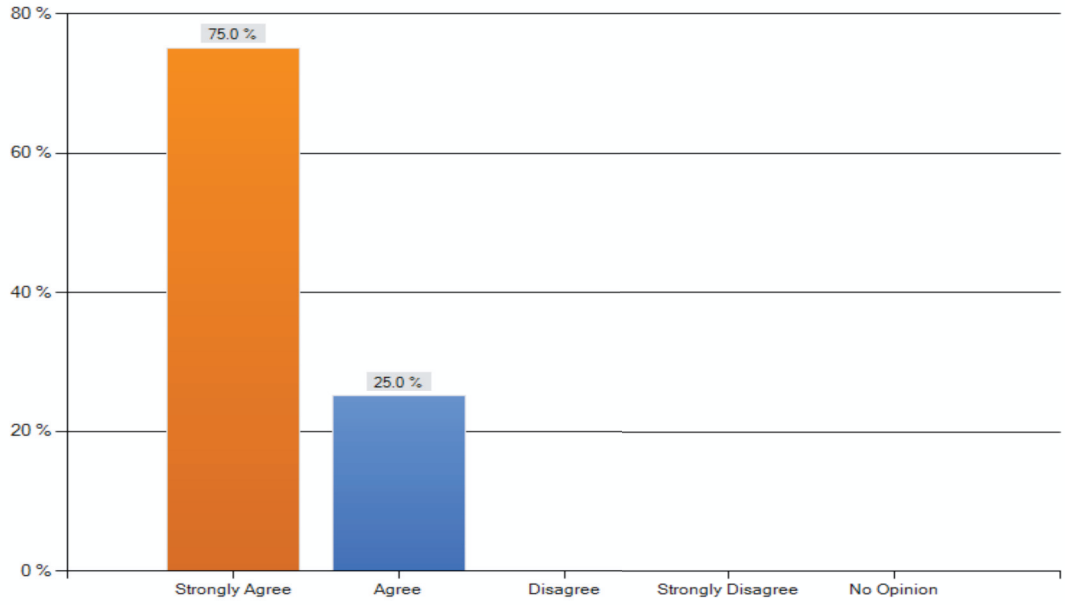


5. The corners should be anchored downward, never drawn up as this creates a thinning of the lip material in the vibrating portion of the embouchure.

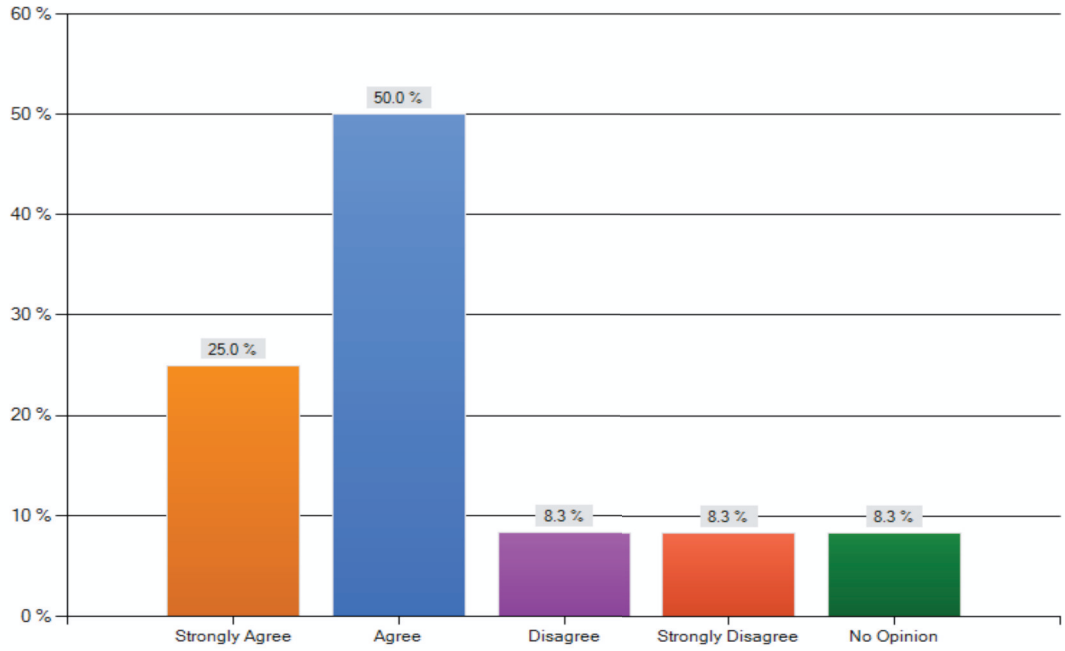


Slide Precision and Timing Statements

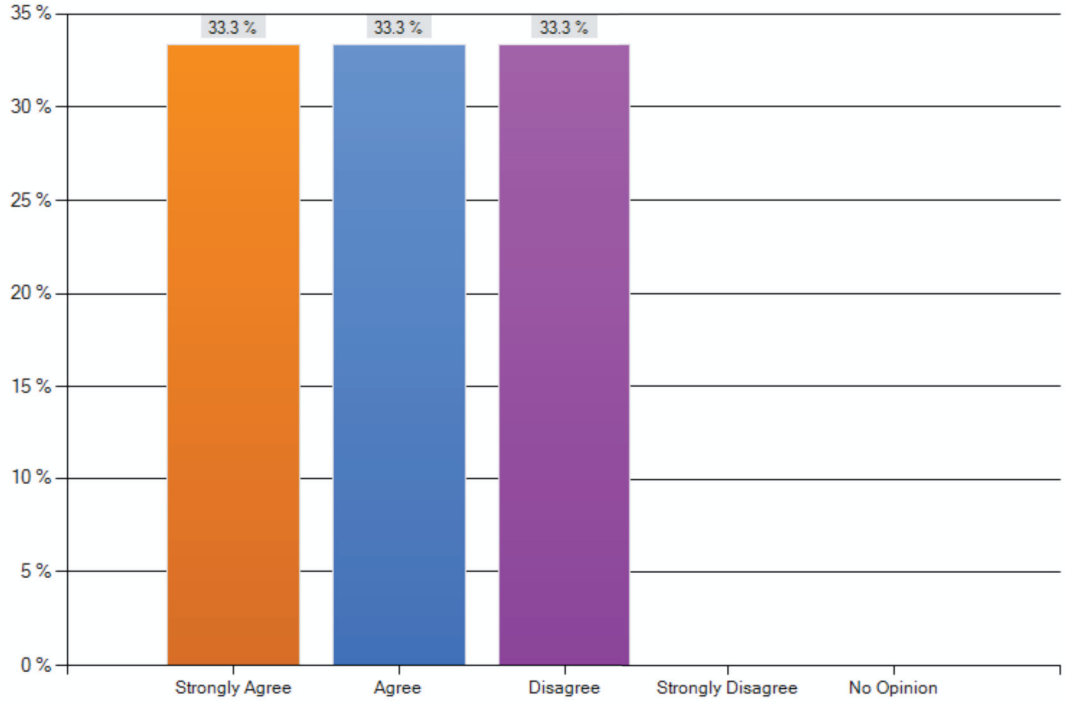
1. The movement of the slide from one position to the next, should be quick but never abrupt or jerky.



2. Wrist, hand and finger movement should be minimized so that the primary hinge in the slide arm is at the elbow, thus creating fewer points of variability in slide placement.

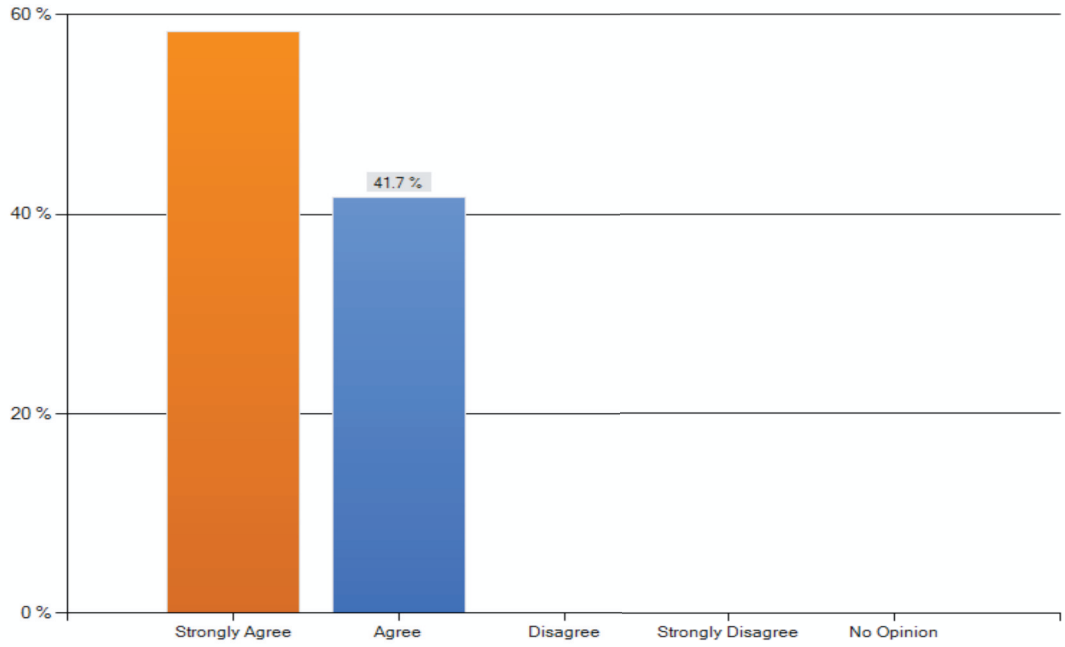


3. The timing of the slide movement between notes is different in legato playing than in more separated or articulated playing due to the difference in the amount of space (time) between notes.

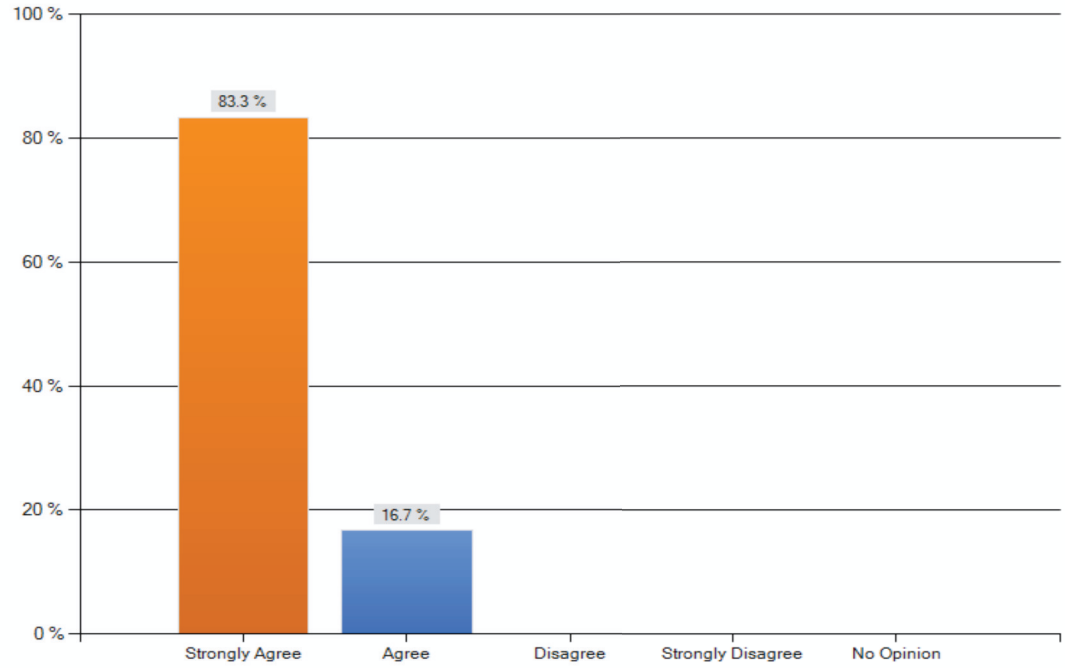


Articulation Statements

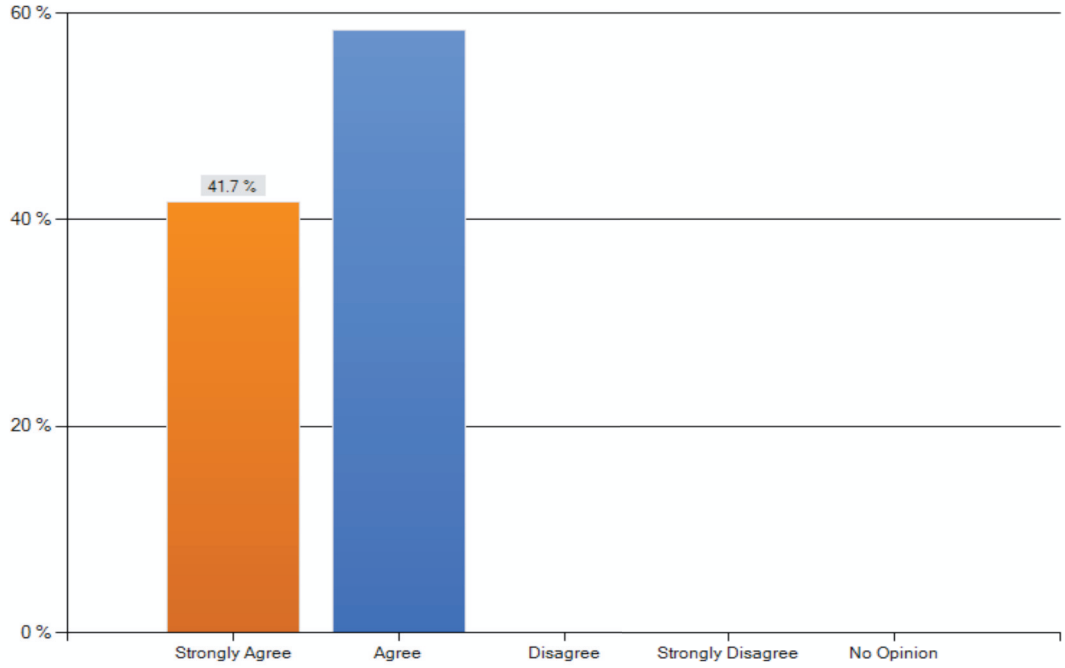
1. Defined simply, an articulation is the manner in which a note begins.



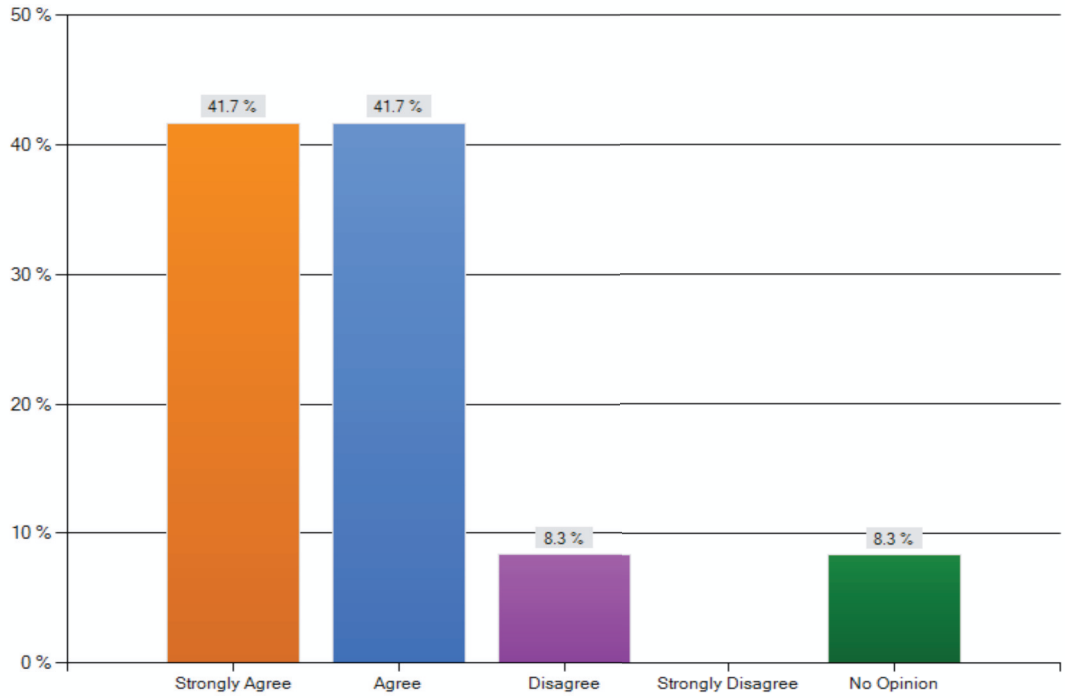
2. Air, not the tongue, creates vibration and thus a musical tone.



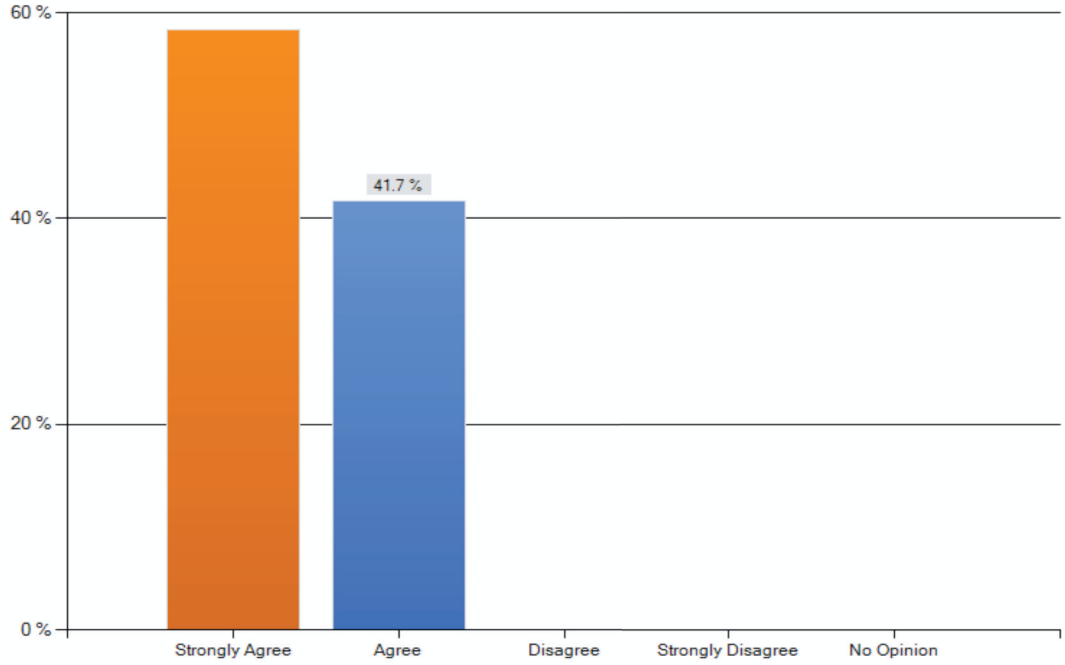
3. The tongue's function in articulation is to help characterize the manner in which the air impacts the vibrating portion of the embouchure.



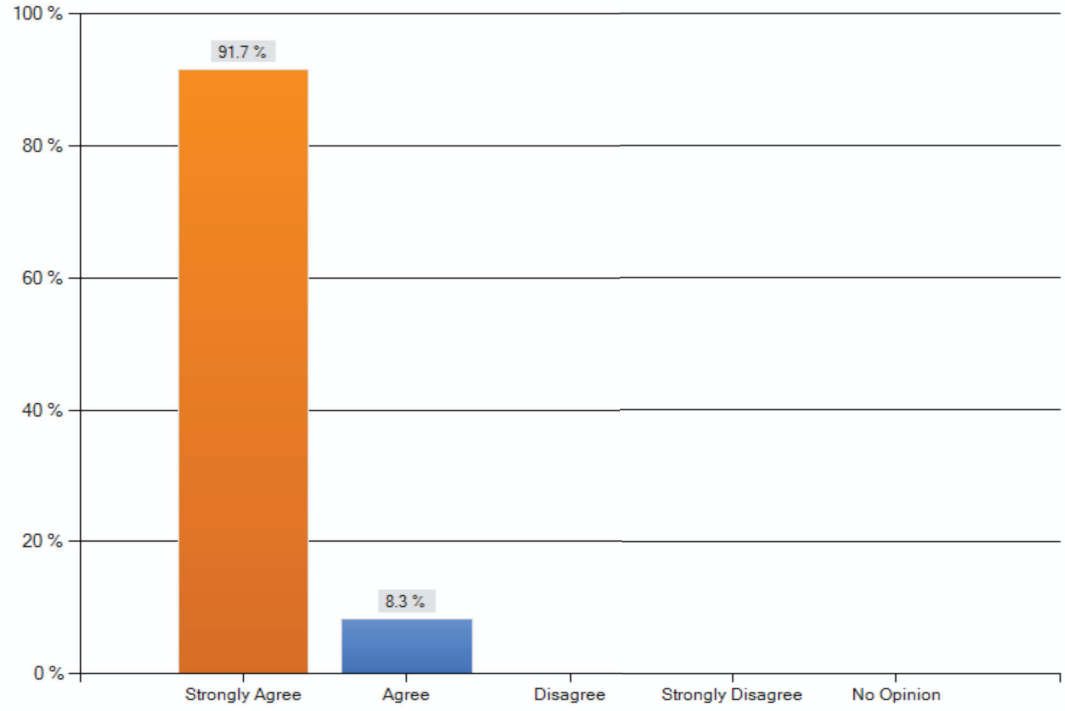
4. Articulations occur when the tongue drops, allowing the air to impact the lips.



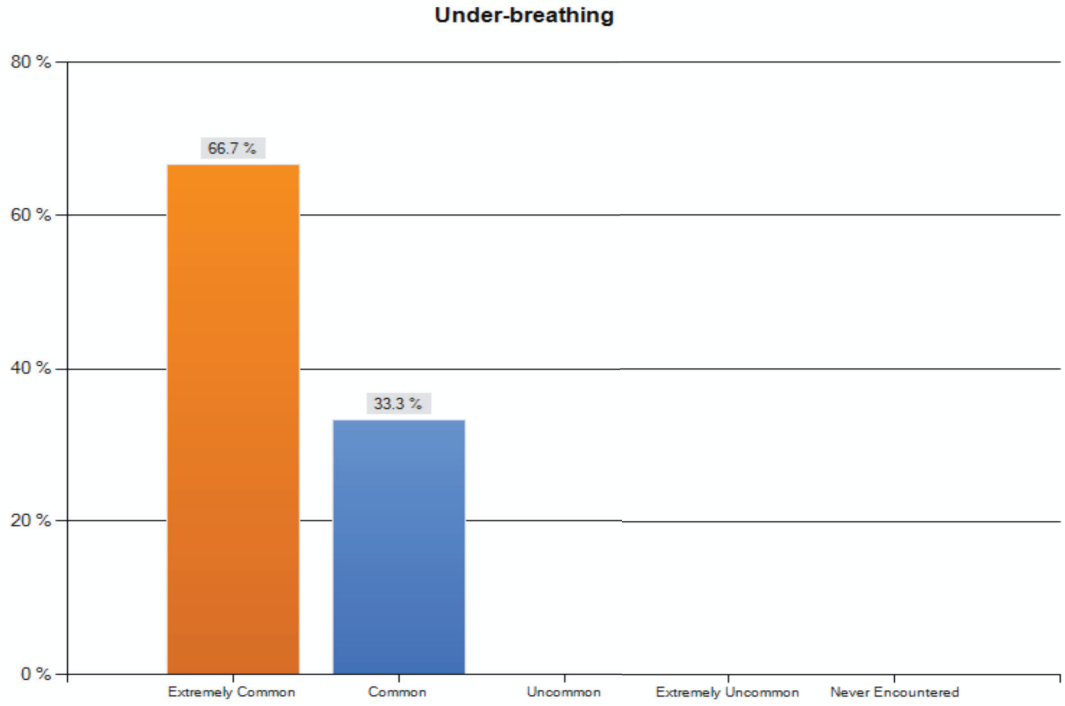
5. With the exception of extreme secco articulations the tongue creates articulations by briefly interrupting an otherwise constant airflow.

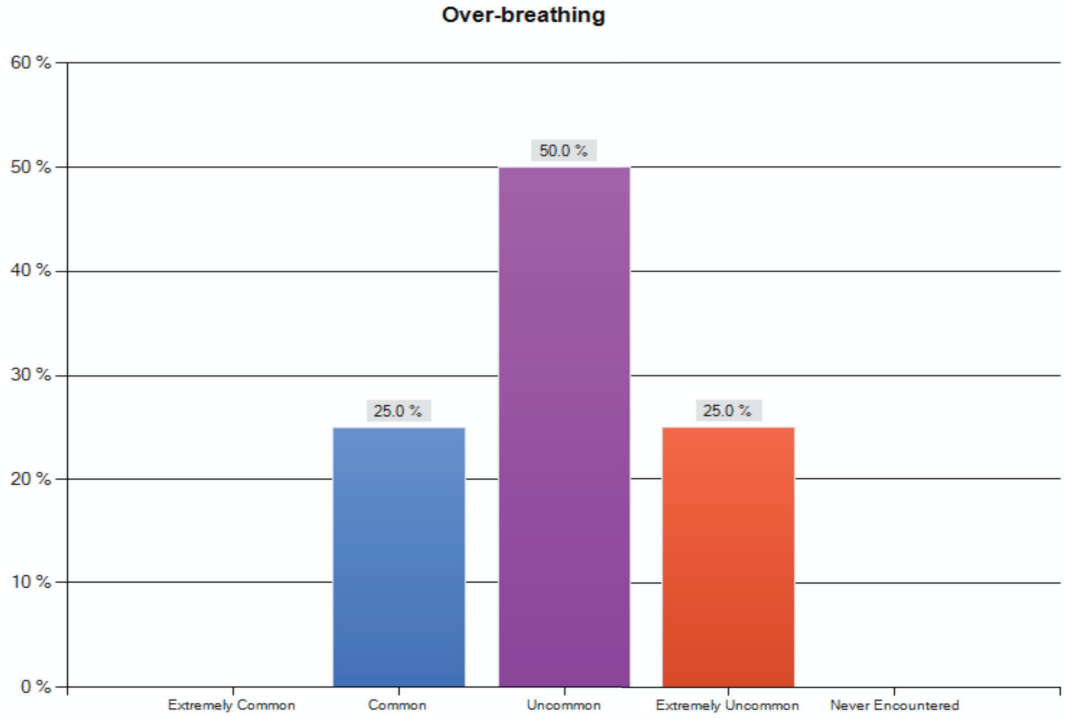


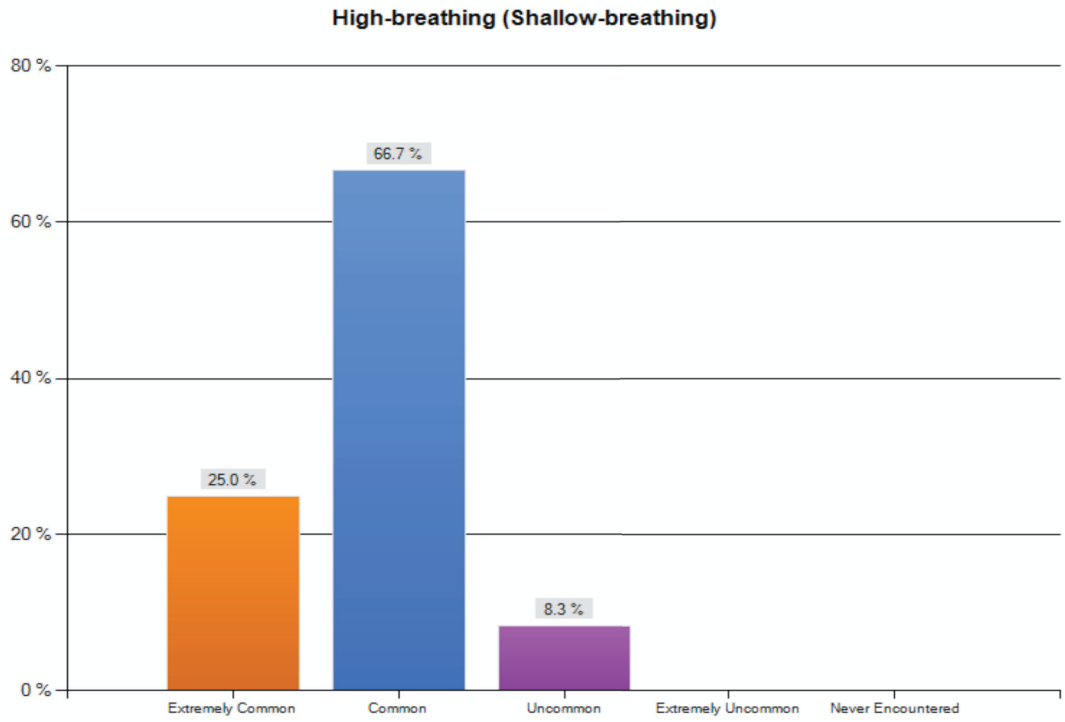
6. Generally speaking, notes should never be stopped by the tongue.

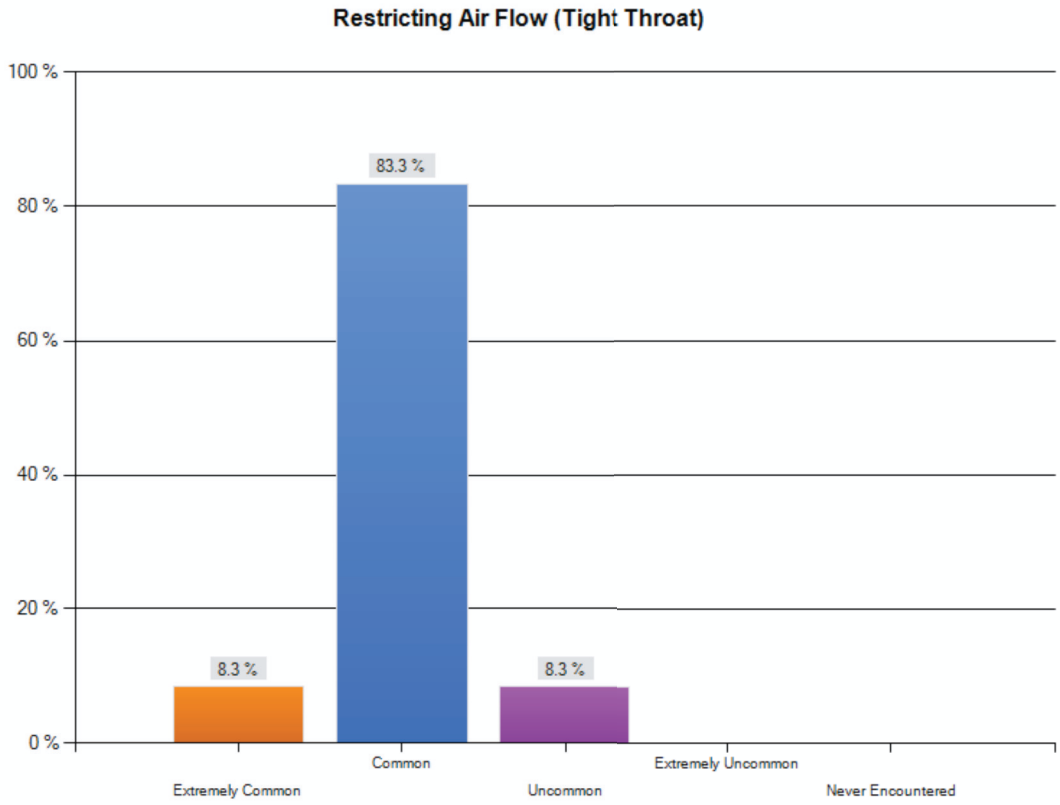


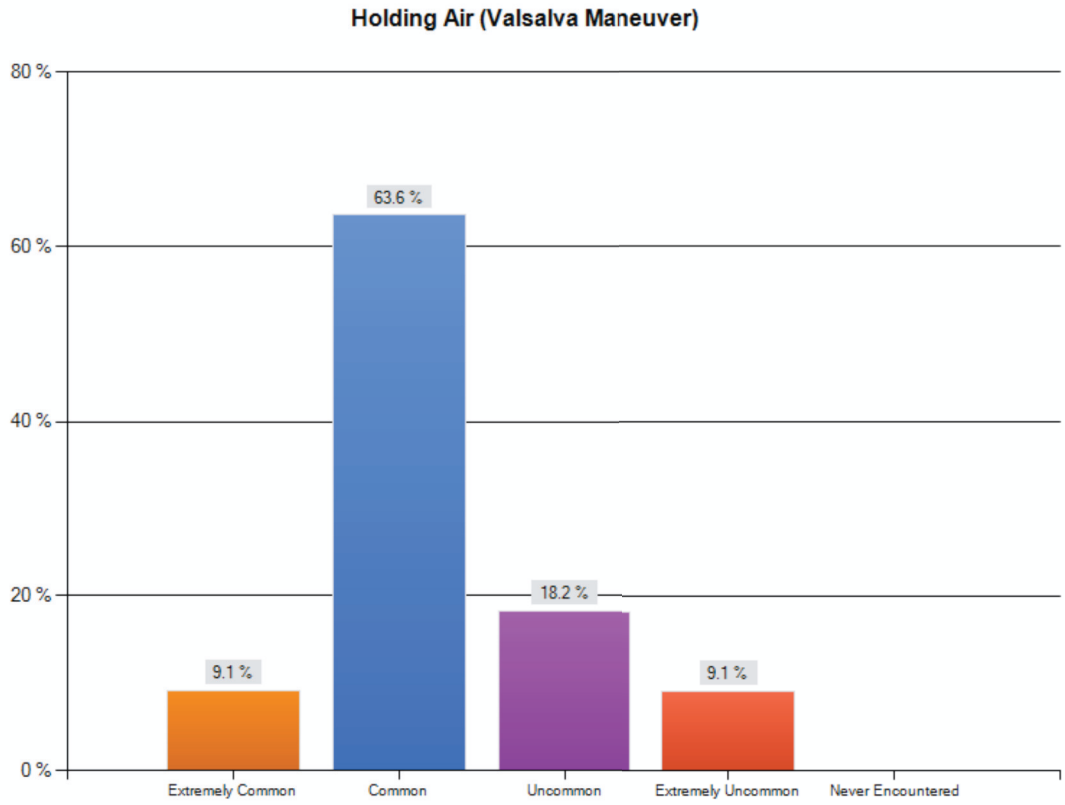
Breathing and Air Support Deficiencies

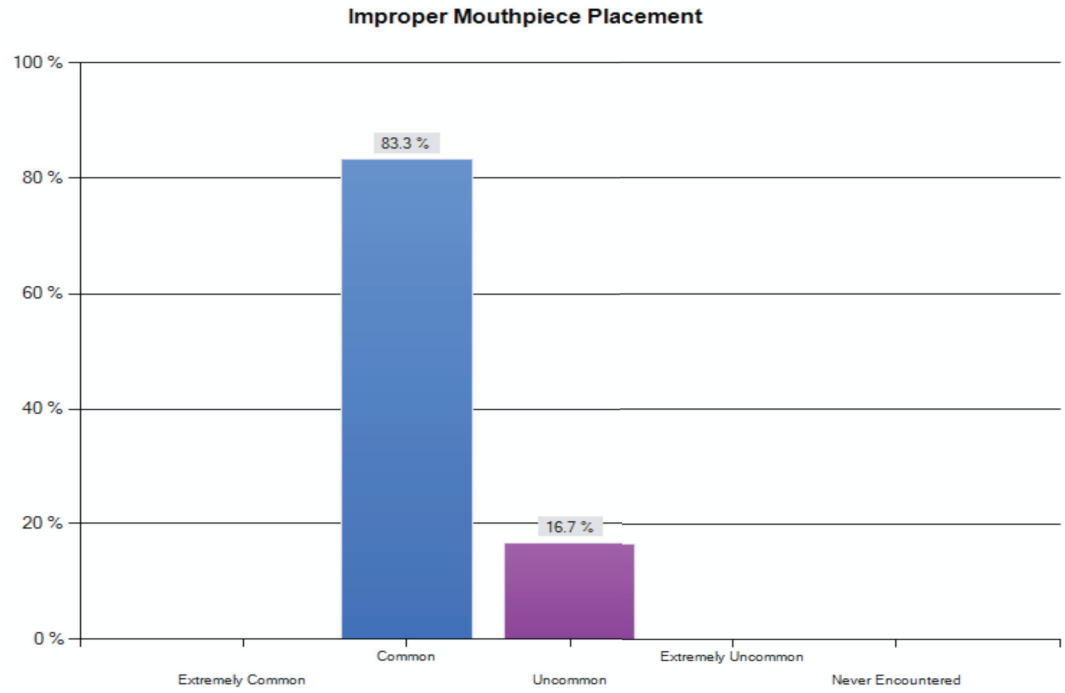


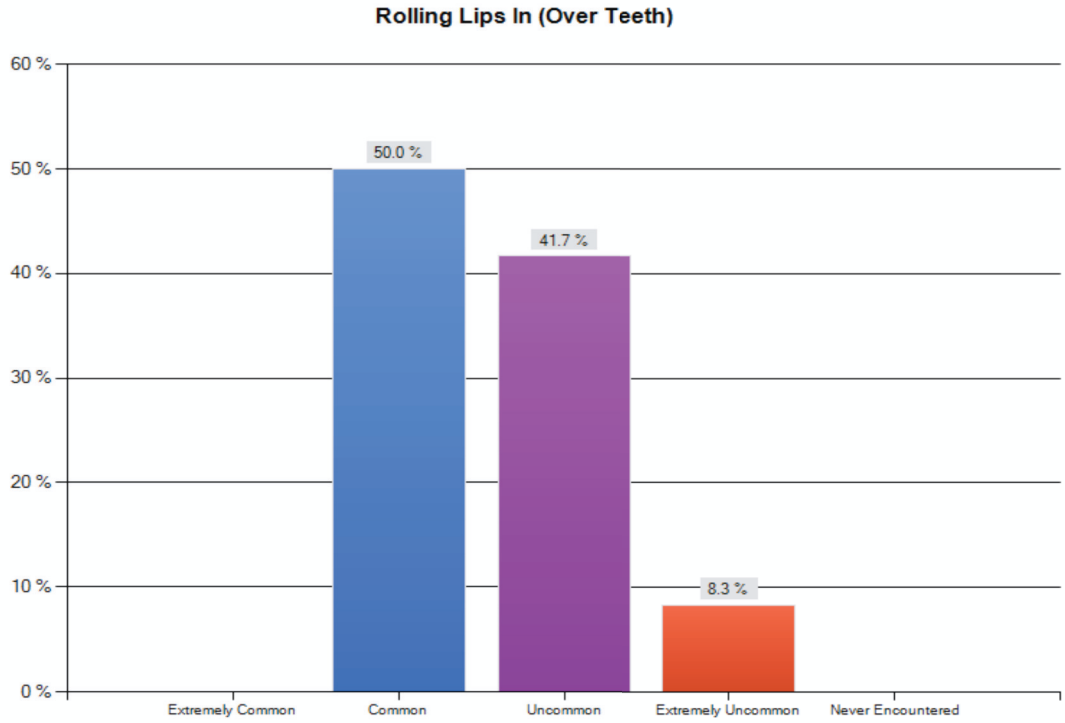



High-breathing (Shallow-breathing)
80 %
60 %
40 %
20 %
0 %
25.0 %
66.7 %
8.3 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

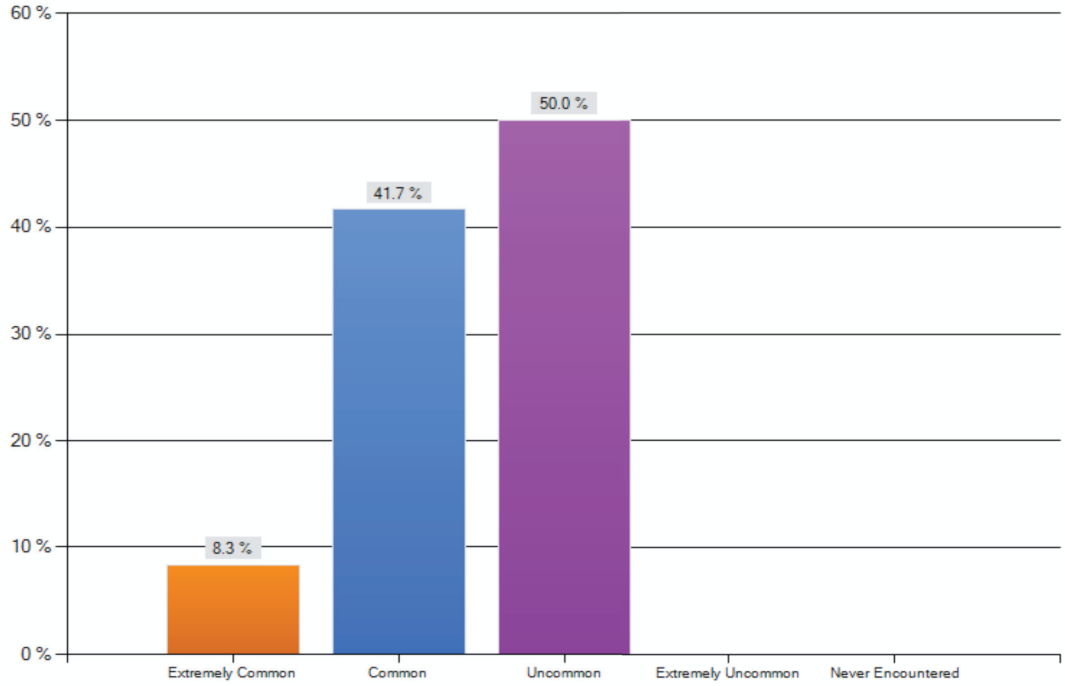

Restricting Air Flow (Tight Throat)
100 %
80 %
60 %
40 %
20 %
0 %
83.3 %
8.3 %
8.3 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered


Holding Air (Valsalva Maneuver)
80 %
60 %
40 %
20 %
0 %
9.1 %
63.6 %
18.2 %
9.1 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

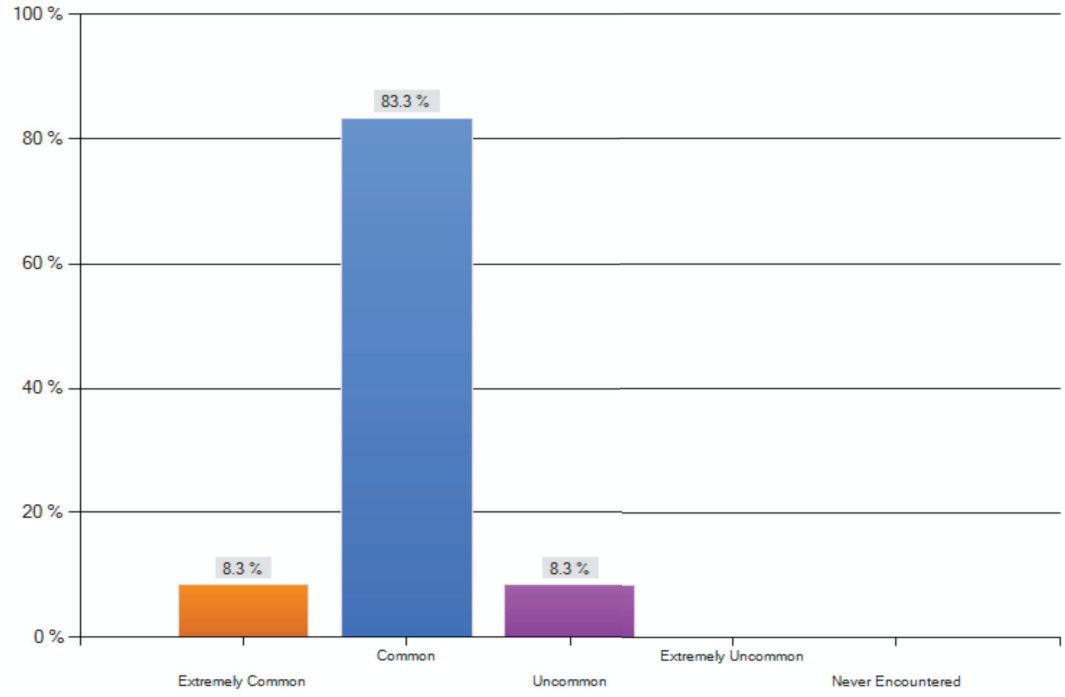

Improper Mouthpiece Placement
100 %
80 %
60 %
40 %
20 %
0 %
83.3 %
16.7 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

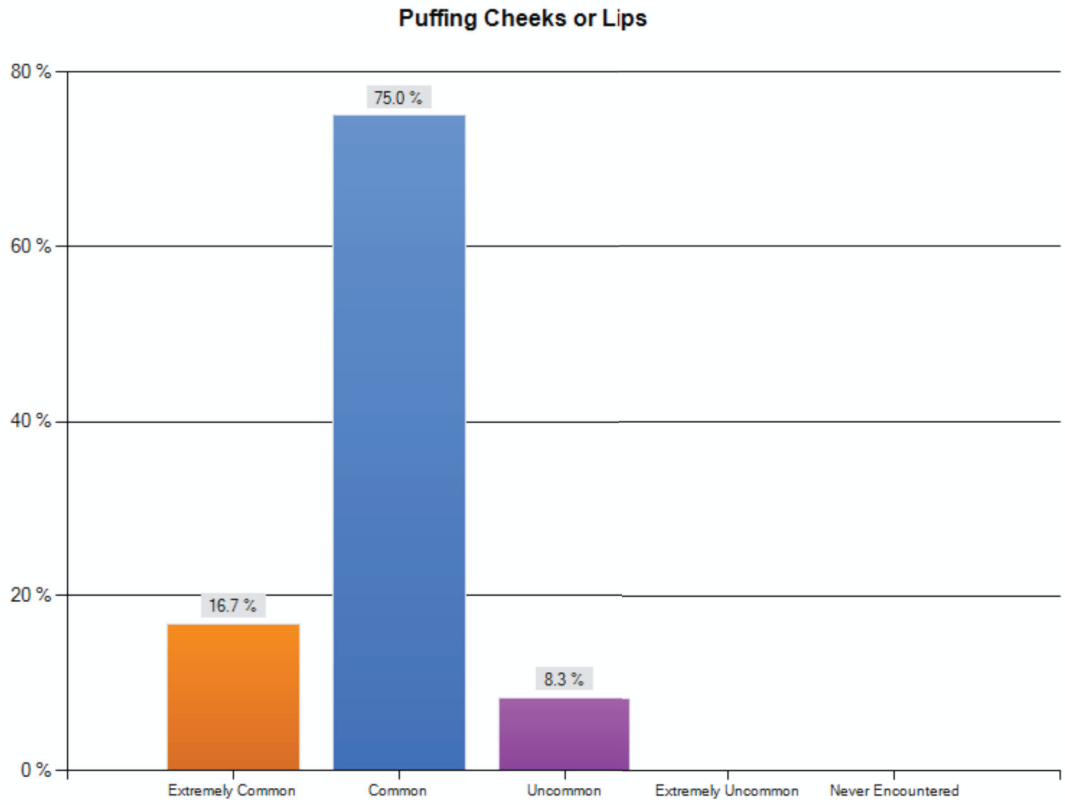

Rolling Lips In (Over Teeth)
60 %
50 %
40 %
30 %
20 %
10 %
0 %
50.0 %
41.7 %
8.3 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

Rolling Lips Out (Into Mouthpiece)

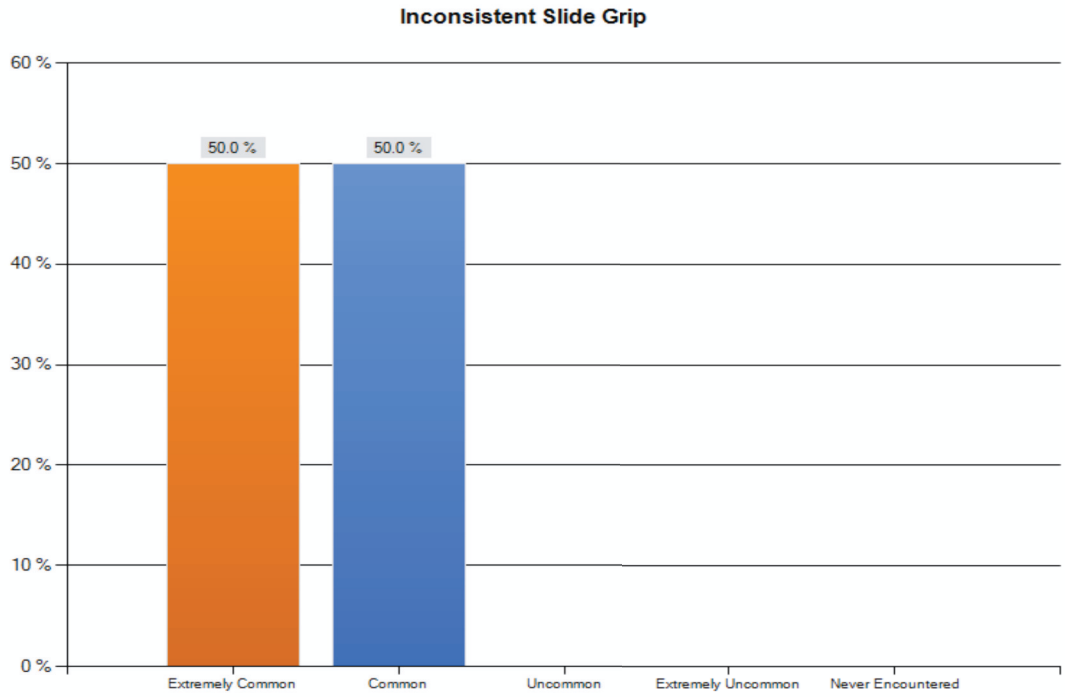


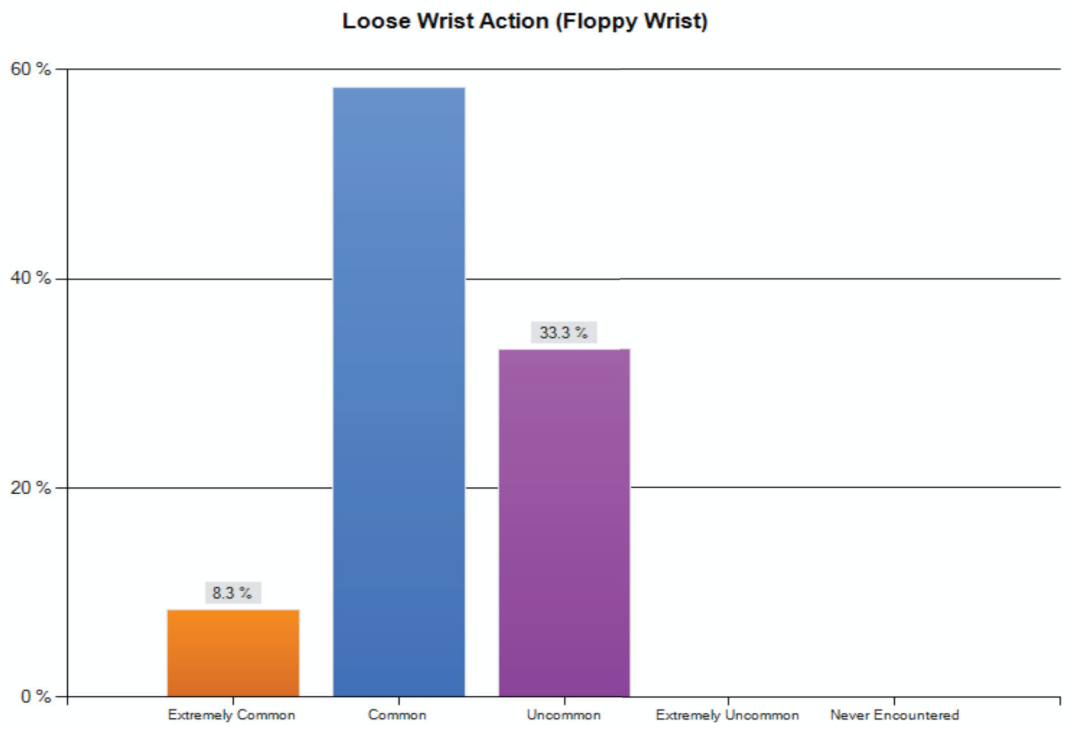
Smiling (Embouchure Corners Pulled Up)

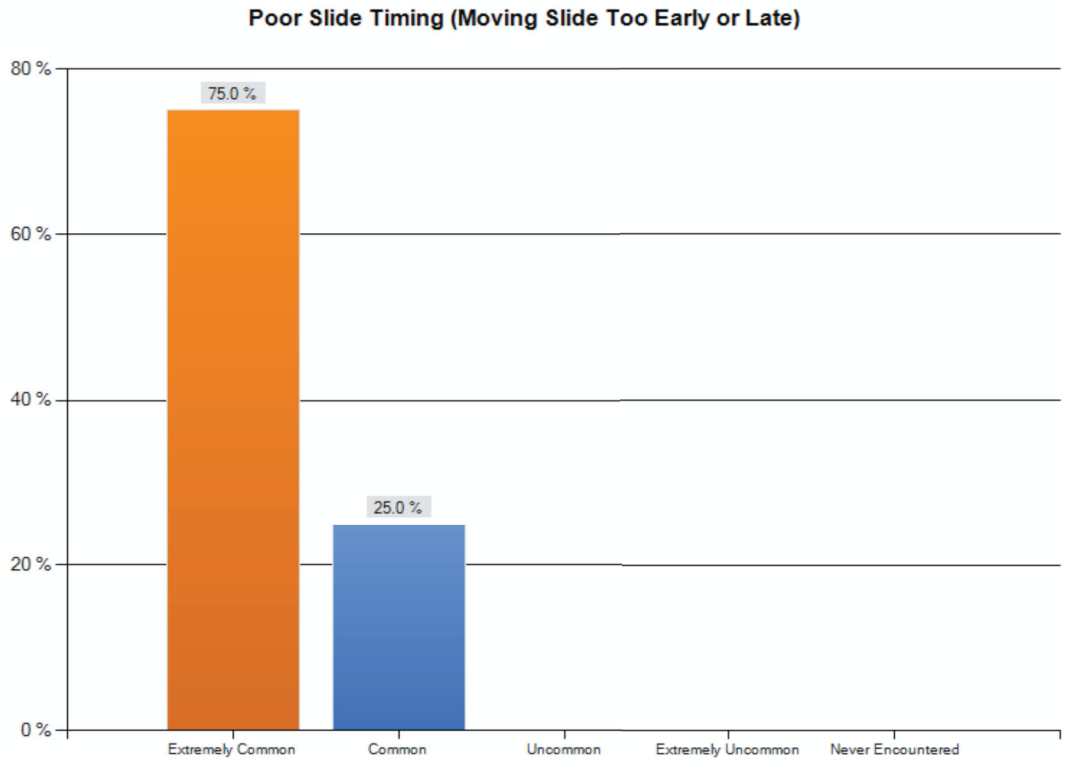


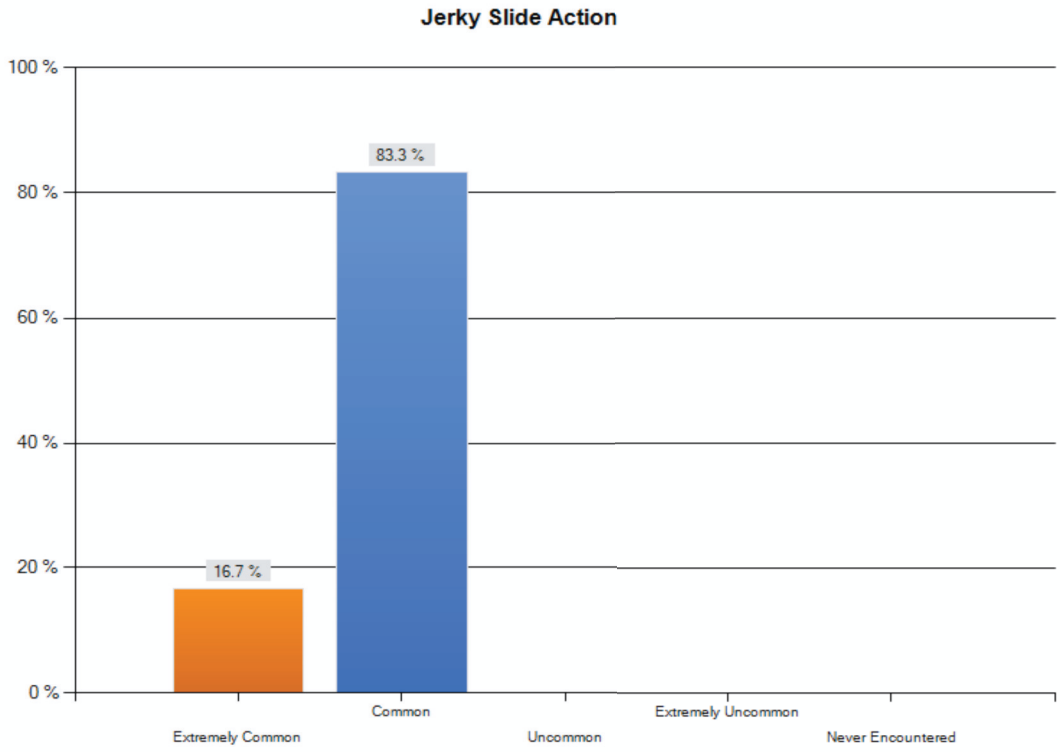

Puffing Cheeks or Lips
80 %
60 %
40 %
20 %
0 %
75.0 %
16.7 %
8.3 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

Slide Precision and Timing Deficiencies

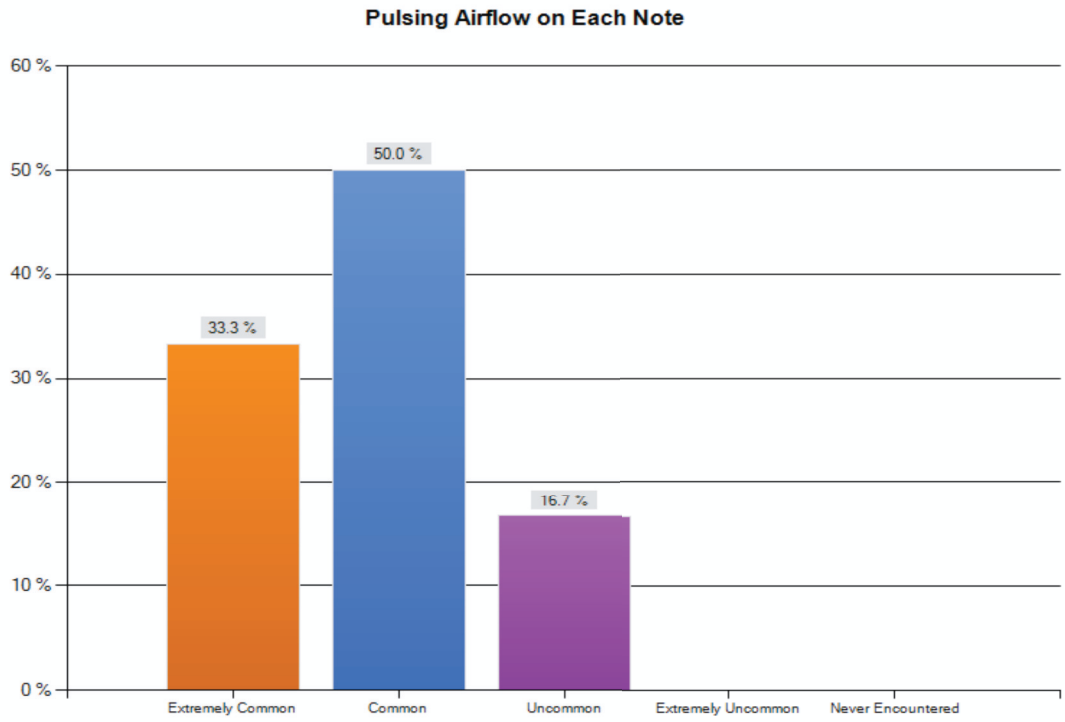


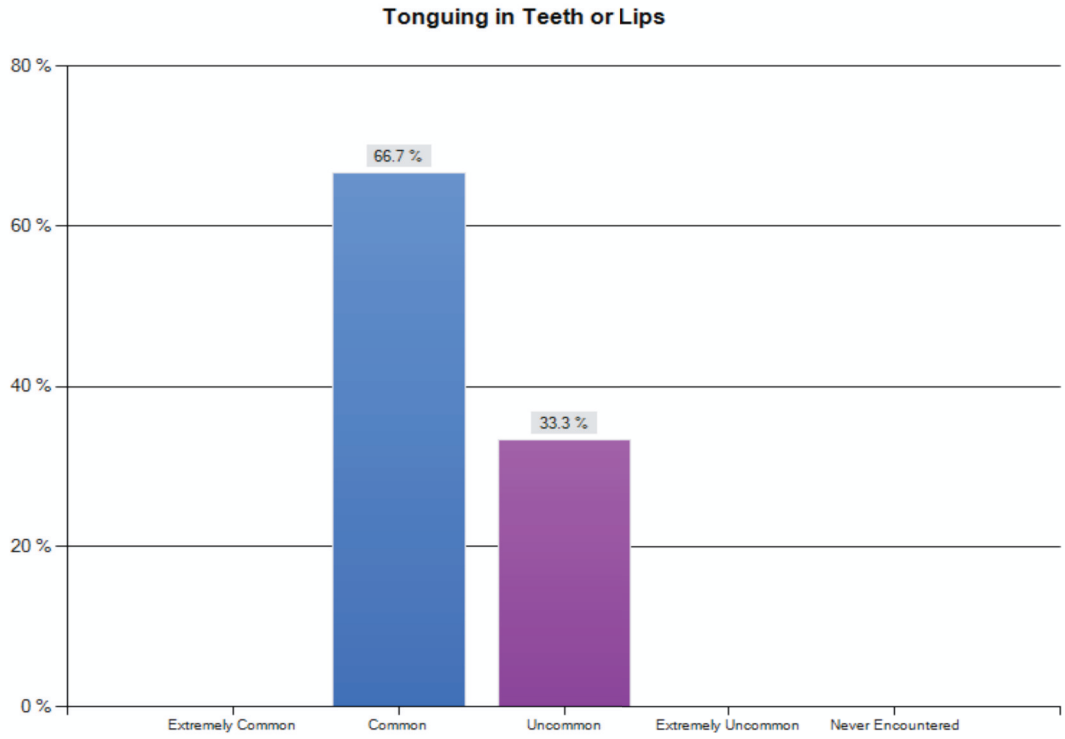

Loose Wrist Action (Floppy Wrist)
60 %
40 %
20 %
0 %
8.3 %
33.3 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

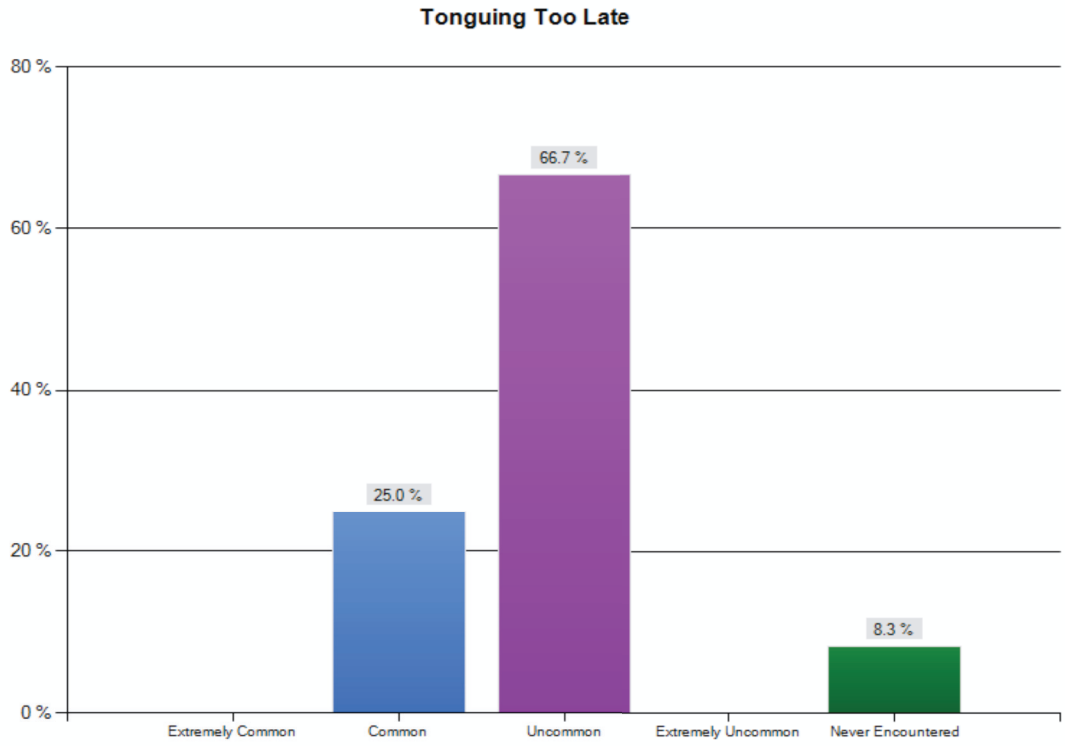

Poor Slide Timing (Moving Slide Too Early or Late)
80 %
60 %
40 %
20 %
0 %
75.0 %
25.0 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

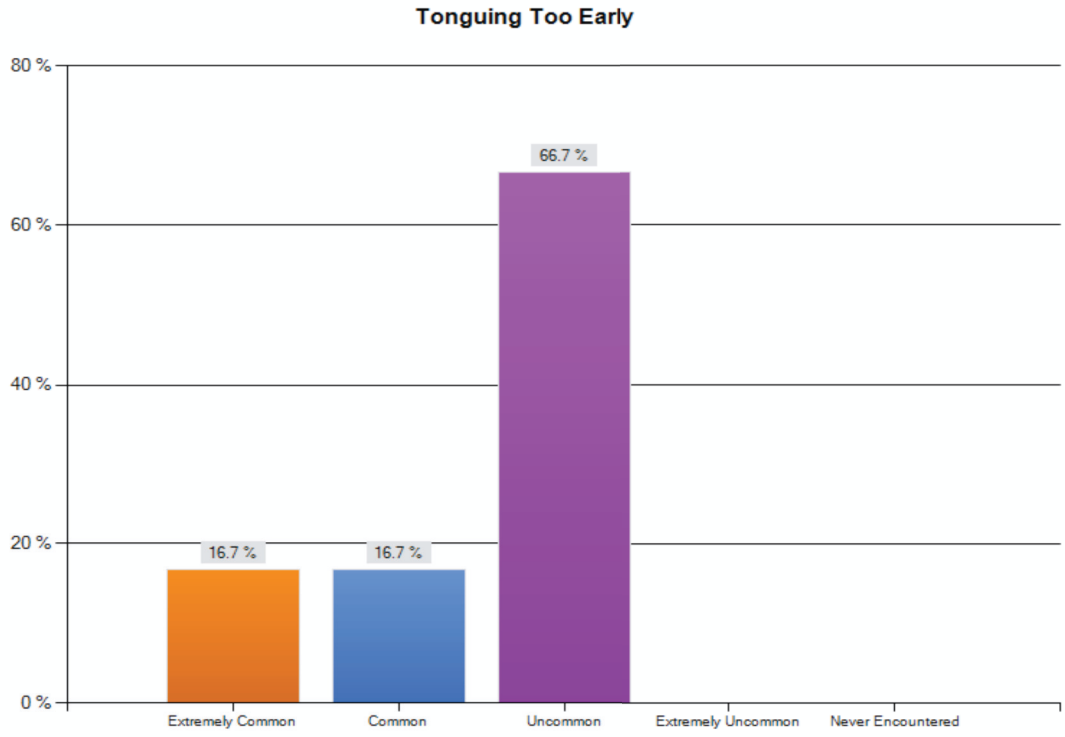

Jerky Slide Action
100 %
80 %
60 %
40 %
20 %
0 %
16.7 %
83.3 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

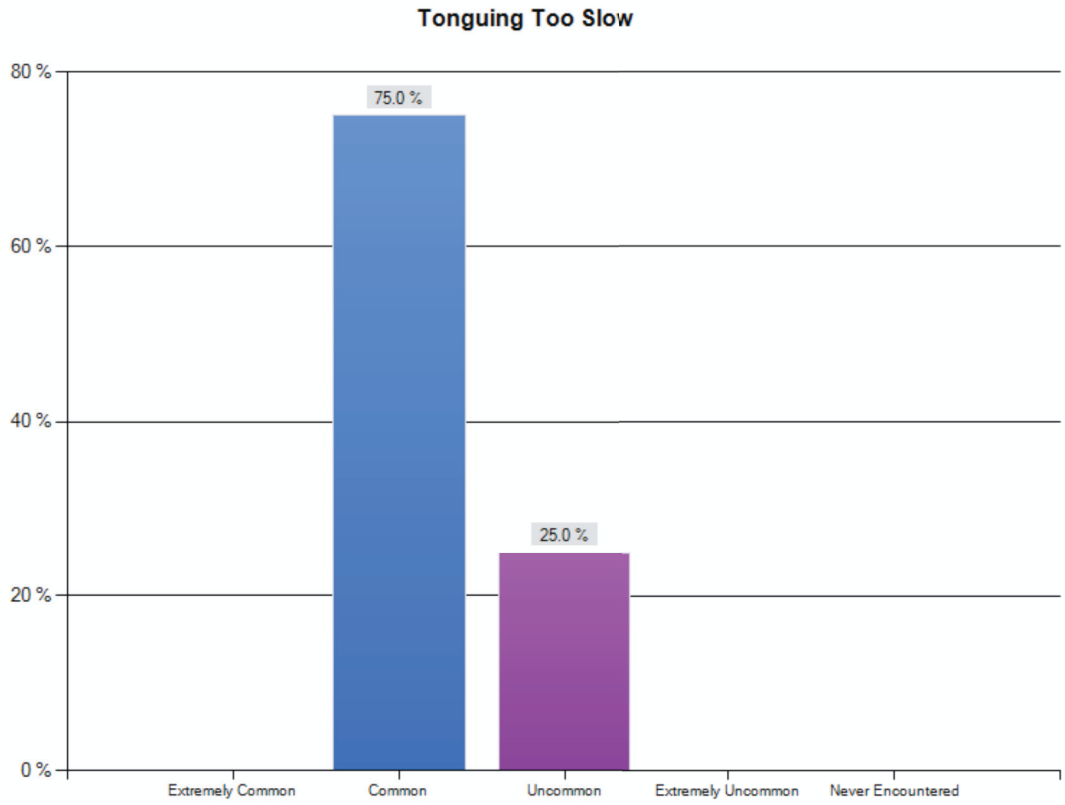
Articulation Deficiencies




Tonguing in Teeth or Lips
80 %
60 %
40 %
20 %
0 %
66.7 %
33.3 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered


Tonguing Too Late
80 %
60 %
40 %
20 %
0 %
66.7 %
25.0 %
8.3 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered


Tonguing Too Early
80 %
60 %
40 %
20 %
0 %
16.7 %
16.7 %
66.7 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered


Tonguing Too Slow
80 %
60 %
40 %
20 %
0 %
75.0 %
25.0 %
Extremely Common
Common
Uncommon
Extremely Uncommon
Never Encountered

Appendix G - Survey Comments

Breathing and Air Support Statements

1. Airflow, and by extension breathing, is the most important concern in proper tone-production on the trombone.

I would also say that having a concept is equally important.

- Dr. Josh Bynum

I do believe airflow is important; however, the student trombonist must first have a clear concept of a proper tone. Once the concept is established then a stable, functioning embouchoure set, and easy, relaxed posture work in coordination with airflow to produce a great tone.

- Dr. Jemmie Robertson

I also think that hearing the sound in your head is an important factor in proper tone production. Perhaps it is the most important factor.

- Joseph Rodriguez

I would say that it is equal to embouchure formation.

- Douglas Hofherr

2. The air may be considered the fuel that creates vibration in the embouchure.

To continue the automobile analogy it is important to note that a well-tuned engine efficiently burns fuel. Some students can get carried away and paradoxically try to force too much air through the horn causing a variety of tension, range, tone and articulation issues.

- Dr. Jemmie Robertson

3. With the exception of extreme articulations and accents, or drastic leaps in range, airflow should remain constant.

Airflow may not be constant based on the space between notes (staccato vs. legato). But in general the airflow should remain constant.

- Dr. Steve Wolfinbarger

Size and speed will vary depending on numerous factors (including range, dynamic, etc.) but the air should always be moving.

- Dr. Josh Bynum

Dynamics are an additional variable.

- Dr. Jemmie Robertson

I'm not sure that large leaps should be an exception to this rule. I tend to keep my air connected on large interval leaps.

- Joseph Rodriquez

I believe that dynamics also change air flow (speed at which air is entering the horn.

- Douglas Hofherr

4. Due to variations in the size of the aperture of the lips, the speed of the airflow should be faster in the upper range than in the lower range.

Although I agree in principle, I generally teach my younger students that air speed affects volume (i.e., fast air speed means louder and slow air speed means softer). By contrast, the upper range requires a smaller aperture and more support, resulting in a more COMPRESSED air stream, while the lower register

does the opposite. Therefore while the air speed in the upper register may increase as a result of the increased support, it's the air compression that most important to achieving a successful upper register.

- Dr. Steve Wolfingarger

Faster...but not overly aggressive (which many younger students tend to do when blowing a faster airstream).

- Dr. Josh Mynum

Though this happens naturally, I feel that teaching faster air in the high range leads to unnecessary tension.

- Dr. Robert Blaine

As we ascend in register the aperture of the lips grows smaller and this can cause the air flow to feel as though it is moving faster; however, I believe the air-flow rate remains nearly the same or in fact diminishes as we ascend. I believe that is why we can generally sustain a middle C longer than a low register trigger C. It may feel faster in the upper register however that may be a perceptual illusion. It is the vibration which is faster, not necessarily the air-flow rate.

- Dr. Jemmie Robertson

Relative dynamics also play a crucial role in rate of airflow.

- Peter Ellefson

I think the air stream is more focused in the upper register and agree that it is faster, but that less total air is expelled in the upper register.

- Douglas Hofherr

Breathing and Air Support Deficiency Comments

Shallow breathing seems to be somewhat on the wane as a common problem. While I have not encountered the Valsalva Maneuver frequently, I think it normally is a common problem.

- Dr. John Seidel

I would've liked an option between common and uncommon. For example, high-breathing is not something I see often, but I also wouldn't call it uncommon. Also, the first two questions don't discriminate between inhalation or exhalation. I'll commonly find students taking excellent inhalations, but then not allowing the air to flow freely upon exhalation. But this circumstance doesn't necessarily mean that "tight-throat"-syndrome is occurring.

- Dr. Cory Mixdorf

Having students indicate clear breath marks in their music really helps phrase shape. I have found that a majority of students neglect this aspect of preparation, which has a negative effect on their breathing. They tend to focus on breathing only at the moment when they are running out of air. The result is an ineffective breathing process.

- Dr Josh Bynum

Over-Physicalizing the breathing process is common.

- Dr. Jemmie Robertson

Regarding exhalation, it is very common for students to use too much air. As young students they have been encouraged to "use more air, use more air." As the body matures and strengthens, the "use more air" paradigm actually produces a situation where air is too powerful and too abundant.

- Peter Ellefson

Embouchure Control and Flexibility Statements

1. Every note played on the trombone must be created by buzzing the lips at the desired pitch frequency.

Only if you want the sound to be centered and resonant.

- Peter Ellefson

I believe it is probably true, but I am not sure. Upper register (harmonics) may require more accuracy.

- Douglas Hofherr

2. The portion of the embouchure that vibrates within the mouthpiece should remain as relaxed and supple as possible.

Of course the "as possible" is the imperative part of this statement in that extreme high range does require a more "focused" aperture, but yes, as relaxed as possible.

- Dr. Cory Mixdorf

Although it varies depending on register and dynamic. Use just enough exertion but not too much.

- Peter Ellefson

3. The vibrating portion of the lips increases (widens) for lower pitches and decreases (narrows) for higher pitches.

I have visual proof of this physical action.

- Peter Ellefson

I never thought about it in this way. I just try to get my lips to get the most vibration possible on all pitches. Perhaps even though I am trying to buzz the whole lips, your statement is what generally does happen.

- Joseph Rodriquez

Most commonly yes, but there are exceptions.

- Douglas Hofherr

4. The muscles at the corners of the mouth provide the necessary control of the vibrating portion of the embouchure and should remain firm but not clinched.

I agree, but am not sure what you mean by "clinched". I think the firmer, the better.

- Dr. John Seidel

Bingo!

- Peter Ellefson

5. The corners should be anchored downward, never drawn up as this creates a thinning of the lip material in the vibrating portion of the embouchure.

Anchored, but not drawn downward. I've seen embouchures where the corners are pulling downward excessively.

- Dr. Steve Wolfinbarger

I more commonly refer to the corners as anchored inward, not necessarily up or down, but if I had to pick, I'd choose down.

- Dr. Cory Mixdorf

Not so much "downward" as stationary. Smiling is a no-no. Downward is a no-no.

- Peter Ellefson

I agree with the second part of the statement. However, I try to glue the corners to the teeth. Not nessesarily in a downward motion, but if anything going toward the mouthpiece.

- Joseph Rodriquez

Embouchure Control and Flexibility Deficiency Comments

Some of these issues I think are more common at pre-college level, and thus I do not see them often, although I do believe that they occur frequently there.

- Dr. John Seidel

Regarding the rolling in of the lips over the teeth, I assume you mean over-pivoting, or tucking the bottom lip over the top (especially in the high register).

This is VERY common. Regarding other embouchure problems, TOO much embouchure tension is a big problem resulting in a tense/tight sound.

- Dr. Steve Wolfinbarger

Incorrect angle of the instrument....anchor point on top lip rather than bottom as a result of adjustment of horn angle in marching band. Not an embouchure problem and can easily be fixed.

- Dr. Jonathan Whitaker

Clarifications: Mouthpiece placement is frequently too high. The lower lip rolling (collapsing) up is a frequent observation. Excessive lip rolling out into the mouthpiece is frequently observed in the low register. Smiling seems to become associated with a deficiency in the high register and puffing cheeks is more frequently an issue in the low register.

- Dr. Jemmie Robertson

I frequently see students rolling their upper lip over the lower lip. This condition, while a short term solution for upper register, creates a circumstance where one set of muscles has to work much harder thus creating fatigue and limited endurance. The lips must meet (as in M or P) in order to function optimally.

- Peter Ellefson

Slide Precision and Timing Statements

1. The movement of the slide from one position to the next, should be quick but never abrupt or jerky.

It is quick, but I refer to it as moving as slow as possible without producing a gliss so as to eliminate that jerkiness.

- Dr. Cory Mixdorf

Rhythmic slide movement is the aspect of technique on which I place the most emphasis. Move TO THE RHYTHM. Not before, and certainly not after.

- Dr. Josh Bynum

It depends on the style of the passage.

- Peter Ellefson

2. Wrist, hand and finger movement should be minimized so that the primary hinge in the slide arm is at the elbow, thus creating fewer points of variability in slide placement.

I agree, but I think that flexibility in the wrist and fingers is important, especially in fine-tuning pitches in performance.

- Dr. Seidel

While I use the elbow as the primary hinge for slide movement, I have found that the wrist works better for me to ensure precise slide placement especially for smaller movements and fine tuning.

- Andrew Hicks

I would say slide motion should be done with 80% arm, 20% wrist when applicable (lots of back and forth action or frequently when reaching to or past 4th position).

- Dr. Cory Mixdorf

Minimized...but not completely eliminated. Otherwise, students tend to be overly rigid with the slide which results in very poor legato technique.

- Dr. Josh Bynum

I teach students to move the slide with the wrist, hands and fingers. This allows for a fast motion without being jerky.

- Dr. Robert Blaine

It makes sense, but I do not know.

- Douglas Hofherr

3. The timing of the slide movement between notes is different in legato playing than in more separated or articulated playing due to the difference in the amount of space (time) between notes.

I always try to play with a very quick but relaxed slide whether I am playing legato or articulated material. I try to encourage this uniformed coordination of tongue and slide to students. I have found that a lot of students equate legato with slower slide movement or slower articulation or both.

- Andrew Hicks

Always to the rhythm....regardless of style.

- Dr. Josh Bynum

In both cases I believe slide motion should be rhythmic.

- Dr. Jemmie Robertson

That seems to make sense.

- Douglas Hofherr

Slide Precision and Timing Deficiency Comments

The slide grip and the timing of the slide....these are the most common deficiencies that I see in young players.

- Dr. Jonathan Whitaker

The slide grip is one of the most difficult deficiencies to correct. Students usually grip the bar too far up on the finger. My ideal slide grip is: Hold the bar as you would hold a wine glass for a toast...or when presenting a rose to someone. Use as little squeeze as possible and keep the thumb on the bar at all times. Also, no bounce into each position...either push or pull but not both.

- Peter Ellefson

Articulation Statements

1. Defined simply, an articulation is the manner in which a note begins.

I agree, although I tend to include note length and shape under the heading of articulation.

- Dr. John Seidel

Equal importance should be given to releases.

- Dr. Josh Bynum

2. Air, not the tongue, creates vibration and thus a musical tone.

No Comments

3. The tongue's function in articulation is to help characterize the manner in which the air impacts the vibrating portion of the embouchure.

No Comments

4. Articulations occur when the tongue drops, allowing the air to impact the lips.

I prefer to think of the articulation occurring when the tongue hits the roof of the mouth, interupting the air, not stopping the air and releasing it. By adjusting how it hits and where it hits you can change the articulation.

- Joseph Rodriquez

5. With the exception of extreme secco articulations the tongue creates articulations by briefly interrupting an otherwise constant airflow.

No Comments

6. Generally speaking, notes should never be stopped by the tongue.

This depends somewhat on the style of music being played. Pedagogically speaking, however, I think you are on firm ground with this statement.

- Dr. John Seidel

Only for special effect.

- Peter Ellefson

99 % of the time....

- Douglas Hofherr

Articulation Deficiency Comments

I use different tongue placement for different registers....especially in the low register (I tongue much lower in my mouth and sometimes between the teeth).

- Dr. Jonathan Whitaker

I have found that improper air delivery and/or air quantity accounts for as many of the problems in starting notes as poor articulation technique does.

- Andrew Hicks

Other deficiencies: Tonguing too hard/soft. Tonguing by flicking toungue.

- Joseph Rodriquez

I don't view tonguing in teeth or lips as a deficiency. The placement of the tongue is dictated by the register one is playing in. In the low register, the tongue is between the teeth. In the upper register it is behind the upper teeth.

- Peter Ellefson

Appendix H - Survey Participants

Robert Blaine

Education

BA - Indiana University

MM - The Catholic University of America

DMA - The Eastman School of Music

Teaching Experience

Fifteen Years

Current Position

Associate Professor of Music at Jackson State University

Josh Bynum

Education

BME - Jacksonville State University

MM - Temple University

DMA - University of Iowa

Teaching Experience

Five Years

Current Position

Associate Professor of Trombone at University of Georgia

Paul Compton

Education

BM - University of Texas at Arlington

MM - University of North Texas

Teaching Experience

Seven Years

Current Position

Associate Professor of Trombone at Oklahoma State University

Peter Ellefson

Education

BA - Linfield College

MM - Northwestern University

Teaching Experience

Twenty Years

Current Positions

Professor of Trombone at Indiana University

Lecturer of Trombone at Northwestern University

Andrew Hicks

Education

BA - Cincinnati Conservatory of Music

Graduate Studies - The Cleveland Institute of Music

Teaching Experience

Five Years

Current Position

Bass Trombone in the Fort Wayne Philharmonic Orchestra

Douglas Hofherr

Education

BME - Indiana University

MA - Ball State University

Teaching Experience

Twenty-five Years

Current Position

Salamonie Middle School Band Director

Dr. Corey Mixdorf

Education

BA - University of Northern Iowa

MM - Indiana University

DM - Indiana University

Teaching Experience

Two Years

Current Position

Assistant Professor of Trombone/Brass Coordinator at Georgia State University

Jemmie Robertson

Education

BM - University of Northern Colorado

MM - Yale University

DM - Northwestern University

Teaching Experience

Five Years

Current Position

Assistant Professor of Trombone at Eastern Illinois University

Joseph Rodriquez

Education

BM - University of Texas at Arlington

MM - Depaul University

Artist Diploma - The Julliard School

Teaching Experience

Fourteen Years

Current Position

Applied Artist at Northern Illinois University

Guest Lecturer in Trombone at Wheaton College Conservatory of Music

Assistant Professor of Trombone and Euphonium at Concordia University in Chicago

Dr. John Seidel

Education

BS - West Chester State College

MM - Temple University

DMA - University of North Texas

Teaching Experience

Twenty-five Years

Current Position

Associate Professor of Trombone at Ball State University

Dr. Jonathan Whitaker

Education

BM - Murray State University

MM - University of Minnesota

DM - Indiana University

Teaching Experience

Six Years

Current Position

Assistant Professor of Trombone at the University of Alabama

Dr. Steve Wolfinbarger

Education

BM - Evangel University

MM - North Texas State University

DMA - University of North Texas

Teaching Experience

Thirty Years

Current Position

Professor of Trombone at Western Michigan University

Appendix I - Audio CD Track Index

Track 1 - Long Tone Exercise #1

Track 2 - Long Tone Exercise #4

Track 3 - Flexibility Exercise #1

Track 4 - Flexibility Exercise #2

Track 5 - Flexibility Exercise #5

Track 6 - Flexibility Exercise #6

Track 7 - Flexibility Exercise #8

Track 8 - Flexibility Exercise #9

Track 9 - Flexibility Exercise #11

Track 10 - Flexibility Exercise #12

Track 11 - Flexibility Exercise #13

Track 12 - Flexibility Exercise #16

Track 13 - Flexibility Exercise #18

Track 14 - Flexibility Exercise #19

Track 15 - Slide Precision Exercise #1

Track 16 - Slide Precision Exercise #4

Track 17 - Slide Precision Exercise #7

Track 18 - Slide Precision Exercise #10

Track 19 - Slide Precision Exercise #13

Track 20 - Slide Precision Exercise #16

Track 21 - Slide Precision Exercise #19

Track 22 - Slide Precision Exercise #22

Track 23 - Articulation Exercise #1

Track 24 - Articulation Exercise #2

Track 25 - Articulation Exercise #3

Track 26 - Articulation Exercise #4

Track 27 - Articulation Exercise #5

Track 28 - Articulation Exercise #7

Track 29 - Articulation Exercise #10

Track 30 - Articulation Exercise #12

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