

AN EXAMINATION OF THE ANATOMICAL AND TECHNICAL ARGUMENTS AGAINST
PLACING THE MOUTHPIECE ON VERMILLION: WHY PLACING ON THE RED IS FINE

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Method

Background of the Problem

While there is a general consensus regarding the importance and mechanics of technique issues such as proper breathing when playing a brass instrument, there remains a great deal of controversy regarding proper use of the brass player's embouchure, specifically regarding the best position of the mouthpiece upon the lips. Many popular texts disagree on mouthpiece placement. One of the earliest and still widely used texts for the development of brass technique is J.B. Arban's *Complete Conservatory Method for Cornet* (1982). In the original text from 1894 Arban wrote, "The mouthpiece should be placed in the middle of the lips, two-thirds on the lower lip, and one-third on the upper lip" (1982, p. 7). Philip Farkas (1962) recommended that most horn players should place the mouthpiece so that two-thirds be placed on the upper lip and one-third on the lower lip. He stated, "I have never met a really accomplished French horn player who used more lower lip than upper." (p. 32). Eight years after publishing this statement in *The Art of Brass Playing* Farkas published *A Photographic Study of 40 Virtuosi Horn Player's Embouchures* showing one horn player with a mouthpiece placement using more lower lip than upper (1970). David Vining (2010) somewhat confusingly wrote that trombonists need to place the mouthpiece with "at least one half top lip and one half bottom lip in order to achieve a good sound" (p. 62). Donald Reinhardt (1973) felt that the best mouthpiece placement was determined by the individual player's anatomy and divided embouchure patterns into nine different types with placements including more upper lip and more lower lip inside.

While the specific mouthpiece recommendations regarding mouthpiece placement are contradictory, there is more consensus regarding how high or low upon the lips the mouthpiece

should be placed. Specifically, some texts on brass technique comment that a mouthpiece setting that places the rim directly on the vermillion of the upper or lower lip is something to be avoided. Frank Gabriel Campus (2005) wrote:

To function properly, the inner edge of the mouthpiece must be placed on tissue that is supported by muscle, but the lips are composed of fatty tissue that by itself cannot support a normal embouchure. A performer whose mouthpiece inner edge is habitually placed on the red (vermillion) of the upper lip is using an embouchure that is not capable of producing the flexibility, strength, and endurance necessary for normal performance. It should be avoided at all costs. (p. 73)

Other brass musicians agree. Trumpet player and teacher Charles Porter commented, “The inner part of the lips are more fragile and more prone to damage. This holds true for EVERYONE [sic]. I’m sure there is an abundance of scientific data to back this up” (Porter, 2012). Jeff Smiley (2001) similarly advised against placing the inner rim of the mouthpiece on the vermillion of the upper lip writing, “The lowered placement may temporarily succeed, but ultimately it’s a dead end street. Negative side effects include loss of stamina, poor tone, and flatness of pitch” (p. 145). Another author writes, “If the inner edge of the mouthpiece rim slips down or is placed on the red of the upper lip, the opening and closing motion of the lip will be affected and the embouchure will not be reliable” (Whitener, 2007, p. 151).

Purpose of the Study

Looking closely at these statements regarding the dangers of placing the mouthpiece on the vermillion of the lips three basic arguments against this placement emerge. First, it’s common to state that the vermillion is inherently more sensitive to mouthpiece pressure and such a

placement is prone to damaging the lips (Campos, 2005). Secondly, many authors (Baldwin, 1996; Campos, 2005; Smiley 2001; Whitener, 2007) state that this placement limits technique, in part due to the observations that show many brass players' upper lip vibrates with more intensity than the lower lip (Leno, 1987; Weast, 1987). Lastly, some claim that this mouthpiece placement hinders technique to the point where it is immediately apparent through sound alone whether the player is placing the mouthpiece with a significant amount of rim contact on the vermillion. One author stated:

I have had many students who played on the red of the lip, and some had excellent range, but flexibility, endurance and response were never good. Consistency from day to day eluded them. In a blind audition, I can easily tell within a minute that someone is playing on the red. (Campos, 2012).

This paper will take a close look at these general arguments against this placement and attempt to determine the validity of each point through an examination of the literature, discussion of the logic of each point, and through an experimental pilot study designed to test whether a mouthpiece placement with the rim in contact with the vermillion makes for a noticeable difference in the player's sound or technique compared to players with a more typical placement.

Research Questions

Three basic research questions will be addressed in this paper:

1. Is the vermillion of a player's lip inherently sensitive to mouthpiece pressure so that a placement with a great deal of rim contact on the red of the lips risks damage to the player's lips?

2. Does a mouthpiece placement placed very low on the upper lip incorrectly inhibit the vibrations of the brass musician's upper lip?

3. Does a mouthpiece placement with a great deal of rim contact on the lip vermillion produce a noticeable difference in a trumpet player's sound or technique?

Research Hypotheses.

HO₁ Hypothesis: There will be no significant difference for risk of injury found for brass players who place their mouthpiece with a significant amount of rim contact on their vermillion compared with brass players who have a more typical placement.

HO₂ Hypothesis: There will be no significant difference noted among trumpet player's technique and sound that correlates with a mouthpiece placement with a significant amount of rim contact on the vermillion.

Delimitations

The six subjects for the experimental study phase of this paper were drawn from a sample population from a prior research presentation on brass embouchures. These six participants were selected because they represented the six professional trumpet players collected for this earlier research with advanced degrees in music and can therefore presumably be considered expert trumpet performers.

Definition of Terms

Downstream embouchure.

An embouchure that has more upper lip than lower lip placed inside the mouthpiece.

Because of the predominance of upper lip inside the mouthpiece cup the air passes the lips and strikes the cup below the shank.

Lips.

The anatomical structures that surround the oral aperture including, but not limited to, the vermillion, vermillion border, philtrum, and oral mucosa. The upper lip includes the vermillion up to the nose. The lower lips includes the vermillion down to the mentolabial sulcus.

Mentolabial sulcus.

The line separating the lower lip from the chin. This line is frequently indistinct and often difficult to visually determine.

Orbicularis oris.

The sphincter muscle that is within the lips and surrounds the opening of the mouth. The orbicularis oris muscle is present under both the vermillion and the non-vermillion part of the lips.

Philtrum.

The area of the upper lip above the vermillion border up to the nose.

Upstream embouchure.

An embouchure that has more lower lip than upper lip placed inside the mouthpiece.

Because of the predominance of lower lip inside the mouthpiece cup the air passes the lips and strikes the cup above the shank.

Vermillion.

The red part of the lips. Frequently referred to as “the lips” by brass players or other non-medical sources.

Vermillion border.

The paler skin area that distinguishes the vermilion from the rest of the lips.

Review of Related Literature

Damage to Lip Vermillion Due to Brass Playing

One of the difficulties in reviewing the literature for information regarding damage to the lips due to mouthpiece placement is that brass players and the general public tend to confuse the vermilion with the lips themselves. The strict medical definition of the lips includes the entire area from below the nose down to the chin (Carey, Cohen, Curry, Devriendt, Holmes, & Verloes, 2009, p. 78). This discrepancy in terminology makes it difficult to transfer information to and from the medical field and the musical literature. For the purposes of this paper the proper medical definitions will be used.

Many authors of brass technique texts demonstrate a lack of understanding of the anatomy of the lips. For example, Campos (2005) writes that, “the lips are composed of fatty tissue” (p. 73). However, this statement is inaccurate as the orbicularis oris muscle group not only surrounds the vermilion but is also directly under the vermilion (Wilson, 2000, p. 38). Diagrams depicting the muscles of the face that show the vermilion borders as a point of reference are confusing and are partially responsible for this misunderstanding (see Figure 1). Wilson (2000) further disputes the belief that the vermilion is more sensitive to pressure and prone to damage, stating, “In summary, the vermilion portion of lips tolerates pressure well. . .” (p. 38).

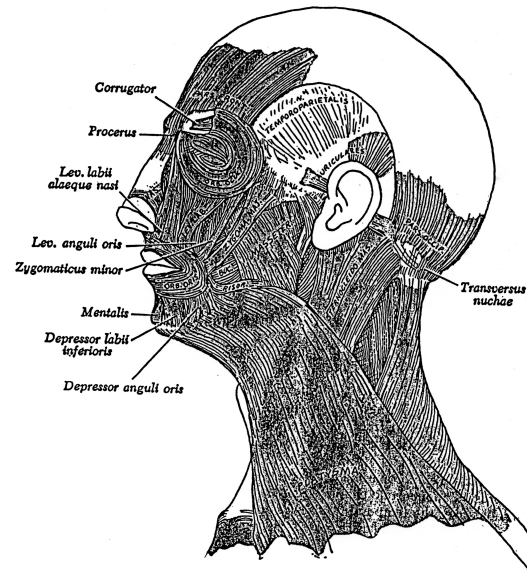


Figure 1. Anatomy of the face showing vermillion as point of reference (Wilson, 2000, p. 38).

Other misunderstandings happen when musicians without a background in medicine try to interpret articles written about musicians' injuries by researchers without a background in music. Stephanie Mencimer wrote, "Musicians' injuries are as numerous as their instruments: fiddler's neck, tuba lips, violinist's jaw, horn player's palsy -- even guitar nipples and harpist's cramp" (2003, p. HE01). Bache and Edenborough (2008) write of injuries some musicians are prone to, commenting, "Guitarist's nipple, cellist's chest, cello knee, and cello scrotum are all described. . ." (p. 3). However, in 2009 one group of authors confessed:

Reading Curtis's 1974 letter to the *BMJ* on guitar nipple, we thought it likely to be a spoof and decided to go one further by submitting a letter pretending to have noted a similar phenomenon in cellists, signed by the non-doctor one of us (JMM). Anyone who has ever watched a cello being played would realise [sic] the physical impossibility of our claim. Somewhat to our astonishment, the letter was published. The following Christmas

we send a card to Dr Curtis of guitar nipple fame, only to discover that he knew nothing about it - another joke we suspect. (Murphy & Murphy, 2009, p. b288)

While good intentioned, these articles served to further spread misinformation based on spoofs erroneously published in otherwise reputable sources. Even resources that may normally be considered trustworthy should be read with some skepticism, particularly when the subjects being discussed can be considered to be outside the field of the authors or are considered controversial among experts in the field.

All brass mouthpiece placements necessarily have some rim contact on the vermillion. If rim contact on the vermillion was inherently damaging to a brass player's lips then all brass players would be prone to developing injuries on the vermillion where the rim contacts the lips along the sides, regardless of how much rim is placed on the red of the lips. Although a review of the medical literature regarding damage to the lips of brass players does show injuries of this nature happens, it is rare for any articles to comment on the individual's mouthpiece placement and how this correlates with the specific area of injury.

Papsin, Maaske, and McGrail (1996) documented a number of case studies of brass musicians who had injuries to the orbicularis oris. The authors mention that lip injuries result from either a sudden increase in contraction of the fibers of the orbicularis oris, resulting a tear in the muscle, or from prolonged stress resulting in repeated partials tears, stretching, and fibrotic repair of the orbicularis oris (Papsin et al., 1996, p. 760). This article makes no mention of where the rim contacted the injured brass players' lips, yet one diagram included in the article suggests that injuries to the orbicularis oris due to brass playing may even occur where the mouthpiece rim does not contact the lips at all (see Figure 2).

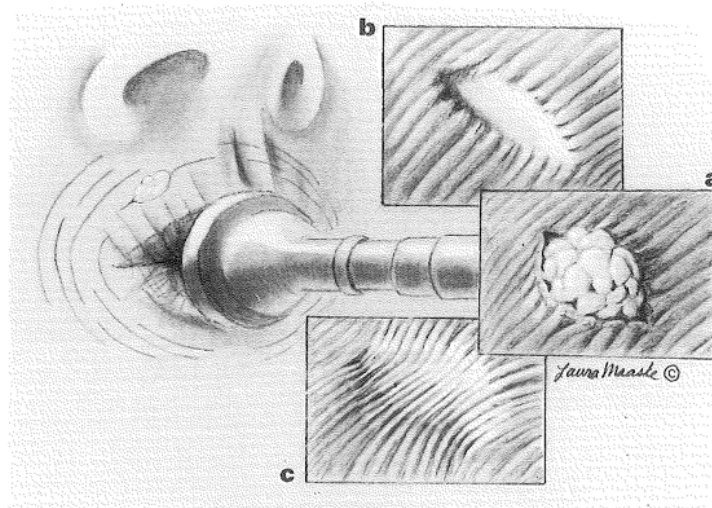


Figure 2. Diagram showing injuries to orbicularis oris muscle on a brass player (Papsin et al., 1996, p. 760).

Steven Frucht (2000) notes that mouthpiece pressure on the lips is sufficient to cause muscle strains and tears in the orbicularis oris (p. 563). The subject in his case study developed sensory loss, focal pain, and a sharp cutting pain extending from her vermillion up to her right nostril. The pain was successfully treated by filing down a prominent tooth along with a period of rest. A diagram of this patient's pain shows the symptoms extending from, but not limited to, the musician's rim placement along the vermillion (see Figure 3).

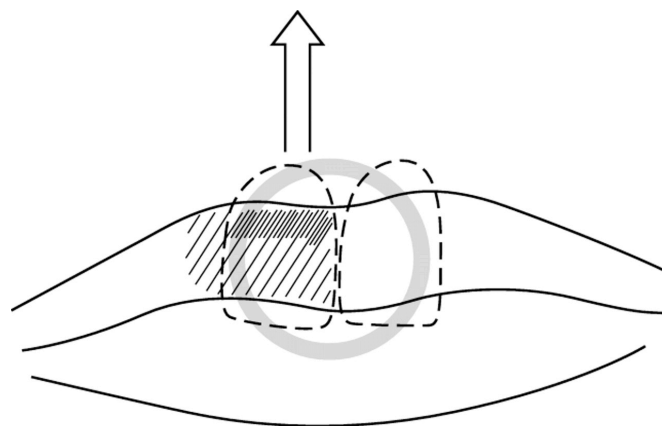


Figure 3. Diagram showing sensory loss (wide cross hatching), focal pain (narrow cross hatching), and lancinating pain (arrow) on diagram of lips and first incisors with rim contact of french horn mouthpiece (Frucht, 2000, p. 563).

Trumpet player Denver Dill (2012) discusses developing a mild herniation and severe stretching to his orbicularis oris, requiring surgery in order to repair the damage. He notes his mouthpiece was placed quite a bit to the right side of his lips following his injury (Dill, 2012, p. 12). Following the surgery his placement moved closer to center. A video posted online showing both Dill's pre-surgery and post-surgery embouchure shows a significant amount of rim contact on the vermillion of his upper lip to his pre-surgery embouchure. His post-surgery mouthpiece placement is much more centered, yet is still placed with about the same amount of rim contact on upper lip vermillion (West Point Bands, 2012).

Conducting a meta analysis of the literature, Yeo, Pham, Baker, and Porter (2002), looked at orofacial injuries common to musicians. They found that many wind musicians experienced problems due to orthodontic issues, denture retention, soft tissue trauma, focal dystonia, herpes labialis, dry mouth, and temporomandibular joint disorders. They also noted that brass musicians may also find that pressure of the mouthpiece can cause pain or discomfort if the lips are pressed against protruded or rotated teeth and some players may develop calluses on their upper lips (Yeo et al., 2002, p. 9). No specific mention was made to how rim contact placed on the vermillion correlates with these injuries. James Ford (2007) noted that the mouthpiece forces used by trumpet players were large enough to cause serious injury to the orbicularis oris muscle (p. 2) but doesn't comment on whether this damage is more likely to occur under the player's vermillion. Liu and Hayden (2002) note that trumpet players are more vulnerable to injury of the orbicularis

oris compared to other brass players (p. 731), however no mention is made regarding the correlation of mouthpiece placement to injuries. Iranzo, Pérez-Soriano, Cmacho, Belloch, and Cortell-Tormo (2010) note that brass players are normally associated with low rates of playing-related musculoskeletal disorders, although injury to the orbicularis oris and disorders of the temporomandibular joints do happen among brass players (p. 97). Similarly, no mention is made by Iranzo et al. in their article about any correlation between these injuries and mouthpiece placement.

Brass Embouchure Technique Limited by Rim Contact on Vermillion

Another common argument for recommending that brass musicians should avoid placing the mouthpiece so the rim contacts a significant part of the player's lips is that this placement is improper embouchure technique. Brevig (1991) wrote that, "Visual inspection of the muscles surrounding the mouthpiece can reveal several embouchure problems. An eccentrically placed mouthpiece, one with too much or too little upper lip in the mouthpiece. . . are all apparent on inspection." (p. 107). Weast (1969), Campos (2005), and Whitener (2007) all comment that the upper lip should be responsible for most of the lip vibrations and that placing the rim so that there is more rim contact on the upper lip, particularly so low that it is placed on the vermillion, will inhibit the vibrations of the upper lip and make playing difficult. Studying the lip vibration of a single trombonist, Copley and Strong (1996) note that, "From the video sequences, it is apparent that the upper lip vibrates considerably more than the lower lip for all cases. . ." (p. 1222-1223).

The statements regarding lip vibrations are corroborated to a certain degree by other authors, however additional research indicate that the additional rim contact on the upper lip

actually functions better for a minority of brass players. Both Reinhardt (1973) and Leno (1987) noted that most brass players place the mouthpiece on the lips so that there is more upper lip inside the cup. Leno's film (n.d.), *Lip Vibration of Trombone Embouchures*, notes that there are two main embouchure types, downstream and upstream, and that the downstream type is most common. In this film Leno both comments on and shows how when the upper lip predominates inside the mouthpiece the upper lip vibrates with more intensity than the lower lip and the embouchure is downstream. The reverse situation, where the embouchure has more lower lip inside and is upstream, shows the lower lip vibrating with more intensity. This supports Reinhardt's view (1973) that one lip or another predominates and is primarily responsible for creating the various degrees of embouchure compression (p. 155). Other research (Farkas, 1970; Gibson, 1973; Turnbull 2001; Wilken, 2000) also similarly show that while the majority of brass players place the mouthpiece so there is more rim contact on the lower lip (downstream), a minority of players instead place the mouthpiece so that there is more rim contact on the upper lip (upstream). While the views of Campos, Weast, and Whitener that the upper lip needs less rim contact to vibrate freely is correct for the majority of brass players, some brass musicians will perform better with more rim contact on the upper lip than the lower lip.

One difficulty in using the vermilion border as a specific recommendation related to mouthpiece placement is that there is a great deal of variation among individuals as to how large their vermilion is. It has been noted that the size and shape of any individual's lips vary with age and is influenced by ethnicity (Carey, 2009, p. 78). Past research showed no correlation between trombonist's vermilion size and embouchure type (Wilken, 2000).

Methodology

In order to determine whether placement on the red has any noticeable detrimental effect on a trumpet player's sound or technique a pilot study was conducted to survey brass musicians' ability to accurately guess six trumpet players' mouthpiece placements aurally through sound samples of approximately 60 seconds each.

Subjects

Six professional trumpet players were selected from previous research conducted on brass embouchures. All six trumpet players have professional performance credentials ranging from performing with military ensembles, professional symphony orchestras, circus bands, jazz ensembles, and studio recordings. Three of the trumpet players specialized in orchestral trumpet playing and three in jazz, although some of the performers do cross over from time to time, some quite regularly. Five of the participants teach trumpet at a college or university, three have doctoral degrees in trumpet performance and three have masters degrees in music. Two of the subjects placed the mouthpiece low enough on the lips so there was extensive rim contact with the vermillion of their upper lip. One of the subjects placed the mouthpiece high enough on the lips so the rim was placed with a great deal of contact on the lower lip vermillion. Three of the trumpet players did not place the mouthpiece high enough or low enough on the lips to have extensive rim contact on their lips, excepting the normal rim contact along the sides of their lips.

Experimental design

Prior to participating in the research collecting data each of the six professional trumpet players signed a subject consent form (see Appendix A) giving permission to use their video and audio footage for the embouchure presentation entitled *Brass Embouchures: A Guide For Teachers and Players*, as well as for other subsequent publications. Each subject was then video

taped performing a series of trumpet playing tasks consisting largely of playing slurs spanning from one to three octaves on various pitches. The camera used was a Sony DCR-SR45 Handycam.

Excerpts from each subject's taping were selected for both encompassing a range of at least two octaves and ease of seeing the subjects mouthpiece placement clearly enough to view how much rim contact was placed on the vermillion in a roughly 60 second clip. The video was exported into the software GarageBand to extract the audio from each clip. Each audio sample was then exported as an MP3 file. A single video showing each of the trumpet players performing the audio samples was also created using iMovie.

An online survey was created and posted on the internet at <http://www.wilktone.com/?p=3746>. The site and page was created using Wordpress. Audio samples used the Wordpress plugin Audio Player to embed each MP3 sample into the web page. The survey was created using the Wordpress plugin WPSQT. Each survey participant was asked to listen to the embedded audio samples of the six trumpet players and then was asked to state whether they thought the trumpet player placed the mouthpiece on the red of the lips or not based on the sound alone. At the end of the survey a link to the video was provided.

In order to encourage participation in the online survey messages were posted to three brass internet forums asking for brass musicians to take the survey. The following message was posted to the Trumpet Herald Forum (<http://www.trumpetherald.com/forum/index.php>), Trumpet Master Forum (<http://www.trumpetmaster.com/vb/f131/>), and The Trombone Forum (<http://www.tromboneforum.org>):

I'm conducting an informal experiment as sort of a pilot study to observe how accurate people are guessing a trumpet player's mouthpiece placement through sound alone, specifically if one can actually hear if the player places the mouthpiece on the red of the upper or lower lip. If you'd like to participate and see how you do, please visit the following web site. There are audio recordings of 6 professional trumpet players playing octave slurs for about a minute. At least one player places the mouthpiece so the rim is in direct contact with the red of the lips and at least one player does not. Then there is a short quiz asking for your thoughts on whether the player places the mouthpiece on the red or not.

<http://www.wilktone.com/?p=3746>

Feel free to post your comments on the site or here if you have thoughts about this topic.

After taking the survey each participant would have the answers displayed and the following information about each player was shown.

Player A does not place the mouthpiece with rim contact on the red of the lips. This player can be typed as having a "medium high placement" embouchure type. Player A has a DMA in trumpet performance, experience performing with a military ensemble, and teaches trumpet at the collegiate level.

Player B places the mouthpiece on the red of the lower lip. This player can be typed as having a "very high mouthpiece placement" embouchure type. Player B has an advanced degree in trumpet performance, experience as a professional orchestral trumpet performer, and teaches trumpet at the collegiate level.

Player C places the mouthpiece on the red of the upper lip. This player can be classified as having a "low placement" embouchure type. Player C is a professional jazz trumpet player with military band experience. He has an advanced degree in music.

Player D places the mouthpiece just barely right on the red of his upper lip. This player is a little unusual in that he is a "medium high placement" embouchure type who places on the red of his upper lip, but the rather large size of his lip vermilion makes this placement with more upper lip inside still have the rim contacting his upper lip in this way. Player D is a professional jazz trumpet player with experience performing with touring big bands. He has an advanced degree in music. He teaches music at the collegiate level.

Player E does not place the mouthpiece with rim contact on the upper or lower lip. This player can be classified as having a "very high placement" embouchure type. Player E has a DMA in trumpet performance. He plays lead and section big band jazz and also much classical. Player E teaches music at the collegiate level.

Player F does not place the mouthpiece so the rim contacts the red of the lips. This player can be classified as having a "very high placement" embouchure type. Player F has experience playing professionally in orchestra settings and has an advanced degree in trumpet. He teaches trumpet at the collegiate level. (Wilken, 2012)

Participants were invited to comment on the survey web page or on the brass discussion forum topics in order to solicit information about their thoughts and strategies for determining the trumpet players' mouthpiece placements through the audio examples alone.

Results from each survey of the 98 participants was tallied and placed into the software Numbers to calculate the average results of each survey and of each individual trumpet player's correct answers (see Appendix B). Results for each individual survey were rounded down to the nearest whole number automatically by the WPSQT plugin, so these percentages were used to calculate the statistical average of all survey results. Participant numbers 1-28 were used to test the WPSQT plugin and were discarded. To tabulate the number of correct answers for each individual trumpet player a 0 was placed for an incorrect answer and a 1 for a correct answer. Percentages were then calculated to determine the aggregate correct response rate for each individual trumpet player's mouthpiece placement.

Results and Discussion

A total of 98 participants took the survey at the time of this writing. The overall average of each participant's score resulted in an accuracy rate of 51.9% when using audio alone to determine whether a trumpet player places the mouthpiece with a significant amount of rim placed on the vermillion. Player A had the most correct guesses, (64.3% accuracy rate), followed by Player F (60.2% accuracy rate), Player D (50% accuracy rate), Player C (49% accuracy rate), Player B (43.9% accuracy rate) and Player E (42.9% accuracy rate). These results are statistically consistent with random chance.

Comments made to the survey web site and brass fora suggest that many participants were biased against a mouthpiece placement with significant rim contact on the vermillion and based their guesses by listening for playing flaws in each example. Bass trombonist Sven Larsson commented, "I got 4 of 6 right, the ones I got wrong was because I was prejudiced.

Funny since I do know some fantastic players playing on the red” (Larsson, 2012). Another commenter wrote, “What I heard differed from player to player, but it is all easily audible. The main problems included lack of connection between slurred notes, reliance on muscling or overblowing, and unevenness of sound quality between different registers” (PacoTheTrumpeter, 2012). Others listened for the attack and a different tone quality between the upper and lower register as an indication as to whether the trumpet player placed the mouthpiece on the vermillion (Talotta, 2012). As there can be a wide variety of mechanical issues that cause problems unrelated to mouthpiece placement, this strategy appears to have been largely ineffective as a method for determining if a player’s mouthpiece placement was placed on the vermillion or not.

Review of the available literature does not show that mouthpiece placement with a significant amount of rim contact on the vermillion risks injury more than placements without much vermillion contact. As absence of evidence does not constitute evidence of absence it would be premature to state that this proves that a rim contact on the vermillion does not involve additional risk of injury. However, literature showing that the orbicularis oris muscle is present under the vermillion (Carey et al., 2009), statements that the vermillion is able to tolerate pressure well (Wilson, 2000), and research showing injuries to brass musicians’ lips may occur outside of the vermillion (Papsin et al., 1996) all suggest that the lip vermillion is able to accept the mouthpiece pressure from normal brass playing as easily as the non-vermillion area of the lips.

The comparison of the literature between the medical field and musical field show a need for more collaboration between disciplines. Musical resources frequently perpetuate false

statements regarding lip anatomy (Campos, 2005; Porter 2012). Non-musical resources often demonstrate a lack of understanding of the mechanics of musical technique (Bache & Edenborough, 2008; Mencimer, 2003; Murphy & Murphy, 2009). Even expert sources in the field of music frequently provide incomplete or fallacious information regarding how brass embouchures function (Brevig, 1991; Campos, 2005; Farkas, 1962; Smiley, 2001; Vining, 2010; Whitener, 2007).

Furthermore, brass authors with extensive performing and teaching backgrounds frequently lack the skills or wherewithal to investigate the scientific literature of brass embouchures with enough detail to make completely accurate statements regarding topics such as mouthpiece placement. Many authors place too much confidence on research using a very small sample size and erroneously conclude that a mouthpiece placement that works for the majority of brass players is “proper” technique and remain unaware of research that contradicts their advice.

Although a review of the literature seems to indicate that the lip vermillion is capable of accepting the mouthpiece pressure due to normal brass playing as easily as the rest of the lip it would be premature to state this as definitively true at this time. There is a lack of research specifically looking at this issue, perhaps because players whose embouchures make such a high or low mouthpiece placement correct represent a significant minority of brass players. The arbitrary nature of the vermillion as an anatomical feature make using the red of a player’s lips as a basis for recommending a mouthpiece placement make this a difficult subject to research.

Finally, while the results of the above discussed survey seem to indicate that most brass musicians do no better than random chance when trying to determine a trumpet player’s

mouthpiece placement through sound alone, the methodology of this survey needs improvement in order to make for more conclusive results. The small number of trumpet players drawn from did not allow for proper testing of each individual survey taker's abilities to hear mouthpiece placement and ensure that any single participant's answers weren't the result of random chance alone. Information on each survey taker can also be taken to determine the experience level of each participant in order to determine if brass musicians with more experience performed better than participants with comparatively less experience. A more robust and better designed survey might show different outcomes.

That said, the evidence against placing the mouthpiece with extensive contact on the vermillion is so weak as to be considered highly suspect. It is certainly true that such a high or low mouthpiece placement on the lips is not typical and shouldn't be recommend for all players, Instruction by Campos (2005) and others that this placement should be "avoided at all costs" (p. 73) is based on an inaccurate understanding of the anatomy of the lips, an incomplete view of brass embouchure form and function, and a biased interpretation of the aural effects of such a mouthpiece placement.

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Appendix A

Subject Consent Form

Agreement to Serve as a Research Subject

I consent to serve as a research subject in the project “Brass Embouchures: A Guide For Teachers and Players.” The project is conducted by Dr. David Wilken, Assistant Professor of Music at the University of North Carolina at Asheville.

I am aware that the project involves the following procedures: Photographs and/or videos will be taken of my lips, teeth, and jaw structure. Dr. Wilken will work with me to determine the best mouthpiece placement and the proper embouchure form for me, if my embouchure form is seen to be inefficient. Following this, photographs and video will be taken of me playing music and various exercises with a plastic transparent mouthpiece.

Time involved in completing this aspect of the study may range from about 10 to 60 minutes. Since traditional methods of teaching the embouchure tend to encourage a centered mouthpiece placement and a downward airstream direction, this method of study is considered experimental.

I understand that these photographs and video footage may be presented in the completed project. I also understand that these photographs and video may also be presented at professional or research conferences or in further publications. I am aware that the photos or videos will be stored indefinitely on a dedicated hard drive and on DVD backups, located in secured locations on campus and at the researcher’s home.

The major benefit of this project involves providing a method for brass instructors to help students develop an embouchure that is catered to each individual student through documenting the methods used to determine the most effective mouthpiece placement.

I recognize that participation in this study is voluntary. No penalty exists for refusal to participate, and I am free to withdraw consent and end my participation at any time. Results of the study is not based on objectives for any current university course, and while the results from participation may assist progress towards brass performance, performance in this study will not help or hinder my ability to compete for grades. If I am interested in the content, but wish not to be a participant in the study, the researcher will assist me by helping to determine the most effective embouchure for me. I am also aware that no remuneration is provided to research subjects.

I understand that this project is not expected to involve risks greater than those ordinarily found in daily life. While it is not possible to identify all risks in experiments involving human subjects, I recognize that safeguards will be taken to minimize anticipated risks.

For one's rights as a research subject, the following person may be contacted: Dr. Melissa Smith (828-251-6313 or msmith@unca.edu), to discuss any questions or concerns you may have about the rights of study participants. (The IRB is a college committee concerned with the protection of human subjects in research.)

Signature _____ Date: _____

Principal Investigator:
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Appendix B

Survey Results

Participant Number	Complete Score	Correct answer Player A	Correct answer Player B	Correct answer Player C	Correct answer Player D	Correct answer Player E	Correct answer Player F
29	50	1	1	0	0	0	1
30	50	1	0	1	0	1	0
31	50	1	0	1	0	1	0
32	33	1	0	0	0	1	0
33	17	0	1	0	0	0	0
34	33	0	1	0	1	0	0
35	17	0	1	0	0	0	0
36	50	1	1	0	1	0	1
37	66	1	0	1	1	0	1
38	83	1	0	1	1	1	1
39	50	0	0	1	1	0	1
40	83	1	1	1	1	0	1
41	66	1	0	1	1	1	0
42	66	1	1	0	1	0	1
43	66	1	1	0	0	1	1
44	50	0	1	0	1	0	1
45	50	1	1	0	0	1	0
46	50	1	1	0	1	0	0
47	50	0	1	1	1	0	0
48	66	1	1	0	1	1	0
49	83	1	1	1	1	1	0
50	66	1	0	0	1	1	1
51	83	1	1	0	1	1	1
52	66	1	1	1	0	1	0
53	50	1	0	0	1	0	1
54	66	0	0	1	1	1	1
55	66	1	0	1	0	1	1
56	50	0	1	0	1	0	1
57	50	0	1	0	1	0	1
58	66	1	1	1	0	0	1

Participant Number	Complete Score	Correct answer Player A	Correct answer Player B	Correct answer Player C	Correct answer Player D	Correct answer Player E	Correct answer Player F
59	50	1	0	1	0	0	1
60	83	1	1	0	1	1	1
61	66	1	1	0	1	1	0
62	33	0	0	0	0	1	1
63	33	0	0	0	1	1	0
64	33	0	1	0	0	0	1
65	66	1	0	1	1	0	1
66	16	0	0	0	0	1	0
67	16	0	0	0	0	1	0
68	50	1	1	0	1	0	0
69	33	0	0	1	0	0	1
70	50	0	0	1	0	1	1
71	33	1	1	0	0	0	0
72	66	1	1	0	1	0	1
73	100	1	1	1	1	1	1
74	50	1	0	1	0	0	1
75	16	0	0	0	0	1	0
76	50	1	0	1	0	0	1
77	50	1	0	1	0	1	0
78	66	1	1	0	0	0	1
79	83	1	1	1	1	0	1
80	66	1	1	1	0	0	1
81	16	0	0	0	0	0	1
82	50	1	0	0	1	0	1
83	33	0	1	0	0	0	1
84	84	1	1	0	0	0	0
85	33	1	0	0	1	0	0
86	50	0	0	1	1	0	1
87	0	0	0	0	0	0	0
88	50	1	1	0	0	1	0
89	66	1	1	1	0	0	1
90	66	1	1	1	0	0	1
91	50	1	0	1	0	0	1

Participant Number	Complete Score	Correct answer Player A	Correct answer Player B	Correct answer Player C	Correct answer Player D	Correct answer Player E	Correct answer Player F
92	66	1	1	0	0	1	1
93	50	1	0	1	0	0	1
94	50	1	0	0	0	1	1
95	0	0	0	0	0	0	0
96	33	1	0	1	0	0	0
97	66	1	0	1	1	0	1
98	66	0	0	1	1	1	1
99	50	1	0	1	0	0	1
100	66	0	1	1	1	1	0
101	50	0	0	1	1	0	1
102	16	0	0	0	0	0	1
103	50	1	0	0	1	0	1
104	50	0	0	1	0	1	1
105	50	1	0	0	1	0	1
106	66	1	1	1	0	0	1
107	50	1	1	0	0	1	0
108	50	1	0	0	1	1	0
109	50	0	0	1	1	1	0
110	50	0	0	1	1	0	1
111	66	0	0	1	1	1	1
112	83	1	0	1	1	1	1
113	33	1	0	0	1	0	0
114	66	1	0	1	1	1	0
115	66	1	0	1	1	1	0
116	83	1	1	1	1	0	1
117	16	0	0	0	0	1	0
118	16	0	0	0	0	1	0
119	83	1	0	1	1	1	1
120	50	1	0	1	0	1	0
121	50	1	0	1	0	1	0
122	50	0	1	1	1	0	0
123	50	0	0	0	1	1	1
124	66	1	1	0	1	0	1

Participant Number	Complete Score	Correct answer Player A	Correct answer Player B	Correct answer Player C	Correct answer Player D	Correct answer Player E	Correct answer Player F
125	50	1	0	1	0	0	1
126	33	0	1	0	0	0	1
Average	51.928571	63	42	48	49	43	59