A Linguistic Analysis of Clarinet Articulation Pedagogy Literature

by

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ABSTRACT

Clarinet articulation is a process that uses the tongue to create an interruption in sound production either by contacting the reed or disrupting the air stream. This process occurs inside the mouth and is hidden from direct view. As a result, various solutions were developed in clarinet pedagogy to address the issue of teaching with no visual feedback. Clarinet pedagogy literature consists of language that makes it possible for other clarinetists to discuss, teach, and research various aspects of clarinet playing. The interdisciplinary application of theoretical concepts in linguistics and how they map onto the language of clarinet pedagogy offers a new perspective for understanding the teaching methods used for articulation. To provide insight into the relationship of language and clarinet pedagogy, an overview of several linguistic theories and concepts, such as Peircean semiotics, metalanguages, discursive strategies, and articulatory phonetics, is presented. Additionally, a brief explanation of articulation techniques (single, multiple, flutter, and slap articulation) and commonly used teaching strategies is outlined. The language used in clarinet pedagogy literature from resources by prominent clarinet pedagogues, such as the works of John Anderson, Joshua Gardner, Michèle Gingras, Eric C. Hansen, Howard Klug, Phillip Rehfeldt, Thomas Ridenour, Heather Roche, Robert Spring, and Rachel Yoder, is surveyed. Pedagogical insights from a linguistic analysis are used to create resources for teaching and/or correcting articulation. Since the interdisciplinary application of linguistics and clarinet pedagogy is an underexplored topic, this research also aims to serve as a basis for further interdisciplinary studies.

DEDICATION

Thank you to my wife, Ina de Alba, for being an endless source of support throughout my academic journey. Additionally, I would like to thank all of my family and friends for their encouragement over the years.

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INTRODUCTION

Imagine trying to give cooking instructions to a friend, but both you and your friend are blindfolded. Your friend, who is cooking, can only rely on your verbal instructions and their other senses to cook something unfamiliar. Similarly, you are not able to see if they are following your instructions without mistakes. You are only able to rely on the sounds or verbal cues coming from the kitchen to decipher the success of your instructions. All of a sudden, you have a recipe for disaster. This is exactly the problem that clarinet teachers face when trying to teach students articulation. Articulation on the clarinet is a process that occurs inside the mouth and is hidden from direct view. Students can only rely on their teacher's verbal instructions and their senses other than sight when learning articulation. Likewise, teachers mostly rely on student feedback and auditory cues to diagnose articulation problems. Just like the blindfolded cooking example, this is a potential recipe for disaster depending on many factors that will be discussed later in this document.

So how do you teach the intraoral mechanics of articulation that are not easily observed visually? Various solutions were developed in clarinet pedagogy to address the issue of teaching with no visual feedback. Much of the literature regarding the teaching devices and tools used to teach articulation seldom discusses the reasons for the usage of one versus another. In the occasions that do mention a preference, there seems to be contrasting opinions as to the preferred or ideal method. For example, the most common method of teaching clarinet single articulation is using syllables arranged in consonant-vowel sounds, such as "tee" and "dee." However, opinions differ among pedagogues

about which consonant-vowel combination is the ideal to use. For example, Klug argues, "Use the syllable 'thee' instead of the more traditional 't' or 'd.' This will improve the tongue placement and lighten its touch. The traditional syllables force the tongue to leave the roof of the mouth too quickly, move too far, and misorient it spatially."[1] Bringing back our blindfolded cooking analogy, it is as if we now have another blindfolded person entering the kitchen telling your friend, who is cooking, that your instructions are wrong without the actual knowledge of the accuracy of your instructions. This conflict in opinions leads us to an even greater possible recipe for disaster.

Since no clear consensus regarding the pedagogically correct method for teaching articulation exists, we return to the same question. How do you teach the intraoral mechanics of articulation that are not easily observed visually? Perhaps the answer to our question is an interdisciplinary approach. Linguistic theories, such as Peircean semiotics and metalanguages, provide a way to understand the relationship between language and articulation pedagogy. Additionally, articulatory phonetics, which is the study of the movements of the vocal organs during speech, offers a different perspective when examining the techniques used to teach articulation.[2]

To offer insight into the relationship of language and clarinet pedagogy, an overview of various linguistic theories and concepts, such as Peircean semiotics, metalanguages, discursive strategies, and articulatory phonetics is presented. A brief explanation of articulation techniques (single, multiple, flutter, and slap articulation) and

[1] Howard Klug, *The Clarinet Doctor* (Bloomington, IN: Woodwindiana, 1997), 72.

[2] Patricia A. Keating, *Phonetics: Articulatory* (Los Angeles: International Encyclopedia of Social & Behavioral Sciences, 2001), 11381, https://doi.org/10.1016/B0-08-043076-7/02977-6.

commonly used teaching strategies is outlined. The language used in clarinet pedagogy literature from resources by prominent clarinet pedagogues, such as the works of John Anderson, Joshua Gardner, Michèle Gingras, Eric C. Hansen, Howard Klug, Phillip Rehfeldt, Thomas Ridenour, Heather Roche, Robert Spring, and Rachel Yoder is surveyed and categorized. Pedagogical advantages and disadvantages are also examined. Lastly, a resource for diagnosing and fixing articulation issues informed by linguistic theories and concepts is constructed.

Linguistic theories and concepts provide a new lens for analyzing the language used in clarinet pedagogy literature. This interdisciplinary analysis of articulation pedagogy literature allows for a systematic categorization of the strategies used when teaching articulation. It also opens the possibility for new approaches to diagnosing and fixing articulation issues. The conclusions from this research aim to further the understanding of the language used to teach articulation and has the goal of inciting further interdisciplinary research between linguistics and clarinet pedagogy.

CHAPTER 2

LINGUISTIC THEORIES AND CONCEPTS

Peircean Semiotics

The interdisciplinary application of theoretical concepts in linguistics and how they can be mapped onto the language used in clarinet pedagogy is an underexplored topic. However, there seems much to be discovered by approaching clarinet pedagogy through this lens. Beginning with the ideas of Peircean semiotics, Turino explains in the following quote:

> "For Peirce, semiotic processes (semiosis) have three basic elements: (1) the sign, something that stands for something else to someone in some way; (2) the object, which is the 'something else,' or entity, stood for by the sign, be it an abstract concept or a concrete object; and (3) the interpretant, which is the effect created by bringing the sign and object together in the mind of a perceiver."[3]

The process of conveying and understanding various clarinet techniques can be mapped in a similar way. For example, fundamental clarinet concepts, such as single articulation, can be described as the "object." The method or means, such as language, used to describe such concepts are the "sign." Lastly, the effect the sign creates in the student or person attempting to perform the concept is the "interpretant." See Figure 1 below.

[3] Thomas Turino, "Signs of Imagination, Identity and Experience: A Peircean Semiotic Theory for Music," *Ethnomusicology 43, no. 2* (Spring-Summer 1999): 222, http://www.jstor.org/stable/852734.

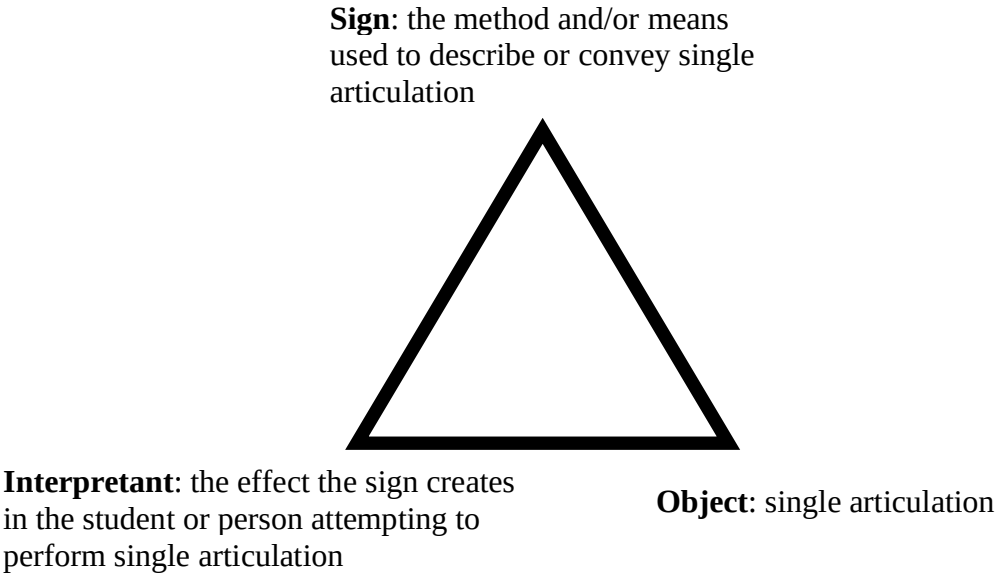

FIGURE 1. Peircean semiotic processes mapped onto single articulation pedagogy. Diagram adapted from Thomas Turino, "Signs of Imagination, Identity and Experience: A Peircean Semiotic Theory for Music," *Ethnomusicology 43, no. 2* (Spring-Summer 1999): 223, http://www.jstor.org/stable/852734.

A key component in Peircean semiotics is the breakaway from the dichotomy of the structuralist approach to semiotics and the move to a trichotomy that can account for the context of an individual's perception of the world and its implications on the relationship between sign and object.[4] Turino observes in the following quote:

> "In dramatic contrast to the autonomous systems approach of Saussurian based structural linguistics, Peirce developed a theory of signs to understand how people are connected to, and experience, the world…Peirce defined the concept of sign in the widest, most flexible way *as something that stands for something else to someone in some way*, thus allowing for many different types of signs outside propositional language."[5]

[4] Turino, "Signs of Imagination, Identity and Experience," 222.

[5] Turino, "Signs of Imagination, Identity and Experience," 222.

The mapping of clarinet pedagogy onto the ideas of Peircean semiotics offers the possibility to explore the various effects that different signs in clarinet pedagogy produce in students and the possible reasons for these discrepancies.

In Peircean semiotics, the sign itself can be categorized as a qualisign, sinsign, or legisign. A qualisign deals with a "pure quality embedded in a sign." For example, the quality of the sound that single articulation produces, such as the shortness of a note or the presence of extraneous noises, are qualisigns. A sinsign "is the actual specific instance of a sign." The use of Larry Comb's recording of the *Midsummer Night's Dream* excerpt from the CD "Orchestral Excerpts for Clarinet with Spoken Commentary" is a sinsign of single articulation in that instance. Lastly, a legisign is a "sign as a general type." The tongue motion required to perform the clarinet excerpt from *Midsummer Night's Dream* apart from any given performance of it is an example of a legisign. These categorizations of signs can help create a means for understanding the different ways in which clarinetists teach single articulation and the reasons for using one over another in certain situations.[6]

In Peircean semiotics, a sign's relationship to an object can be categorized as an icon, index, or symbol.[7] Beginning with icon, Turino simplifies Peirce's idea stating, "The term icon refers to a sign that is related to its object through some type of resemblance between them. The degree, basis, and even accuracy of resemblance is not so much at issue as the fact that resemblance calls forth the object when perceiving the

[6] Turino, "Signs of Imagination, Identity and Experience," 225.

[7] Charles Sanders Peirce, *The Philosophy of Peirce: Selected Writings*, ed. Justus Buchler, (New York, NY: AMS Press, 1978), 104.

sign."[8] Peirce suggests images, diagrams, and metaphors are the three types of icons. For example, an image of a cow resembles the object of an actual cow to which it is referring by means of resemblance. In terms of clarinet pedagogy for example, an image or diagram of a tongue touching the tip of the reed is an icon for the correct location on the tongue and on the reed where single articulation should occur. See Figure 2 below.

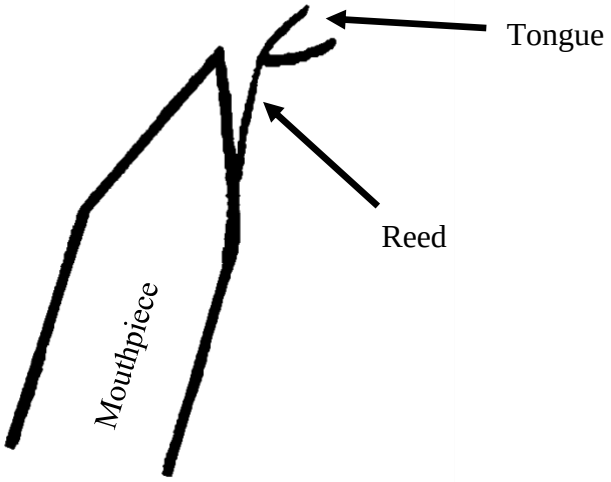

FIGURE 2. Placement of tongue during single articulation on the clarinet. Diagram adapted from Michèle Gingras, *Clarinet Secrets: 100 Performance Strategies for the Advanced Clarinetist*, 2nd ed, Lanham, MD: Rowman & Littlefield, 2017, 14.

Turino explains that an index "refers to a sign that is related to its object through co-occurrence in actual experience…the 'Star Spangled Banner' may serve as an index for baseball games, Fourth of July parades, school assemblies, or imperialism depending on the experiences of the perceiver."[9] The important aspect of the relationship between sign and object of indices is that they are established in co-occurrences within one's own

[8] Turino, "Signs of Imagination, Identity and Experience," 226.

[9] Turino, "Signs of Imagination, Identity and Experience," 227.

experiences. For example, performing correct single articulation as an example in a lesson offers an indexical aural cue for the ideal product for the student to attempt to reproduce when performing single articulation.

Peirce defines the symbol as a sign that points to its object by means of convention or habit. Peirce uses the example of the word "man," writing "It is a general mode of succession of three sounds…which becomes a sign only in the fact that a habit, or acquired law, will cause replicas of it to be interpreted as meaning a man or men."[10] We associate the set of sounds or letters of "man" with its object by convention, not because they resemble a man or require contiguity with the object of a man. In this sense, a teaching method that conveys the physiological processes required to perform single articulation that is established through convention or habit is a sign that is a symbol.

Feld's Metalanguage and Interpretive Moves

Building up from Peircean semiotics, the work of Feld regarding language about music theory also creates a clear stepping stone towards the relationship between language and clarinet pedagogy. Feld describes his ideas of metalanguages in the following quote:

> "Discourse about [music theory] is socially constructed through the conventional uses of terminology to form a metalanguage…Metalanguage then is the terminology of proposition whose purpose is to make concrete instances and theoretical principles co-referent in discourse."[11]

[10] Peirce, *The Philosophy of Peirce: Selected Writings*, 112.

[11] Steven Feld, "'Flow like a Waterfall'': The Metaphors of Kaluli Musical Theory," *Yearbook for Traditional Music* 13, (January 1981): 24, https://doi.org/10.2307/768356.

Similar to music theory being coded in a metalanguage, the discourse about articulation is also coded in a metalanguage.

This metalanguage is understood through "interpretive moves."[12] Feld explains, "Interpretive moves involve…recognition of certain features of code, genre, stylization, and performance instantly identify boundaries of the musical object that exist in a tension of ideational and material structure, of musical and extramusical features."[13] Locational, categorical, associational, reflective, and evaluative are the five interpretive moves presented by Feld.[14] Relating an object to similar or dissimilar items or events within a subjective field is an example of a locational interpretive move. A categorical interpretive move relates an object to a class of things. An associational interpretive move relates objects to particular visual, musical, or verbal imagery. A reflective interpretive move relates objects to personal and social conditions and experiences. Lastly, an interpretive move that relates objects in a form of a critique or assessment that draws on a recognition of other texts, experiences, or performances is an example of an evaluative move. These interpretive moves will be further explained relative to articulation pedagogy in a later chapter.

Interpretive moves are not necessarily independent from each other as Feld explains in the following quote:

> When people say "it's different from…", "it's a kind of…", "it sort of reminds me of…", and things of this sort, they are creating discourse organization that has locational, categorical, and associational features. When they say, "Well, if I had

[12] Steven Fled, "Communication, Music, and Speech about Music," *Yearbook for Traditional Music* 16 (1984): 8, https://doi.org/10.2307/768199.

[13] Feld, "Communication, Music, and Speech about Music," 8.

[14] Feld, "Communication, Music, and Speech about Music," 8.

> to name it…I mean…on some level,…for me at least,…you know, I really can't say but, do you know what I mean?…" they are not just tongue-tied, inarticulate, or unable to speak. They are caught in a moment of interpretive time, trying to force awareness to words. They are telling us how much they assume that we understand exactly what they are experiencing. In fact, we do understand exactly what they are experiencing. We take it as socially typical that people can talk this way about music, stringing together expressives, and we assume that this confirms what we are all supposed to know: that at some level, one just cannot say with words what music says without them. Finally, when someone says of a piece, "it's not as good as…" they are making an evaluative move that draws on simultaneous recognition of other texts, other experiences, other performances."[15]

Regarding clarinet pedagogy, this idea of interpretive moves is evident in the learning process, especially when teaching articulation. For example, when a student is explaining what they experience when performing single articulation, it is common for them to use language similar to that of what Feld presents above, such as "it's different from…," "it's a kind of…," "it sort of reminds me of…"[16] Understanding the interpretive moves needed to comprehend the metalanguage of articulation pedagogy offers the chance to ease the difficulties of teaching articulation.

Porcello's Discursive Strategies

Similar to the interpretive moves of Feld, Porcello developed "five discursive strategies used for talk about timbre during recording sessions," which can easily be correlated to discourse about articulation.[17] The five strategies for talk about timbre are singing/vocables, lexical onomatopoesis, pure metaphor, association, and evaluation. Singing/vocables refer to vocal sounds that attempt to directly mimic the timbral

[15] Feld, "Communication, Music, and Speech about Music," 14.

[16] Feld, "Communication, Music, and Speech about Music," 14.

[17] Thomas Porcello, "Vocal Anthropology: From the Music of Language to the Language of Song," In *A Companion to Linguistic Anthropology* (Oxford, UK: Blackwell Publishing, 2007), 324.

characteristics of the sounds discussed, such as, “hm,” “pts,” “dz,” etc. Connecting back to Peircean semiotics, singing/vocables “function as iconic linguistic signs in which voice quality is intended to comprise the same timbral quality as the musical sounds it ostensibly replicates.”[18] Lexical onomatopoesis involves words that resemble the acoustic characteristics of the sounds that they are describing, such as “buzz.” Pure metaphors are terms that do not acoustically resemble the sounds but are used to describe the timbral characteristics, such as “tight,” “boxy,” and “deep.” According to Porcello, “Many of these are professional terms, codified among musicians.”[19] The “professional terms” described by Porcello are also known as jargon. Association functions indexically and employs naming other musicians, recordings, sounds, and/or time periods as a frame of reference to describe timbre. Lastly, Porcello explains, “evaluation is used to establish a mutual sense of solidarity between the two interlocutors, to mark a territory of shared musical aesthetics.”[20] Of the five discursive strategies, the most commonly used strategies in language about articulation are vocables, lexical onomatopoesis, pure metaphor, and association, which is more thoroughly explored later.

Articulatory Phonetics

Articulatory phonetics gives insight into the motions of the vocal oral tract, which can be used to evaluate current methods of teaching articulation. According to Keating, “Articulatory phonetics is the branch of phonetics concerned with describing the speech

[18] Porcello, “Vocal Anthropology,” 746.

[19] Porcello, “Vocal Anthropology,” 747.

[20] Porcello, “Vocal Anthropology,” 747.

sounds of the world's languages in terms of their articulations; that is, the movements and/or positions of the vocal organs (articulators)."[21] As previously mentioned, because articulation on the clarinet occurs inside the mouth, much of the pedagogical literature relies on vocal approximation, such as syllables, to describe the intraoral mechanics. The concerns of articulatory phonetics research with the motions of the vocal organs during speech is a clear intersection with clarinet articulation pedagogy. However, in phonetics, articulation encompasses both vowel and consonant production, whereas clarinet articulation primarily uses consonants.

Speech Production

According to Gick, Wilson, and Derrick, "In order to understand the sounds of speech (the central goal of phonetics as a whole), we must first understand how the different parts of the human body move to produce those sounds (the central goal of articulatory phonetics)."[22] As seen in Figure 3, the process of speech production, also known as the speech production chain, is divided into two parts.[23] The first part of the speech production chain is concerned with the air stream process.[24] Beginning with a "speech plan" in the brain, nerve impulses are sent through the body, which activates muscle fibers that cause the lungs to move air through the vocal folds. The second part of the speech production chain involves moving the air through the vocal tract. The air is

[21] Keating, *Phonetics: Articulatory*, 11381.

[22] Bryan Gick, Ian Wilson, and Donald Derrick, *Articulatory Phonetics* (Chicester: John Wiley & Sons, 2013), 3, ProQuest Ebook Central.

[23] Gick, Wilson, and Derrick, *Articulatory Phonetics*, 6.

[24] Keating, *Phonetics: Articulatory*, 11382.

manipulated by different structures in the oral vocal tract to produce a variety of speech sounds. Gick, Wilson, and Derrick further explain, "by changing the shape of our vocal tract, we can block or release airflow, create vibrations or turbulence, change frequencies or resonances, and so on, all of which produce different speech sounds."[25] This understanding of the broader body movements that occur in speech production provides context for analyzing the more specialized processes of the vocal oral tract.

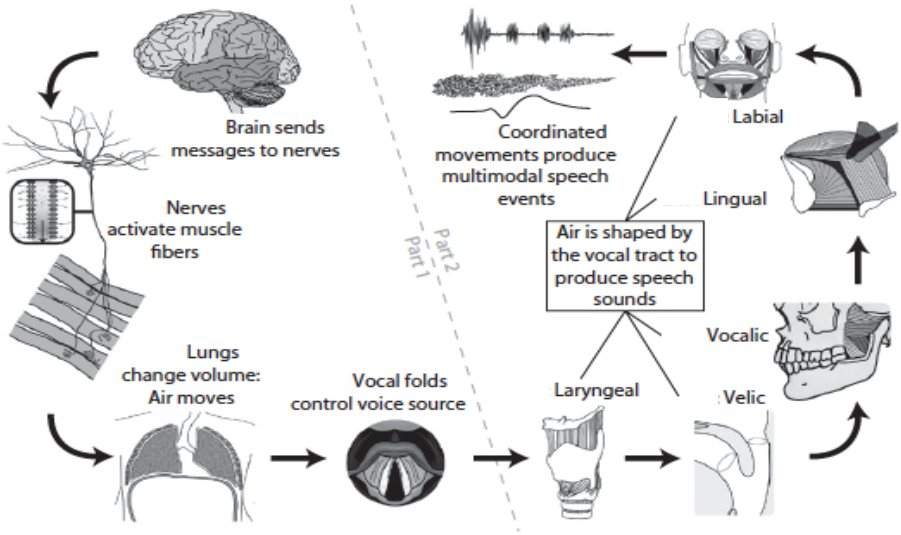

FIGURE 3. Speech production chain. Diagram adapted from Bryan Gick, Ian Wilson, and Donald Derrick, *Articulatory Phonetics* (Chicester: John Wiley & Sons, 2013), 6, ProQuest Ebook Central.

The speech production chain can be compared to the process of clarinet playing. Just like speech, the first part of playing the clarinet requires an air stream. The brain sends nerve impulses through the body to activate the lungs to produce an air stream. Secondly, the air stream is manipulated by different structures in the vocal oral tract to accommodate playing requirements of the clarinet, such as voicing and articulation.

[25] Gick, Wilson, and Derrick, *Articulatory Phonetics*, 6.

Unlike speech, however, the vocal folds are not activated when playing clarinet, with the exception of singing or humming while playing. These similarities between the physical processes involved in speech production and clarinet playing make the interdisciplinary application of articulatory phonetics to articulation pedagogy apparent.

International Phonetic Alphabet (IPA) Chart

According to Keating, "The most influential system of articulator-based notation has been that of the International Phonetic Association…founded in 1886. In the [International Phonetic Association] system, the symbols are not articulatorily iconic, being instead based on Roman letters, but they encode a well-developed system of articulatory description."[26] In other words, the IPA chart uses symbols to categorize the different speech sounds found in various languages. These categories are based on the vocal organs, also known as articulators, and their motion along the oral vocal tract, commonly referred to as places of articulation, used in the production of speech sounds. The portions of the IPA chart of particular importance to articulation research are the consonants, vowels, and clicks.

Consonants

As seen in Figure 4, the categories of consonants, listed vertically in the first column of the chart, describe the type of motion enacted by articulators to produce a given consonant. As Hardcastle, Laver, and Gibbon explain,

> …beginning at the top with sounds that exhibit full closure (Plosives or "Stops") and Nasals, which also have oral closure. Trills, Taps/Flaps, and Fricatives have progressively greater opening of the articulators, and Approximants (at least central or "median" approximants) have the greatest degree of articulatory opening before a segment is open enough to be recognized phonetically as a

[26] Keating, *Phonetics: Articulatory*, 11381.

vowel. Lateral approximants also have oral opening, but at the sides (or one side) of the mouth, hence the label Lateral fricative and Lateral approximant.[27]

This categorization of consonants allows for an understanding of how articulators are interacting during speech production. Furthermore, this categorization also gives insight to differences between the consonants used in articulation pedagogy. The plosives /t/ and /d/ (as in "ta" and "da"), fricatives /θ/ (as in "thee") and /h/ (as in "ha"), and the lateral approximant /l/ (as in "la") are some of the consonant sounds used to teach clarinet single articulation. The IPA chart reveals the presence of a physiological difference in the motions of the articulators depending on the consonant used in the syllable.

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2005)

CONSONANTS (PULMONIC) © 2005 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

FIGURE 4. Consonant section of ICA chart. Diagram adapted from William J. Hardcastle, John Laver, and Fiona E. Gibbon, *The Handbook of Phonetic Sciences* (Hoboken: John Wiley & Sons, 2010), 683, ProQuest Ebook Central.

Consonants are also categorized by the place of articulation along the oral vocal tract. These categories are located along the top horizontal portion of the IPA chart (fig. 4). Following along Figure 5, bilabial consonants are produced when the lips are brought

[27] William J. Hardcastle, John Laver, and Fiona E. Gibbon, *The Handbook of Phonetic Sciences* (Hoboken: John Wiley & Sons, 2010), 681-685, ProQuest Ebook Central.

together. Labiodental involves a combination of one lip touching the teeth. Dental consonants are produced against the teeth. The tongue commonly touches between the top and bottom teeth when making dental consonants, but it can also touch just behind the teeth, before the alveolar ridge, which is known as post-dental consonants. Alveolar consonants are when the tongue touches the alveolar ridge, which is the slight hump behind the upper teeth. Post-alveolar consonants are produced just behind the alveolar ridge before the palate. Retroflex refers to consonants that are produced when the tongue is curled back towards the palate. The tongue touches the hard palate when making palatal consonants. Velar consonants are sounds made when the back of the tongue touches the soft palate. Similarly, uvular sounds are made by the back of the tongue touching the uvula. Pharyngeal consonants are produced in the pharynx, and glottal consonants are sounds caused by the closing of the glottis, which is the opening controlled by the vocal folds.[28]

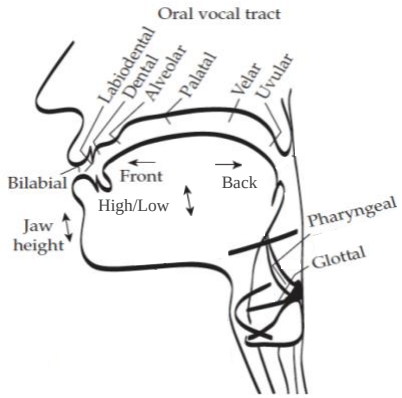

FIGURE 5. Depiction of the oral vocal tract. Diagram adapted from William J. Hardcastle, John Laver, and Fiona E. Gibbon, *The Handbook of Phonetic Sciences* (Hoboken: John Wiley & Sons, 2010), 686, ProQuest Ebook Central.

[28] David Crystal, *A Dictionary of Linguistics and Phonetics* (Hoboken: John Wiley & Sons, 2008), 22-515, ProQuest Ebook Central.

Common syllables used to teach single articulation on clarinet involve the consonants /t/, /d/, and /l/, and are able to be produced in a dental, alveolar, and postalveolar place of articulation. This is unlike the consonants /θ/, which is only produced in a dental place of articulation, and /h/, which is only produced at the glottis. The IPA chart categorization of consonant sounds exposes the large variety of motions needed to produce all the different syllables used when teaching articulation.

Vowels

Another aspect of the IPA chart of interest for informing articulation pedagogy is the categorization of vowels (fig. 6). As Hardcastle, Laver, and Gibbon explain, "The vowel diagram in the IPA chart…separates vowels into close and open in terms of jaw height (high and low in terms of tongue height), front and back with reference to tongue positioning, and unrounded or rounded in terms of lip configuration."[29] Comparing Figures 5 and 6, the position of the tongue in the mouth varies depending on the vowel being produced. This is easily felt by producing the vowel /i/ (as in "heat") and /a/ (as in "hot"). The IPA chart informs how the tongue is shaped in the mouth when pronouncing different vowels. The vowel component of the syllables used to teach articulation is primarily in charge of voicing. Voicing on the clarinet involves manipulating the shape of the oral cavity to play a given note within a given range.[30] Depending on the range of pitches being played on the clarinet, the information about vowels from the IPA chart clarifies which vowel should be used.

[29] Hardcastle, Laver, and Gibbon, *Handbook of Phonetic Sciences*, 689.

[30] Joshua T. Gardner, "Ultrasonographic Investigation of Clarinet Multiple Articulation" (DMA diss., Arizona State University, Tempe, 2010), 10, ProQuest Dissertations and Theses Global.

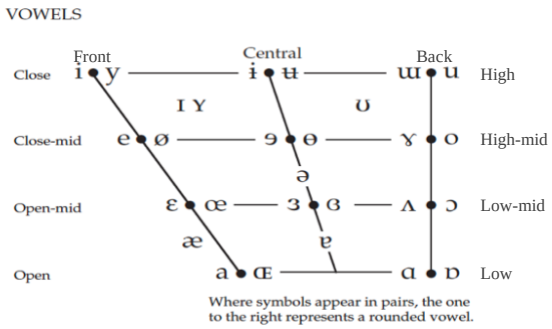

FIGURE 6. Vowels section of the IPA chart. Diagram adapted from William J. Hardcastle, John Laver, and Fiona E. Gibbon, *The Handbook of Phonetic Sciences* (Hoboken: John Wiley & Sons, 2010), 683, ProQuest Ebook Central.

Clicks

Clicks are a type of consonant that can be found in languages such as Zulu and Xhosa.[31] As seen in Figure 7, clicks are classified by the place of articulation in which they are produced. Bilabial clicks are produced with the lips. However, dental, alveolar/postalveolar, palatoalveolar, and alveolar lateral are of more interest for informing articulation pedagogy because they are produced using the tongue. Alveolar/postalveolar clicks are produced near the alveolar ridge, whereas palatoalveolar clicks utilize both the alveolar ridge and palate. Alveolar lateral clicks involve only one side of the tongue when producing the click. The tongue motion needed to produce clicks in the oral vocal track is closely related to the same tongue demands for slap articulation on the clarinet. Since clicks are not commonly found in English, the information about clicks from the IPA chart provides a starting point for understanding the tongue motions of slap articulation on the clarinet.

[31] Crystal, *Dictionary of Linguistics*, 79-80.

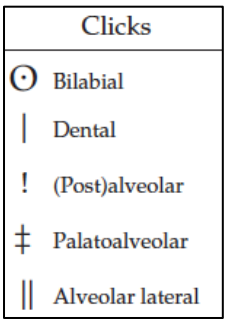

FIGURE 7. Clicks section of the IPA chart. Diagram adapted from William J. Hardcastle, John Laver, and Fiona E. Gibbon, *The Handbook of Phonetic Sciences* (Hoboken: John Wiley & Sons, 2010), 683, ProQuest Ebook Central.

CHAPTER 3

OVERVIEW OF CLARINET ARTICULATION PEDAGOGY

Single Articulation

Articulation, also known as tonguing, according to Rehfeldt, "…is primarily a concern of attack and release. With the clarinet, as with other wind instruments, this is controlled largely by an action of the tongue…. Wind players are taught to articulate (or 'tongue') all pitches which are not tied or slurred."[32] Referring back to Figure 2 in Chapter 1, single articulation involves bringing the tip of the tongue to the tip of the reed with the least amount of movement in order to interrupt the vibration of the reed, which results in a brief stop in sound production.[33] Although this is a seemingly simple task, by observing the sizable amount of literature about single articulation, it is evident that this proves to be a complex concept for new players as well as a difficult concept for experienced players to improve or fix.

As mentioned previously, the biggest obstacle that arises with teaching articulation on the clarinet is that it occurs inside the mouth and is hidden from view. As a result, clarinet teachers must rely on other sources of feedback, such as aural cues and a limited number of visual cues from the throat and jaw, to determine whether or not students are articulating correctly.[34] For example, Klug describes "…swallowing motion indicates a great excess of tongue effort…. Horizontal tonguing is slow, adds a heavy

[32] Rehfeldt, *New Directions for Clarinet*, Rev. ed. (Lanham, MD: Scarecrow Press, 2003), 10.

[33] Joshua T. Gardner and Eric C. Hansen, *Extreme Clarinet* (Louisville, KY: Potenza Music, 2012), 12.

[34] Joshua T. Gardner, "Ultrasonographic Investigation of Clarinet Multiple Articulation" (DMA diss., Arizona State University, Tempe, 2010), 1, ProQuest Dissertations and Theses Global.

noise to the tone and adversely changes the throat opening, hurting high register notes."[35] With experience, teaching articulation ends up being a kind of "educated guessing game" between teacher and student.

One of the most common ways of teaching single articulation on the clarinet is the use of syllables consisting of consonant-vowel, consonant-vowel-consonant, or just vowel sounds as a way of approximating the motion of the tongue. Most pedagogues prefer to limit the use of syllables to just one or two, such as "tah" or "dah." On the contrary, others believe in having a sort of "articulation vocabulary" depending on the demands of the music.[36] As Gingras suggests, "Articulations can be interpreted with all kinds of syllables, such as 'la,' da,' 'dat,' 'tah,' 'tat,' 'tah,' and so on. The idea is to build a basic articulation 'palette' that will become consistent, predictable, and reliable."[37] The variety in opinions about syllables is a clear indicator of a need for a better understanding of the different physiological responses that they produce.

Some syllables, such as "hah" or the use of vowel alone, actually do not utilize the tongue in order to create an interruption in the vibration of the reed. This creates confusion because the overall consensus among pedagogues is that the air stream should remain constant during articulation.[38] Gingras contradicts this belief, writing, "Initially, the 'a' articulation should be practiced as 'ha,' using the air column to emulate a staccato

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[35] Klug, *The Clarinet Doctor*, 72.

[36] Michèle Gingras, *Clarinet Secrets: 100 Performance Strategies for the Advanced Clarinetist*, 2nd ed. (Lanham, MD: Rowman & Littlefield, 2017), 17.

[37] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 17.

[38] Gardner and Hansen, *Extreme Clarinet*, 17.

sound."[39] Regarding vowel alone syllables, Gardner notes, "The vowel component of the syllable is responsible for voicing."[40] Voicing entails changing the shape of the tongue in order to properly produce a given pitch in different ranges of the clarinet. Therefore, the vowel used for a given syllable is dependent on the range in which the clarinetist is articulating.[41]

The lack of visual feedback and the sort of "guessing game" created by using aural cues as methods for evaluating students' single articulation are major reasons for the pedagogical disagreements that exist. Likewise, pedagogues disagree about the effectiveness of different syllables used to approximate the intraoral mechanics of single articulation. An improved understanding of these syllables is needed to evaluate the benefits of using one over another.

Multiple Articulation

Multiple articulation, also known as double tonguing, according to Gardner and Hansen, "…consists of two syllables…the front articulation occurs when the tip of your tongue meets the tip of the reed. (This is the same articulation you use when you single-tongue.) The back articulation occurs when the middle areas of your tongue touches the roof of your mouth, interrupting the air stream."[42] Figure 8 illustrates the two motions that occur during multiple articulation. Unlike single articulation where the air stream remains constant, the tongue motion that occurs in the back requires the tongue to touch

[39] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 5.

[40] Gardner, "Ultrasonographic Investigation," 4.

[41] Gardner, "Ultrasonographic Investigation," 10.

[42] Gardner and Hansen, *Extreme Clarinet*, 18.

the hard palate to create an interruption in the air stream. This causes the reed to stop vibrating to create a brief stop in sound production. However, contrary to the "hah" or the vowel alone syllables, the interruption in reed vibration during multiple articulation is always caused by the tongue. Because multiple articulation shares the same front tongue motion as single articulation, it inherits the same deceptive complexities as single articulation. In addition, it also adds a fairly difficult back tongue motion, which sets up yet another case for pedagogical debates.

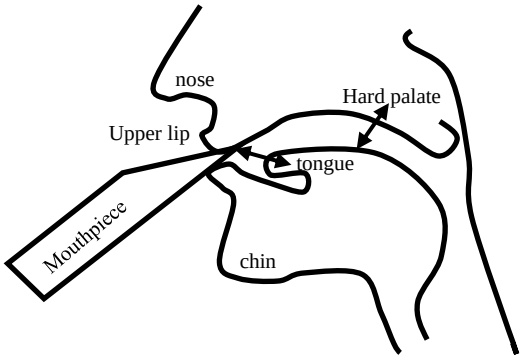

FIGURE 8. Motion of the tongue during multiple articulation.

Primarily used to accommodate passages that require a rapid succession of articulations, multiple articulation is a fairly new form of articulation that is becoming increasingly standard. Because of its novelty, the literature regarding multiple articulation pedagogy is limited. Like single articulation, syllables are the most common way to approximately describe the tongue motions of multiple articulation. For example, Gingras suggests, "As when speaking, play 'ta' with the tip of the tongue and 'ka' with the back of the tongue."[43] On the other hand, Gardner and Hansen argue "We recommend Goo or Gee as a back syllable because their delicacy allows for easier, more flexible multiple

[43] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 19.

articulation in the altissimo register."[44] Although the options for the syllable to describe the tongue motion that occurs in the back is restricted to the consonants /k/ or /g/, we are still faced with the same debate about syllables as single articulation.

Flutter Articulation

First introduced to the clarinet in Richard Strauss's piece *Don Quixote* in 1897, flutter articulation has become a relatively standard clarinet technique.[45] In addition to being regularly used by contemporary composers, flutter articulation is also frequently used in jazz.[46] According to Rehfeldt,

> For the clarinet, [flutter articulation] is produced either by rolling the tongue on the upper palate, as pronouncing d-r-r-r, or, since many clarinetists experience difficulties with the mouthpiece obstructing such movement, by an [sic] uvular undulation in the throat facilitated by raising the back of the tongue slightly in the mouth. The result of the latter is nearly identical to the rolling method, but the pronunciation is more like g-r-r-r.[47]

The rolling of the front part of the tongue is usually described as a "Spanish 'r'," and the alternative uvular trill is commonly described as a "French or German dry 'r'."[48] Similar to the syllables used to describe the tongue motions of single and multiple articulation, syllables, such as "harr" and "tarr" are used to describe the tongue motions of flutter articulation. Unlike single and multiple articulation, the major difficulty of flutter articulation is the need to avoid touching the reed during the rolling action of the tongue.

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[44] Gardner and Hansen, *Extreme Clarinet*, 18.

[45] Rehfeldt, *New Directions for Clarinet*, 63.

[46] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

[47] Rehfeldt, *New Directions for Clarinet*, 63-64.

[48] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

Using a front roll of the tongue poses the greatest risk for touching the reed. Therefore, the uvular trill is favored by some pedagogues. Flutter articulation also produces a different sound depending on the method used (front or uvular trill), and a clarinetist may choose one method over the other depending on the context of the music. Conversely, for various reasons, some clarinetists experience difficulty with one method of flutter articulation over the other, and preference is a result of individual physical limitations.[49]

Additionally, some clarinetists are unable to perform flutter articulation using the methods described above. For example, Gringas suggests, "For individuals who cannot roll their tongue for various reasons…[play] the written note while singing a pitch that is dissonant to the written note."[50] I argue that this technique can no longer be considered flutter articulation because the tongue is no longer being utilized. Instead, the vocal chords are producing the effect. Furthermore, the act of singing a dissonant note while playing is commonly referred to as growling.[51] Although a fairly established technique, the pedagogy of flutter articulation is not as codified as single and multiple articulation. Further insight regarding the intraoral mechanics of tongue rolls is needed to further develop flutter articulation pedagogy.

Slap Articulation

Rehfeldt describes slap articulation as "an old-time jazz effect, executed by placing a comparatively large portion of tongue on the reed's tip and suddenly releasing,

[49] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

[50] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

[51] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 174.

often accompanied by a drop in jaw pressure, simultaneously with the initiation of the air stream—literally slapping the reed on the mouthpiece. The result is a sort of dead 'thud.'"[52] Slap articulation works particularly well on bass clarinet. It is also slightly easier to produce on bass clarinet because of the larger reed size. On the other hand, slap articulation proves to be one of the more difficult articulation techniques to perform on soprano clarinet. Pedagogical literature describing how to perform or teach slap articulation is very limited. Table 1 shows three methods to produce slap articulation. Gingras suggests slap articulation can be performed using either a "spitting," "suction," or "popping" motion.[53] However, the three different methods create confusion regarding the intraoral mechanics of slap articulation. Each have stark differences in methodology, conflicting starting and ending positions of the tongue, and contradictory implied directions of force.

Of the three methods described in Table 1, the suction method is the closest method to the typical explanation of the tongue motion during slap articulation. However, the term "suction" is slightly misleading because of the implied inward motion or inhalation it prescribes. An "initiation of the air stream" (or exhalation of air) is needed when performing slap articulation.[54] On the other hand, the spitting method closely resembles the description of slap articulation by Rehfeldt above, but it lacks the clarity of tongue motion compared to the suction method. Perhaps the most confusing method

[52] Rehfeldt, *New Directions for Clarinet*, 65.

[53] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 22.

[54] Rehfeldt, *New Directions for Clarinet*, 65.

suggested by Gingras is the popping method because of its focus on the involvement of the lips in slap articulation. Likewise, the tongue is not used as a means for pulling the reed away from the mouthpiece to create the slap effect.[55]

The methods described by Gingras for slap articulation vary widely and contradict the established definition and understanding of the intraoral mechanics of slap articulation presented by Rehfeldt. Slap articulation is also the least developed in pedagogy as compared to other articulation techniques. A clearer understanding of the tongue motions needed to pull the reed away from the mouthpiece is necessary to establish an accurate method of teaching slap articulation and to create exercises to alleviate the difficulty of slap articulation on soprano clarinet.

Table 1. Three methods of slap articulation

Description	Spitting	Suction	Popping
Intraoral mechanics description	While the tongue is pushing the reed shut, compress the air in your mouth, and suddenly release the tongue and airflow while dropping the jaw.	Lay your tongue flat on the majority of the reed's surface. Imagine your tongue is glued to the reed, create suction, and quickly slap it away from the reed while you blow.	Squeeze the reed shut with the lips while compressing the air in the mouth and then, suddenly release the compressed air through the reed and mouthpiece stopped immediately by the tongue.
Tongue starting and ending position	Starts *on* and ends *off* of the reed	Starts *on* and ends *off* of the reeds	Starts *off* and ends *on* of the reed

Source: Adapted from Michèle Gingras, *Clarinet Secrets: 100 Performance Strategies for the Advanced Clarinetist*, 2nd ed. (Lanham, MD: Rowman & Littlefield, 2017), 22.

Clearly, the current established pedagogy dealing with single, multiple, flutter, and slap articulation is riddled with differing opinions about best practices. Because of

[55] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 22.

the lack of visual feedback, philosophies concerning the intraoral mechanics of each articulation technique is also a source of debate. A new approach to articulation pedagogy is needed to give teachers an improved understanding of how different methods affect the actual physiological response of students.

CHAPTER 4

REVIEW OF PRIOR AND RELATED LITERATURE

Demystifying the tongue motions required for clarinet performance and wind instruments in general has been an overarching goal in previous woodwind pedagogy research. The purpose of the present research is to further understand the language used to teach articulation. The tongue motions observed through viewing the oral cavity during clarinet performance is important for determining any inaccuracies between pedagogical beliefs or proprioception and what actually occurs during clarinet performance. Of the following selected studies, topics, such as tongue shape, tongue movement for articulation versus voicing, syllables used to teach articulation, and implications of linguistic analysis, are important to the present research.

Clarinet Tongue Motion Research

Because the motions required for articulation occur inside the mouth, much research has been conducted to view the intraoral mechanics of articulation. The main methods of direct oral cavity observation while playing clarinet are X-ray, fiber-optic endoscopy, and most recently, ultrasound. The following studies focus on the use of X-ray and fiber-optic endoscopy during clarinet playing and aim to provide an outline of the main observations gathered by these types of viewings. Because of its novelty, ultrasound will be surveyed in a later section.

Anfinson

In the study "A Cinefluorographic Investigation of Supralaryngeal Adjustments in Selected Clarinet Playing," Anfinson explores the possibilities of using cinefluorography,

which is the use of x-ray to create motion films, to study clarinet playing techniques.[56] The techniques observed include performing staccato versus legato articulation at various tempos, performing articulated passages versus slurred passages, and performing passages in different registers. Anfinson focuses on "supralaryngeal adjustments" (motion of structures in the vocal tract above the glottis) made during various scenarios of clarinet performance, giving primary attention to the tongue.[57]

During the study, nine subjects were photographed during clarinet performance to observe supralaryngeal adjustments under various conditions. When examining the differences between staccato and legato articulation, Anfinson observes, "the tongue was positioned higher in the oral cavity and the tip withdrew less from the mouthpiece after contacting the reed staccato than in legato tonguing."[58] Similarly, when examining the effects of the speed of articulation, the tongue remains at a higher position in the oral cavity and exhibits less retraction away from the mouthpiece after contacting the reed for faster tempos compared to slower tempos.[59] Regarding playing in different registers, Anfinson notes, "…adjustments of greater complexity were exhibited for a change of register than for the two previous conditions [staccato versus legato tonguing and speed]…The tongue high point became lower and farther forward in the oral cavity, the throat opening became larger, the back of the tongue tip withdrew slightly farther back

[56] Roland Anfinson, "A Cinefluorographic Investigation of Supralaryngeal Adjustments in Selected Clarinet Playing Techniques," (DMA diss., State University of Iowa, 1965), 15, ProQuest Dissertations and Theses.

[57] Anfinson, "A Cinefluorographic Investigation," 17-18.

[58] Anfinson, "A Cinefluorographic Investigation," 68.

[59] Anfinson, "A Cinefluorographic Investigation," 68-69.

and down for the highest notes [concert E-flat6]."[60] Although the adjustments for articulation versus a change in register were observed to be noticeably different, it was also observed in this study that the anterior and posterior portions of the tongue did not move with complete independence. However, this observation is contradictory to the beliefs of some clarinet pedagogues. Anfinson comments, "Some teachers have recommended that only the tongue tip be moved for articulation. It does not appear that this can be done with complete independence."[61] This observation is also further supported by the physiological mechanics of the tongue. As Levine, Torcaso, and Stone explain, "the tongue is one of a small collection of biomechanical systems known as muscular hydrostats."[62] In this system, muscular movement of individual tongue muscles is dependent on the interaction with other muscles within the tongue.[63] For more information about controlling the shape of a muscular hydrostat, see Levine, Torcaso, and Stone, 2005. Of importance to this research, Anfinson provides a view inside the oral cavity during certain techniques of clarinet performance, such as articulation, and exposes the misconception that the anterior portion of the tongue can move with complete independence from the posterior portion of the tongue.

[60] Anfinson, "A Cinefluorographic Investigation," 69.

[61] Anfinson, "A Cinefluorographic Investigation," 72-73.

[62] William S. Levine, Caroline Essex Torcaso, and Maureen Stone, "Controlling the Shape of a Muscular Hydrostat: A Tongue or Tentacle," In *New Directions and Applications in Control Theory*, (Berlin, Heidelberg: Springer Berlin Heidelberg, 2005) 207.

[63] Levine, Torcaso, and Stone, "Controlling the Shape of a Muscular Hydrostat," 207-208.

Carr

Carr uses X-ray to examine the intraoral mechanics of different performance techniques for several woodwind instruments in the study, "A Videofluorographic Investigation of Tongue and Throat Positions in Playing Flute, Oboe, Clarinet, Bassoon, and Saxophone." The performance techniques observed were dynamic changes, ascending and descending scales, syllables in varying registers, harmonic series, slurred versus articulated passages, legato versus staccato articulation, multiple articulation, pitch changing, and vibrato. The results that are important to the present research are the tongue and throat motions observed during clarinet performance.

Twenty-five professional musicians (five from each instrument group) were randomly selected to participate in Carr's study and were videotaped via x-ray while performing each of the exercises designed to observe the playing techniques previously mentioned. Focusing on the analysis of the tongue and throat motions of clarinet playing, Carr notes, "Of all the instruments, the clarinet group mean showed the greatest variance in the tongue position when playing from the low register into the higher register."[64] In addition, Carr detected similar significant tongue position variances in performing articulation in different clarinet registers.[65] Carr writes, "The clarinet group raised the tongue for the throat register tones and made an extreme drop in the tongue placement for the altissimo register…The tongue tip and angle of placement was more forward and up

[64] Walter Edward Carr, "A Videofluorographic Investigation of Tongue and Throat Positions in Playing Flute, Oboe, Clarinet, Bassoon, and Saxophone" (DMA diss., University of Southern California, 1978), 53, ProQuest Dissertations and Theses.

[65] Carr, "A Videofluorographic Investigation," 54.

for staccato than for legato articulation."[66] These trends support the results of Anfinson's study. Lastly, when performing multiple articulation, the tongue was higher in the mouth compared to other articulations.[67] Of importance to this research, Carr's findings support and expand Anfinson's research of viewing the oral cavity via X-ray by examining a greater variety of clarinet playing techniques.

Compagno

In the study, "Laryngeal Movements Observed During Clarinet and Flute Performance," Compagno investigates the movements of various parts of the vocal oral tract though the use of a laryngoscope, also known as a fiber optic scope.[68] Movements under different playing conditions, such as scales, arpeggios, expanding intervals, dynamic changes, articulation, and vibrato, were observed. The movements of the tongue during clarinet performance are of importance to the present study.

Eight college trained clarinetists participated in the study.[69] The laryngoscope was inserted into the nasal cavity. Unlike other scope studies that insert from the mouth, the insertion of the laryngoscope through the nasal cavity provides a view of the back of the oral cavity from the top. In two instances, an anesthetic solution was required due to discomfort during insertion. Although the insertion of a laryngoscope in the nasal cavity and the use of anesthetic solution are definitely not considered part of normal playing

[66] Carr, "A Videofluorographic Investigation," 66.

[67] Carr, "A Videofluorographic Investigation," 78.

[68]Nicholas Anthony Compagno, "Laryngeal Movements Observed during Clarinet and Flute Performance," (DMA diss., University of North Texas, 1990), 59, ProQuest Dissertations and Theses.

[69] Compagno, "Laryngeal Movements," 61.

conditions, Compagno suggests there were no hinderances caused during performance. Compagno claims, "The nature of the laryngoscopic process did not affect the normal playing position of the subjects, and did not limit the performance of the tasks."[70] Once the laryngoscope was inserted, the subjects were videotaped while playing the performance tasks.

Compagno states, "The tongue assumed various positions during clarinet performance when playing from register to register, which functioned to modify the shape of the pharyngeal cavity."[71] In the lower register of the clarinet, the tongue was observed to be in a high and back position, which created a decrease in the size of the pharyngeal cavity. Contrastingly, playing in the upper register on the clarinet resulted in an increase of the pharyngeal cavity with the tongue moving downward and forward.[72] Interestingly, subjects that exhibited excessive tongue motion during the articulation tasks of the study experienced difficulty performing. Compagno observes, "…to produce a clearly defined and short staccato on the clarinet, the laryngeal structures should remain steady while producing the articulation with the tip of the tongue."[73] This observation is congruent with other woodwind articulation pedagogy.[74] In summary, Compagno presents a different means for viewing inside the oral cavity and further supports previous findings regarding tongue motions during clarinet performance.

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[70] Compagno, "Laryngeal Movements," 60-61.

[71] Compagno, "Laryngeal Movements," 116.

[72] Compagno, "Laryngeal Movements," 116.

[73] Compagno, "Laryngeal Movements," 120.

[74] Compagno, "Laryngeal Movements," 120.

Hungerford

Similar to Compagno, Hungerford uses a fiber optic scope to view the oral cavities in the study, "The Use of a Flexible Fiber Optic Scope to View the Oral Cavities of Experiences and Less Experienced Clarinetists." The fiber optic scope was inserted in the left side of the mouth next to the mouthpiece. The two goals of the study were to compare the movement in the oral cavities during clarinet performance to the published writings of pedagogues, as well as to observe the differences and similarities of the movements in the oral cavities between advanced and less advanced clarinetists. In addition to the comparisons made to pedagogical writings, Hungerford's observations of the tongue during clarinet performance, particularly during articulation, are also of importance to the present research.

In agreement with the findings of previous studies, Hungerford found similar tongue motion regarding register changes being performed. Studying the range from concert D3 to F6 Hungerford notes, "The tongue is low and forward for chalumeau notes, creating a more narrow throat opening…The tongue lowers in the back as the pitches ascend."[75] In addition, the middle of the tongue is lower and flatter for the altissimo register. Like Compagno's findings, the subjects with excessive tongue motion during articulation experienced difficulty performing. Hungerford observes, "In this study, those who used tip-to-tip or near the tip tonguing, sound better than those who don't. Articulation sounds cleaner for the subjects who don't let their tongues 'flop around'

[75] Delores Ann Hungerford, "The Use of a Flexible Fiber Optic Scope to View the Oral Cavities of Experienced and Less Experienced Clarinetists," (DMA diss., University of Washington, 2004) 159, ProQuest Dissertations and Theses.

during the articulation process."[76] Congruent with the findings of Anfinson regarding the inability of independent movement of the tip of the tongue during articulation, Hungerford also observes, "The tongue 'bounces back' to a voiced position after an articulated note."[77] Hungerford acknowledges certain limitations, such as the inability to view all aspects of the tongue through the use of a fiber optic scope, and recommends additional research be conducted to alleviate the difficulties of teaching the intraoral mechanics of clarinet performance. In addition to Hungerford's observations of the tongue motions during clarinet performance, the revelation that clarinetists and teachers "are unaware of their own tongue positions" is of importance to the present research.[78]

Patnode

Patnode also utilizes a fiber optic scope to view the oral cavity in his study, "A Fiber Optic Scope Study Comparing Perceived and Actual Tongue Positions of Saxophonists Successfully Producing Tones in the Altissimo Register." The purpose of this study was to determine the ability for advanced saxophonists to accurately describe their tongue position when performing in the altissimo register. Video was recorded through a fiber optic scope, which was inserted in the left side of the mouth next to the mouthpiece. Nine graduate and post-graduate saxophonists were included in this study. Each subject completed two tasks. The first task was slurring octave intervals beginning with concert G4 through A-flat6. The second task included slurring chromatically

[76] Hungerford, "The Use of a Flexible Fiber Optic Scope," 155.

[77] Hungerford, "The Use of a Flexible Fiber Optic Scope," 159.

[78] Hungerford, "The Use of a Flexible Fiber Optic Scope," 156.

ascending pitches beginning at concert G5 up to A-flat6. After each task, the subjects were then asked if they felt a change in their tongue position. If so, they were then asked to describe what they believed to be the direction of the tongue motion.

Patnode concludes, "Most saxophonists in this study were not able to determine their actual tongue positions…the actual direction and position of the tongue when performing in the altissimo register is undiscernible from many saxophonists."[79] Like Hungerford, Patnode findings further support that performers have varying ability to determine their own tongue positions. Patnode also suggests this to be a reason for "no prevailing idea of the proper placement of the tongue in achieving tones in the altissimo register."[80] Comparative to saxophone pedagogy for altissimo register performance, varying proprioception between clarinetists is another possible explanation for the various opinions in clarinet articulation pedagogy. Patnode's conclusions regarding advanced saxophonists' ability or inability to accurately determine their tongue motion during performance is of importance to the present study.

Interdisciplinary Implications of Ultrasound Imaging

Ultrasound in Linguistic Research

Beginning with its clinical use in the 1960s, articulatory phonetics studies have regularly used ultrasound imaging technology to observe aspects of the tongue. Gick notes, "Ultrasound is able to capture dynamic tongue shape, enabling the study of such

[79] Matthew Patnode, "A Fiber Optic Scope Study Comparing Perceived and Actual Tongue Positions of Saxophonists Successfully Producing Tones in the Altissimo Register," (DMA diss., Arizona State University, Tempe, 1999), 144-145, ProQuest Dissertations and Theses Global.

[80] Patnode, "A Fiber Optic Scope Study,"145.

elusive lingual measures as the tongue root, sagittal groove, and interactions between vowels and lingual consonants."[81] In early studies, ultrasound imaging required the use of larger unwieldy machines only available in hospitals. However, according to Gick, "More recently, the increased availability and lower price of portable and PC-based ultrasound units, digital video recording equipment, and image analysis software have brought ultrasound within financial reach of many linguistic phonetics labs."[82] Additionally, advancements in image quality in the 1970s solidified ultrasound imaging as a tool to measure the movements and shapes of the tongue by the 1980s.[83]

With the increased use of ultrasound to study the tongue, Stone published "A Guide to Analysing Tongue Motion from Ultrasound Images" as a useful guide to assist new users. As Stone notes, "When using ultrasound to measure the tongue, the transducer is placed beneath the chin. The sound wave travels upward through the tongue body until it reaches and reflects back downward from the upper tongue surface."[84] The transducer is what emits and receives the sound waves. For more information about the specifics of ultrasound imaging, see Stone, 2005.

Although ultrasound has many benefits compared to other methods used to study the motions of the tongue during speech, such as x-ray, endoscopy, and electrodes, a few limitations exist. For example, viewing the tongue tip and epiglottis are problematic due

[81] Gick, "The Use of Ultrasound for Linguistic Phonetic Fieldwork," *Journal of the International Phonetic Association* 32, no. 2 (December 2002): 113, https://doi.org/10.1017/S0025100302001007.

[82] Gick, " Use of Ultrasound for Linguistic Phonetic Fieldwork," 114.

[83] Gick, " Use of Ultrasound for Linguistic Phonetic Fieldwork," 113.

[84] Maureen Stone, "A Guide to Analysing Tongue Motion from Ultrasound Images," *Clinical Linguistics & Phonetics 19, no. 6-7* (2005): 457, https://doi.org/10.1080/02699200500113558.

to air under the tongue tip and the acoustic shadow cast by the hyoid bone, respectively.[85] Pushing the transducer upward to see more of the tip causes errors in the shape because of the pressure put on the posterior tongue.[86] Additionally, due to how ultrasound works (a discussion of which is beyond the scope of this paper), the pharyngeal walls are not visible during typical submental transducer placement used for tongue imaging.[87] That being said, the benefits of using ultrasound imaging to study the tongue still prove to be useful for furthering the understanding of speech production.

Ultrasound in Clarinet Research

Recently, clarinet pedagogy research has started to utilize ultrasound imaging. As stated earlier, other methods used to study the intraoral mechanics of clarinet playing were fiber-optic endoscopy and x-ray. However, each of these methods poses certain weaknesses. Fiber-optic endoscopy is a slightly more invasive method requiring insertion of the scope through the nasal passage or oral cavity on either side of the mouthpiece. This hinders the ability for test subjects to perform clarinet normally. Additionally, anatomical movements cannot be isolated from scope movements because of the inability to fix the scope relative to rigid skeletal structures, which greatly affects collecting measurements. In addition, methods involving x-ray can pose health risks because subjects are exposed to ionizing radiation. Unlike the previous methods, ultrasound

[85] Stone, "A Guide to Analysing Tongue Motion from Ultrasound Images, 465-466.

[86] Stone, "A Guide to Analysing Tongue Motion from Ultrasound Images, 464.

[87] Gick, " Use of Ultrasound for Linguistic Phonetic Fieldwork," 116.

imaging is a non-invasive and safe method of viewing the oral cavity without hindering the intraoral mechanics of clarinet playing.

Gardner argues, "[Ultrasound]…counters the limitations of other imaging modalities…Because ultrasound is a proven and safe imaging modality for conducting quantitative tongue motion research during speech, it seems a likely candidate for imaging tongue motion during performance."[88] The use of ultrasound imaging in clarinet research is fairly new and developing, but recent studies support the overwhelming benefits it offers to study the intraoral mechanics of articulation. As seen in Figure 9, the transducer, which transmits and receives ultrasonic sound waves to produce an image, is placed under the chin. The resulting image is a profile view of the tongue inside the mouth. Ultrasound imaging allows for tongue shapes and movements during clarinet playing to be observed.

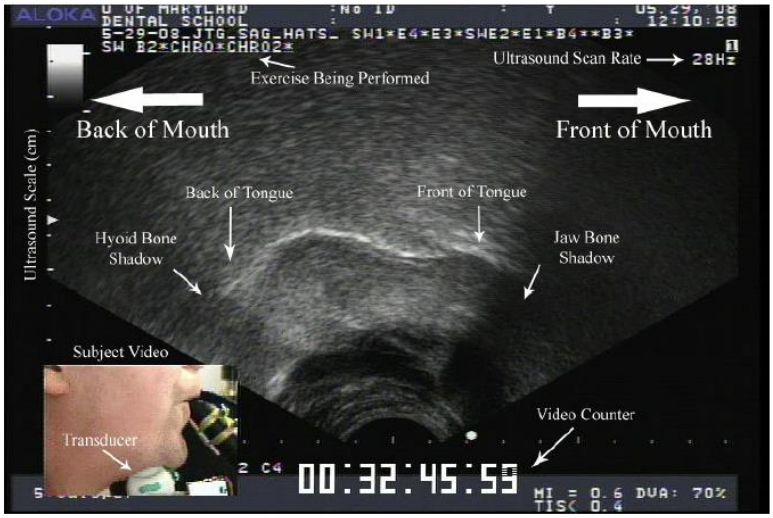

Figure 9. Still image of ultrasound video with labeled features. Adapted from Joshua T. Gardner, "Ultrasonographic Investigation of Clarinet Multiple Articulation" (DMA diss., Arizona State University, Tempe, 2010), 63, ProQuest Dissertations and Theses Global.

[88] Gardner, "Ultrasonographic Investigation," 2.

Ultrasound imaging is an established tool used in articulatory phonetics research. The increasing use of ultrasound imaging in clarinet pedagogy research serves as further evidence of the interdisciplinary application of linguistics. Ultrasound imaging also provides a solution to the difficulties of teaching articulation techniques because it allows for the examination of the intraoral mechanics previously hidden from view while overcoming many limitations of previous methods of viewing the oral cavity.

Linguistics and Wind Instrument Pedagogy

Research regarding the interdisciplinary application of linguistic theories and concepts to analyze clarinet pedagogy is extremely limited, if not non-existent. The following section aims to outline the findings of previous research conducted that examined various methods of teaching articulation. These studies contain an emphasis on linguistic concepts, such as articulatory phonetics, and provide supporting evidence for the possibilities for the interdisciplinary application of linguistics to analyze articulation pedagogy.

Budde

In the study, "An Analysis of Methods for Teaching Middle School Band Students to Articulate," Budde evaluates the effectiveness of four different strategies used to teach articulation to middle school band students. Like the issue of teaching articulation on clarinet, Budde also observes a similar difficulty when teaching other wind instruments. For example, Budde writes, "Since the act of tonguing cannot be seen, any determination of success (or lack thereof) regarding the quality of articulation must be based on external physical observations or an assessment of the resulting musical

tones, interpreted through the aural lens of the student and teacher."[89] Budde attempts to address the lack of research and understanding regarding the methods for teaching articulation in hopes of alleviating the inherent difficulties teachers face.

The study included four different methods of teaching articulation along with one control group. Budde explains,

> "The independent variable in this study included five teaching conditions that were implemented over the course of a 10-week treatment period. These included:
> - control group: participated in only the pretest and posttest, but included masking activities to minimize the possibility of potential threats to validity
> - articulation guide group: participated in the pretest and posttest and also received and reviewed information about correct articulation techniques throughout the treatment period
> - practice group: participated in the pretest and posttest, received and reviewed information about correct articulation techniques, and practiced the articulation exercise along with accompaniment tracks during band rehearsals throughout the treatment period
> - audio model group: participated in the pretest and posttest, received and reviewed information about correct articulation techniques, and practiced the articulation exercise along with accompaniment tracks during band rehearsals throughout the treatment period; in contrast to the practice group, the accompaniment tracks utilized in the audio model group included performances by professional musicians modeling the articulation exercise
> - visual model group: participated in the pretest and posttest, received and reviewed information about correct articulation techniques, practiced the articulation exercise along with accompaniment tracks (which included performances by professional musicians modeling the articulation exercise) during band rehearsals, and had the opportunity to view computer-generated signal graph images of their sounds (as well as those of the professional models) during the treatment period."[90]

The effectiveness of each teaching method was observed by administering an articulation pretest and posttest at 60, 80, 100, and 120 beats per minute, which were scored by three

[89] Paul Joseph Budde, "An Analysis of Methods for Teaching Middle School Band Students to Articulate," (DMA diss., University of Minnesota, 2011), 1, ProQuest Dissertations and Theses.

[90] Budde, "An Analysis of Methods for Teaching," 221-222.

external judges. The results were then compared to determine if there was a statistically significant difference in the effectiveness of each method.

Budde found that three teaching method groups (practice, audio model, and visual) displayed statistically significant improvement in articulation performance. Furthermore, Budde also tested a progressive approach that utilized all three methods, which proved to be the most beneficial. Budde writes, "The current researcher recommends the combination of these three elements for inclusion within band rehearsals in order to improve the articulation skills of young wind musicians."[91] Regarding linguistic implications, Budde notes that further research is still needed to better understand the syllables used to teach articulation and how different languages can affect the physiological response produced in wind players. Budde observes, "little attention has been given to this issue when considering how language differences can impact the process of instrumental instruction, particularly regarding articulation on a wind instrument."[92] Budde's research serves as further evidence for the possible application of linguistic theories and concepts to analyze the teaching methods used in instrumental pedagogy.

Schlafer

Schlafer's research, "A Linguistic Analysis of the Use of Vowels to Affect Voicing on the Bassoon," is perhaps one of the most direct examples of the interdisciplinary applications of linguistics to analyze woodwind pedagogy. Schlafer

[91] Budde, "An Analysis of Methods for Teaching," 234.

[92] Budde, "An Analysis of Methods for Teaching," 37.

examines the use of vowels in bassoon pedagogy to teach oral cavity shapes needed in performance. In addition to discussing the shortcomings of common woodwind pedagogy practices, Schlafer also suggests the use of the International Phonetic Alphabet (IPA) chart as a resource tool for representing oral cavity shapes.

As with clarinet articulation, the difficulty of teaching voicing on bassoon is a result of how difficult it is to observe visually.[93] Schlafer notes, "The oral cavity is hidden from view during speech just as it is in bassoon playing. Nonetheless, linguistics has developed a system of codifying speech sounds that considers both the shape of the oral cavity and changes affecting it."[94] When comparing the pedagogical uses of vowels in bassoon teaching, Schlafer observed a lack of uniformity and consistency in the speech sounds used to describe the oral cavity. Schlafer suggests using linguistics as a way to analyze and standardize the vowels used to affect tone, register, pitch, and dynamics when playing bassoon. However, it should be noted that performance on a reed instrument is inherently different from speech production since instrumental performance is comparatively higher pressure than speech and is a closed system upstream to the reed valve. Additionally, the acoustic effects of speech phonemes are assumed to correlate to the acoustic requirements of instrumental performance. Therefore, the use of speech sounds to describe the intraoral mechanics of instrumental performance is only an approximation.

[93] Julie Schlafer, "A Linguistic Analysis of the use of Vowels to Affect Voicing on the Bassoon," (DMA diss., Arizona State University, 2006), 10, ProQuest Dissertations and Theses.

[94] Schlafer, "A Linguistic Analysis of the use of Vowels," 13.

Comparing the speech sounds of the IPA chart and prior acoustic and radiation studies conducted to examine the oral cavity during bassoon performance, Schlafer observed a common goal in vowels used in bassoon pedagogy. For example, Schlafer writes "though all bassoonists did not suggest the same vowel for playing in the low register or making a note flat, they did suggest using a vowel that is more-back and lower in the oral cavity than vowels used to sharpen a note, or to play in the upper register."[95] In addition, Schlafer observed a correlation between speech sounds and oral cavity shapes in bassoon performance. For example, Schlafer writes, the commonly used closed vowel [i] and open vowel [a] seem to be effective for upper register/sharpening, lowering register/flattening respectively."[96] The conclusions of Schlafer's research support the potential advantages of applying linguistics to analyze woodwind pedagogical methods in hopes of better understanding the effects of the language used to teach certain concepts, such as voicing or articulation.

Sullivan

In the study, "The Effects of Syllabic Articulation Instructions on Woodwind Articulation Accuracy," Sullivan investigates the use of a multi-syllabic approach versus a mono-syllabic approach when teaching articulation to high school woodwind players. Identical to teaching clarinet articulation, teaching articulation in a wind band setting is difficult because the tongue is not visible during performance, and as a result, band directors also use syllables to describe the tongue motions involved in articulation.

[95] Schlafer, "A Linguistic Analysis of the use of Vowels," 62.

[96] Schlafer, "A Linguistic Analysis of the use of Vowels," 62.

Sullivan states, "…pedagogues disagree on tonguing techniques for the same instrument, as well as across families of instrument…There is a lack of standardization in teaching articulation."[97] Comparable to the linguistics vein of articulatory phonetics research, Sullivan aims to examine the effects of syllables used in woodwind articulation pedagogy to improve the accuracy of teaching techniques.

In Sullivan's study, sixty-six woodwind players from grade levels ten, eleven, and twelve were divided into two groups with each containing sixteen flutes, three double reeds, nine clarinets, and five saxophones. Both groups were evaluated to have equal ability in performance and articulation. The multi-syllabic group was instructed to perform varying articulation with different syllables, such as "dah" for legato and "tut" for staccato. On the other hand, the mono-syllabic group was instructed to use the singular syllable "tah" for all instances of articulation. After each group was instructed over a seven-day period, all participants recorded a prepared articulation example and an articulation sight-reading exercise. These were then scored by three "expert judges" by counting the number of accurately performed articulations.[98]

Sullivan found that a multi-syllabic approach was more advantageous when trying to improve woodwind articulation accuracy as compared to a mono-syllabic approach. In both the prepared articulation example and an articulation sight-reading exercise, the participants in the multi-syllabic approach scored higher than those of the mono-syllabic group. In addition, there were no observed interactions between syllabic approach and the

[97] Jill Marie Sullivan, "The Effects of Syllabic Articulation Instruction on Woodwind Articulation Accuracy," *Contributions to Music Education 33, no. 1* (2006): 60, http://www.jstor.org/stable/24127200.

[98] Sullivan, "The Effects of Syllabic Articulation Instruction,"62-65.

type of woodwind instrument played. Sullivan suggests this as an indication of a universal effectiveness when using a multi-syllabic approach for all woodwinds. Sullivan speculates, "the syllables may have served as a mnemonic device in helping those students remember the physiological response…"[99] However, as seen in Patnode's study, a person's ability to accurately determine the motions of their tongue varies between individuals. Therefore, without verification by observing the oral cavity during performance, it is difficult to determine if the students were actually using these syllables.

Discussion

As revealed by previous literature pertaining to the present research, it is apparent that much is still to be discovered regarding articulation pedagogy. Prior oral cavity imaging studies have confirmed several tongue motion trends that occur during clarinet performance. The shape of the tongue is greatly affected by the register. For example, Anfinson, Carr, Compagno, and Hungerford all confirmed that in the lower register of the clarinet, the tongue is in a high and back position, which creates a decrease in the size of the pharyngeal cavity. In contrast, playing in the upper register on the clarinet results in an increase of the pharyngeal cavity with the tongue moving downward and forward. Although both Anfinson and Hungerford observed the inability of the tip of the tongue to move in complete independence from the rest of the tongue, both agree players with the least amount of extraneous tongue motion during articulation experience the least amount of difficulty during performing, which is congruent with articulation pedagogy.

Applying linguistic theories and concepts to analyze articulation pedagogy is an underexplored field as seen by the lack of prior research into this topic. However, other

[99] Sullivan, "The Effects of Syllabic Articulation Instruction,"67.

studies have examined the methods used for teaching articulation. Budde and Sullivan's studies, which analyze the teaching methods used to teach articulation, demonstrate that a combination of various teaching styles as well as a multi-syllabic approach yield the best results. In addition, Schlafer's examination of bassoon pedagogy using linguistics is a direct example of the potential pedagogical insights that linguistics, especially articulatory phonetics, can provide to better understand the syllables used for teaching articulation.

CHAPTER 5

METHODS OF ANALYSIS

Overview

Linguistics offers a new perspective to understanding the language used to teach articulation. The current study has two main goals: to survey and categorize the language of selected articulation pedagogy literature to examine the pedagogical implications of a linguistic analysis, and to create a resource for diagnosing and fixing articulation issues. When applying linguistic theories and concepts to analyze articulation pedagogy literature, the actual tongue motions observed in prior studies is considered, with the goal of explaining any discrepancies between the pedagogical beliefs and the actual physiological requirements for clarinet performance. In the end, several tables are constructed to display the findings of the various methods of categorizations mentioned below as a pedagogical resource for clarinetists.

Selected Pedagogy Literature

The language used in clarinet pedagogy literature from resources by prominent clarinet pedagogues, such as the works of John Anderson, Joshua Gardner, Michèle Gingras, Eric C. Hansen, Howard Klug, Phillip Rehfeldt, Thomas Ridenour, Heather Roche, Robert Spring, and Rachel Yoder, are surveyed and categorized. Because this research is exploratory and aims to incite additional investigations using linguistic concepts and theories to analyze clarinet pedagogy, the literature included in this research is not an exhaustive selection. Rationale for the selection of the clarinet pedagogy literature observed in the present research is discussed in Chapter 6.

Linguistic Analysis Methods

Peircean Semiotics

In the following analysis, the language used to teach articulation (single, multiple, flutter, and slap) is categorized using three trichotomies in Peircean Semiotics. First, a mapping of the trichotomy of sign-object-interpretant onto the pedagogy of articulation is further explained in order to clarify the implications of this type of analysis. Secondly, the trichotomy of signs as either a qualisign, sinsign, or legisign is used to categorize the signs used to teach articulation. Lastly, the trichotomy describing the relationship between sign and object as icon, index, and symbol is used to investigate the similarities and differences between pedagogical beliefs and the actual physiological requirements for clarinet performance and possibilities for easing difficulties of teaching articulation.

Feld's Metalanguage and Interpretive Moves

Because articulation occurs inside the oral cavity hidden from view, teachers have needed to create several methods for teaching and fixing articulation. This has led to conventional terminology that clarinetists use to teach articulation, such as syllables and metaphors. According to the ideas of Feld, articulation pedagogy is coded in a metalanguage. In the following analysis, interpretive moves (locational, categorical, associational, reflective, and evaluative) are used to categorize the language used in articulation pedagogy, with the goal of decoding the metalanguage of articulation pedagogy.

Porcello's Discursive Strategies

Similar to Feld's interpretive moves, Porcello formulated five strategies (singing/vocables, lexical onomatopoesis, pure metaphor, association, and evaluation) to

examine the language audio engineers use to describe timbre in a recording studio. Because clarinet teachers heavily rely on nonvisual cues when teaching and fixing students' articulation, various terms and other language have been codified among pedagogues to alleviate this difficulty. The language used to describe articulation is categorized into Porcello's five strategies, with the goal of creating a resource of cues to aid in teaching and diagnosing articulation issues.

Articulatory Phonetics

Articulatory phonetics examines the speech sounds of the world's languages relative to articulators and places of articulations, which can also be used to evaluate current methods of teaching articulation. Because articulation on the clarinet occurs inside the mouth, much of the pedagogical literature relies on vocal approximation, such as syllables, to describe the intraoral mechanics of articulation. The International Phonetics Alphabet (IPA) chart is used to examine and categorize the consonants used to teach clarinet single and multiple articulation, with the goal of revealing pedagogical advantages and disadvantages. In addition, potential pedagogical uses of the IPA chart for informing methods for teaching flutter and slap articulation will be explored.

CHAPTER 6

SELECTED CLARINET PEDAGOGY LITERATURE

Rationale for selection

The clarinet pedagogy literature included in this research was selected to demonstrate a range of pedagogical teachings from various professional clarinetists. These clarinetists are highly respected pedagogues with exemplary education credentials and teaching experience. The following section outlines the contents of the ten resources of articulation pedagogy analyzed in this research as well as biographical information of the authors to rationalize the inclusion of their pedagogical teachings in the present research.

"Concepts for the Clarinet Teacher" by John E. Anderson

John Anderson was a professor of clarinet at the University of Minnesota School of Music from 1976 to 2009.[100] During his tenure, he held the posts of director of graduate and undergraduate studies. Anderson's career is described in The University of Minnesota School of Music's magazine as follows, "He has been a tireless champion of new music, specializing in extended techniques for the clarinet."[101] In addition to his teaching career, Anderson has also published books about clarinet pedagogy, such as the foundational study, "Clarinet Essentials." He is currently an editor of clarinet method books, solos, and woodwind chamber music for Jeanné, Inc.[102]

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[100] Lisa Marshal, "Honoring Retirees," *Tutti*, 2009, 25, https://issuu.com/uofmsom/docs/tuttifall2009.

[101] Marshal, "Honoring Retirees," 25.

[102] "John Anderson.," Jeanne-Inc., accessed February 26, 2021, https://jeanne-inc.com/collections/john-anderson.

"Concepts for the Clarinet Teacher" is published by Jeanné, Inc. and is designed to aid college music education students. The contents of the book have two goals: to serve as a resource for novice clarinet instruction and to notify of problems, difficulties, and solutions that can arise during clarinet instruction. Methods for teaching single articulation, exercises for practice, and a "problem and probable causes" table is included in this book.[103] This resource is unique because it is written for students that need to learn how to both play and teach the clarinet in a short span of time.

"Extreme Clarinet" by Joshua T. Gardner and Eric C. Hansen

Joshua T. Gardner is currently a clinical associate professor of music at Arizona State University. He is an active performer as a soloist and in internationally recognized ensembles, such as Paradise Winds and Égide Duo. He has presented lectures on tongue motion during clarinet performance, and he is advancing the use of ultrasound for quantified research and performance diagnostics. Gardner received bachelor's degrees in music education and clarinet performance from the University of Kentucky and the doctorate from Arizona State University. In addition, Gardner is a Silverstein Pro Team Artist and a Henri Selmer Paris/Conn-Selmer Artist.[104]

Eric C. Hansen is currently an associate professor of music at the University of Wisconsin – Green Bay and maintains an active career performing as a soloist, in chamber groups, and in large ensembles around the United States as well as internationally. Hansen received bachelor's degrees in music education and clarinet

[103] John E. Anderson, *Concepts for the Clarinet Teacher*, 3rd ed. (Minneapolis, MN: Jeanné, 1996), 52.

[104] "Joshua Gardner," Arizona Board of Regents, iSearch, accessed February 26, 2021, https://isearch.asu.edu/profile/797344.

performance from Arizona State University and a master's degree in music from the University of Kentucky. He has taught at various summer music camps. Hansen has particular interest in a range of musical styles, such as advanced contemporary music featuring extended techniques for clarinet, as well as jazz and klezmer music. Hansen also advocates for interdisciplinary research, particularly in the history, technology, psychology, and sociology of video games music.[105]

"Extreme Clarinet" is published by Potenza Music and is co-authored by Gardner and Hansen. The book focuses on the development of fundamental technical skills and advanced techniques, such as multiple articulation, circular breathing, and the extreme upper-register of the clarinet. The authors comment, "We, the authors, created Extreme Clarinet to combine the instruction of basic fundamentals, extended range, precise finger motion, precise and rapid single and multiple articulation, and circular breathing into one guide."[106] This resource exposes the recent trend of certain techniques, such as multiple articulation, shifting from being considered "extended" techniques to now being required skills expected of clarinetists.

"Clarinet Secrets…for the Advanced Clarinetist" by Michele Gingras

Michele Gingras is a Distinguished Professor Emerita of clarinet at Miami University in Ohio. She was also named Curry Distinguished Educator and Distinguished Scholar of the graduate faculty. In 2017, she became instructor of clarinet at Butler University in Indianapolis. She has previously held the position of secretary of the

[105] "Eric Hansen," University of Wisconsin-Green Bay, Music, accessed February 26, 2021, https://www.uwgb.edu/music/faculty-staff/music-education/hansene/.

[106] Gardner and Hansen, *Extreme Clarinet*, 3.

International Clarinet Association. Gingras has performed internationally and released several CDs, and she is the author of numerous articles and reviews for international publications. She has also published two other books: "Clarinet Secrets" in 2004 and "More Clarinet Secrets" in 2011. In addition, she is an artist clinician for Buffet Crampon and Légère Reeds.[107]

"Clarinet Secrets: 100 Performance Strategies for the Advanced Clarinetist" is published by Rowman & Littlefield, and this second edition is an expansion of her previous books. This book is intended to be a resource for intermediate and advanced clarinetists and teachers. Also included in the book are photos, diagrams, and musical examples that clearly illustrate various concepts, such as articulation, intonation, tone and technique. Regarding articulation, Gingras's book is one of the only resources to include pedagogical information about a majority of types of articulation, particularly single, multiple, flutter, and slap articulation.[108]

"The Clarinet Doctor" by Howard Klug

Howard Klug is currently a professor of clarinet at Indiana University Bloomington. Klug has an extensive performing career as a chamber musician, soloist, and clinician throughout the United States and internationally. In addition to clarinet, he also plays flute and saxophone, and he was a member of the U.S. Air Force Band in Washington, D.C. Klug has also held the principal clarinet position with the Fresno

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[107] "Michele Gingras." Butler University, Butler Beyond: The Campaign for Butler University, accessed February 26, 2021, https://www.butler.edu/directory/user/mgingras.

[108] Gingras, *Clarinet Secrets: 100 Performance Strategies*, xi-xii.

Philharmonic, the Bear Valley Festival Orchestra, Sinfonia da Camera, and the Indianapolis Chamber Orchestra. He earned his bachelor's degree in science at Ohio State University and his master's degree in music at the University of Maryland.[109]

"The Clarinet Doctor" is published by Woodwindindiana, Inc. and is a resource that outlines Klug's concept of "Clarinet Calisthenics." Klug writes, "[This] is an approach to learning the clarinet that focuses on the traditional scale and interval patterns which make up the vast majority of the music we play." The book presents a timeline for the progression of concepts and exercises to be learned and practiced over a four-year period that is typical of an undergraduate education. Klug dedicates two sections to concepts about the tongue, throat, and articulation. Like Anderson, Klug also includes information about visual and aural cues that signal incorrect articulation and probable causes and solutions for them.[110]

"The Educator's Guide to the Clarinet" by Thomas Ridenour

Thomas Ridenour currently runs and operates Ridenour Clarinet Products in Duncanville, Texas producing clarinets, clarinet accessories, and educational materials. He earned his bachelor's degree in clarinet performance at Murray State University and his master's degree in music at Yale University. Previously, Ridenour was a professor of clarinet at Wesleyan University, Hartt College of Music, and University of Connecticut. He also performed on Connecticut Public Radio and Boston Public Radio as well as with chamber groups such as Chamber Music Plus. Ridenour also performed the North

[109] "Welcome," HowardKlug.com, Howard Klug: Clarinetist, accessed February 26, 2021. http://howardklug.com/.

[110] Klug, *The Clarinet Doctor*, 1.

American premiere of Robert Muczynski's "Time Pieces" for clarinet and piano. Additionally, he has given lectures and masterclasses at many major universities throughout the United States and Canada. He published articles on various aspects of the clarinet and also wrote the book "Clarinet Fingerings: A Comprehensive Guide for the Performer and Educator."[111]

"The Educator's Guide to the Clarinet: A Complete Guide to Teaching and Learning the Clarinet" is intended to provide all the information needed to effectively teach the clarinet. Ridenour writes, "The Educator's Guide to the Clarinet is meant for anyone and everyone who is faced with the task of teaching and learning the clarinet, whether in the studio or the classroom, whether public schools or universities."[112] The book is divided into two main sections. The first section covers topics in clarinet pedagogy such as tone, embouchure, and articulation. The second section focuses on clarinet equipment.

"New Directions for Clarinet" by Phillip Rehfeldt

Phillip Rehfeldt is a professor emeritus of woodwind instruments and musicology at the University of Redlands. He has also made a career recording and performing new music for the clarinet. Rehfeldt has performed with various chamber groups and ensembles, such as the Tahquitz Wind Quintet, the Redlands Symphony Orchestra, and the San Bernardino Civic Light Opera. In addition to "New Directions for Clarinet," Rehfeldt also has other publications, such as woodwind pedagogy books and music

[111] Thomas Ridenour, *The Educator's Guide to the Clarinet: A Complete Guide to Teaching and Learning the Clarinet*, 2nd ed. (Duncanville, TX: printed by the author, 2002) iv.

[112] Ridenour, *The Educator's Guide to the Clarinet*, v-vi.

editions for clarinet. He earned the doctorate in clarinet performance from the University of Michigan.[113]

"New Directions for Clarinet, revised edition" is published by The Scarecrow Press, Inc. and is intended as a resource for composers and clarinetists dealing with the performance techniques that have progressed since 1950. Rehfeldt writes, "The purpose, simply stated, has been…to identify or 'categorize' the practices now prevalent which differ from those formerly standardized; to provide some perspective on specific performance capabilities and limitations; and, whenever appropriate, to include suggestions for performance." Notable additions in the revised edition are an appendix on William O. Smith and his early multiphonic fingerings and an appendix of Eric Mandat's quarter-tone fingerings. Like Gingras, Rehfeldt includes pedagogical information about a majority of types of articulation, particularly single, multiple, flutter, and slap articulation.[114]

Blog Posts by Heather Roche

Heather Roche is the author of "one of the most widely read new music blogs on the Internet."[115] She earned the doctorate at the University of Huddersfield, where she conducted research that explored the nature of dialogue within performer-composer relationships. Roche received her bachelor's degree in music from the University of Victoria in Canada and a master's degree in music from the Guildhall School of Music

[113] Rehfeldt, *New Directions for Clarinet*, 179.

[114] Rehfeldt, *New Directions for Clarinet*, vii-ix.

[115] Heather Roche, "Biograph," heather roche (blog), accessed February 26, 2021, https://heatherroche.net/about/.

and Drama in London. She has an extensive performing career and has performed at major European festivals and with ensembles and orchestras, such as Musik Fabrik, WDR Orchestra, and Riot Ensemble.

Heather Roche maintains an active blog that covers several clarinet topics. Her blog posts especially have a focus on "unconventional sounds," such as air sounds, use of aluminum foil, and trumpet embouchure, and the posts serve as a resource for both composers and clarinetists. Roche's blog post "…on clarinet articulation" outlines various ways that the tongue and throat are involved in clarinet performance, and it also includes audio examples of each articulation.[116] Roche's writings covering single, multiple, flutter, and slap articulation are of particular interest to the present research. Roche dedicates an entire blog post to slap articulation, which is titled "how to slap tongue," and she also dedicates an entire blog post to multiple articulation, which is titled "how to improve your double tongue."[117] Roche also includes audio examples and video as supplementary material.[118]

"Warmed-Up Clarinet…Don't Just Have Leftovers!" by Robert Spring

Robert Spring is currently a professor of music in clarinet at Arizona State University. He was awarded three degrees, including the Doctor of Musical Arts degree, at University of Michigan. In addition to teaching on the faculties of several summer music festivals, Spring has published numerous articles on various clarinet techniques,

[116] Heather Roche, "…on clarinet articulation," heather roche (blog), April 4, 2014, https://heatherroche.net/2014/04/04/on-clarinet-articulation.

[117] Heather Roche, "how to improve your double tongue," heather roche (blog), August 16, 2014, https://heatherroche.net/2014/08/16/how-to-improve-your-double-tongue/.

[118] Heather Roche, "how to slap tongue," heather roche (blog), August 25, 2014, https://heatherroche.net/2014/08/25/how-to-slap-tongue/.

such as multiple articulation and circular breathing. Spring also has an active career in performance, having performed as a soloist with symphony orchestras and wind bands in the United States and internationally in Canada, Europe, Asia, and South America. Between 1998 and 2000, Spring served as president of the International Clarinet Association. Spring hosted the 1995 International Clarinet Association ClarinetFest at Arizona State University and has performed at numerous International Clarinet Association conventions. Spring is a guest professor at the Beijing Central Conservatory of Music and is a Henri Selmer Paris Performing Artist.[119]

"Warmed-Up Clarinet or How to Make Certain You Don't Just Have Leftovers!" is a chapter written by Spring in the book, "The Woodwind Player's Cookbook: Creative Recipes for a Successful Performance." The book contains chapters that are each written by a different woodwind professional that include concise "recipes" to improve various aspects of performance. Spring's recipe outlines "a comprehensive warm-up" that covers all of the fundamental aspects of clarinet performance, such as breathing, sound production, intonation, and range extension.[120] In addition, Spring also describes methods for improving single articulation and multiple articulation.

"How to Slap Tongue" by Rachel Yoder

Rachel Yoder serves as the current editor of "The Clarinet," which is the International Clarinet Association's quarterly journal. She is also adjunct professor of

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[119] "Robert Spring," Arizona Board of Regents, iSearch, accessed February 26, 2021, https://isearch.asu.edu/profile/87432.

[120] Robert Spring, "Warmed-up Clarinet or How to Make Certain You Don't Just Have Leftovers!" In *The Woodwind Player's Cookbook*, (Galesville, MD: Meredith Music, 2008), 134.

music at the DigiPen Institute of Technology in Washington. Yoder maintains an active performance career that includes performances with the Seattle Modern Orchestra, Yakima Symphony Orchestra, Universal Language Project, Chorosynthesis, Seattle Metropolitan Chamber Orchestra, and North Corner Chamber Orchestra. In addition, she has performed and presented throughout the United States at numerous International Clarinet Association conferences, the 2015 International Computer Music Conference, and the 2012 and 2013 Society for Electroacoustic Music in the United States conferences. Yoder's research includes topics such as interactive computer music, integrating technology into music pedagogy, and extended techniques for clarinet.[121]

Yoder's blog post, "How to Slap Tongue," outlines instructions on how to develop slap articulation on clarinet. Yoder breaks down her method into a concise three-step process. She also includes an approximately six-minute long video where she walks through the process into greater detail. Although she uses a bass clarinet in the video, the instructions are intended for learning slap articulation on clarinet in general, as well as saxophone. The video (and audio) demonstrations provided by Yoder in this blog post are of importance to the present research.[122]

[121] Rachel Yoder, "Biography," Rachel Yoder, clarinet, accessed February 26, 2021, http://www.rachelyoderclarinet.com/about/

[122] Rachel Yoder, "How to Slap Tongue," *Rachel Yoder, clarinet* (blog), March 25, 2012., http://www.rachelyoderclarinet.com/2012/03/how-to-slap-tongue/

CHAPTER 7

ANALYSIS OF LITERATURE

Peircean Semiotics Analysis

Peircean semiotics strives to account for the context of an individual's perception of the world. For example, certain associations, such as "a cellist rolling the bow from the lowest to the highest string in one gesture"[123] might be instantly clear to one student, but if another student has never seen a cellist perform, this association might not have any meaning. The debate over the best practices when using syllables to describe single articulation on clarinet is yet another point of confusion in clarinet pedagogy. For example, the fact that pedagogues do not agree on the ideal syllable to use when teaching single articulation on clarinet is evidence that some teachers experience different results when using the same syllables. Their personal experience using certain syllables can be a possible explanation for their favored use of one over another.

Sign-Object-Interpretant in Articulation Pedagogy

Perhaps an ideal syllable to use when teaching single articulation does not exist. Looking back to the sign-object-interpretant trichotomy of Peirce presented earlier, the sign is the syllable representing the object of single articulation. Regardless of being correct or incorrect, the interpretant is the effect the sign created in the student or person attempting to perform single articulation. This suggests the possibility that one syllable could cause dissimilar results for different students. For example, the syllable "tee" could be a sign that produces proper single articulation for student A, but "tee" could be a sign that produces improper single articulation for student B. Subsequently, student B might

[123] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 3.

understand the syllable “thee” as a sign for proper single articulation. Furthermore, as noted by Patnode, some individuals are better than others at discerning what their tongue is doing when they play. This brings into question whether clarinetists are actually using these syllable approximations when performing articulation and whether the success in articulation performance is related to the possible physiological similarities between these syllable approximations and actual performance or whether they are the result of better proprioception.

The same possibility that one syllable could cause dissimilar results for different students also applies to the syllable used to teach the back articulation of multiple articulation. Referring back to the sign-object-interpretant trichotomy, the consonants /k/ or /g/ act as the sign representing the posterior motion of the tongue during multiple articulation. The effect the sign created in the student attempting to perform multiple articulation is the interpretant. This perspective of the relationship between sign-object-interpretant opens up the possibility for understanding the reasons some pedagogues suggest one consonant versus the other. For example, some clarinetists, such as Roche and Spring, advocate for the use of /k/ as the back syllable, whereas others, such as Gardner and Hansen, suggests using /g/. Similarly, Gingras suggests starting with /k/ and switching to /g/ as an alternative if any errors occur. As stated previously, Peircean semiotics strives to account for the context of an individual’s perception of the world. In the case of multiple articulation, some pedagogues may favor either /k/ or /g/ based on their own personal experience in learning and teaching multiple articulation. Perhaps, like single articulation, one consonant that is best to use when teaching multiple articulation does not exist.

Flutter articulation poses an interesting sign-object-interpretant intersection. The sign is the manner, commonly described as a "Spanish 'r'" or "French or German dry 'r'," [124] used to describe the object of rolling the tongue to produce flutter articulation. Unlike single and multiple articulation, the major difficulty of flutter articulation is the need to avoid touching the reed during the rolling action of the tongue. A palatal trill in speech is often more forward in the mouth compared to flutter articulation because the clarinetist must avoid contacting the mouthpiece and reed. Therefore, the use of speech sounds to teach the intraoral mechanics of flutter articulation is only an approximation. For various reasons, some clarinetists experience difficulty with one method of flutter articulation over the other, and preference is a result of individual physical limitations.[125] The pedagogy language surrounding flutter articulation is a clear illustration of how clarinetists' personal experiences and the teaching limitations of vocal approximations shape the performance and/or teaching methods.

Slap articulation pedagogy is by far the least developed in terms of literature and teaching methods. Roche writes, "It took me an embarrassingly long time to learn to slap tongue. We're talking about *years* here…The only thing I could think to do was to comb the internet for advice and to ask every single person I met how they learned and how they think about it."[126] Like flutter articulation, slap articulation serves as another example of how clarinetists' personal experiences shape the performance and/or teaching

[124] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

[125] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

[126] Roche, "how to slap tongue."

methods. For example, the "Popping motion," as outlined by Gingras, suggests using compressed air in the mouth to produce a slap articulation.[127] On the contrary, Roche highly discourages the involvement of air to produce slap articulation.[128] Clearly, the signs clarinetists use to represent the object of slap articulation needs development.

Trichotomy of Signs in Articulation Pedagogy

In Peircean semiotics, the sign itself can be categorized as a qualisign, sinsign, or legisign. A qualisign deals with a "pure quality embedded in a sign." A sinsign "is the actual specific instance of a sign." Lastly, a legisign is a "sign as a general type." These categories of signs help organize the various methods or signs used to teach articulation.[129]

Regarding single articulation, the quality of the sound that the articulation produces, such as the shortness of a note or the presence of extraneous noises, are qualisigns. Qualisigns are also commonly used to diagnose errors in single and multiple articulation. For example, Klug notes a "'Heavy, 'thud' tonguing"[130] when describing incorrect articulation. The "thuddiness" in this case is a qualisign. Similarly, Gardner and Hansen write, "We recommend Goo or Gee as a back syllable because their delicacy allows for easier, more flexible multiple articulation in the altissimo register."[131] In this case, the syllable using /g/ as the back articulation is a qualisign for the delicate, legato-

[127] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 22.

[128] Roche, "how to slap tongue."

[129] Turino, "Signs of Imagination, Identity and Experience," 225.

[130] Klug, *The Clarinet Doctor*, 74.

[131] Gardner and Hansen, *Extreme Clarinet*, 18.

like stroke of the tongue needed to produce multiple articulation. Depending on the student's perception, /k/ could be a sign for a harsher sound and can cause extraneous tongue motion, as suggested by Gingras.[132] Whether a front palatal trill or a uvular trill, the distinctive "rrrrr" sound is the main qualisign for flutter articulation. Similarly, the characteristic "slap", "pop", or "thud" sound is the main qualisign for slap articulation.

Sinsigns are a common category of signs used in a private lesson setting. Demonstrating an articulated passage in a piece of music that a student is working on is a sinsign of that type of articulation for that instance. In a lesson, a teacher communicating that the articulation was correct or incorrect is also a type of sinsign. This gives the student a way to determine signs that signal either proper or improper tongue motions. Additionally, recordings are another example of sinsigns used when teaching articulation. Playing the excerpt of Richard Strauss's *Don Quixote* that contains flutter articulation in the clarinet part is a sinsign providing students an example of the sound they are trying to achieve in that particular instance.[133]

Legisigns are a little more difficult to identify. For instance, the tongue motion required to perform the clarinet excerpt from *Midsummer Night's Dream* apart from any given performance of it is an example of a legisign. In other words, the general mechanics of any type of articulation can be considered a legisign. The syllables an instructor regularly uses to try to suggest how to achieve a certain articulation are

[132] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 19.

[133] Rehfeldt, *New Directions for Clarinet*, 63.

legisigns that signal approximations of the tongue movement for later performance in the context of a specific piece.

Sign-Object Relationship in Articulation Pedagogy

In Peircean semiotics, a sign's relationship to an object can be categorized as an icon, index, or symbol. Turino simplifies Peirce's idea stating, "The term icon refers to a sign that is related to its object through some type of resemblance between them. The degree, basis, and even accuracy of resemblance is not so much at issue as the fact that resemblance calls forth the object when perceiving the sign."[134] Peirce suggests images, diagrams, and metaphors are the three types of icons. In "Clarinet Secrets: 100 Performance Strategies for the Advanced Clarinetist," Gingras uses diagrams extensively in the chapter concerning articulation, as seen in Figures 10 and 11.

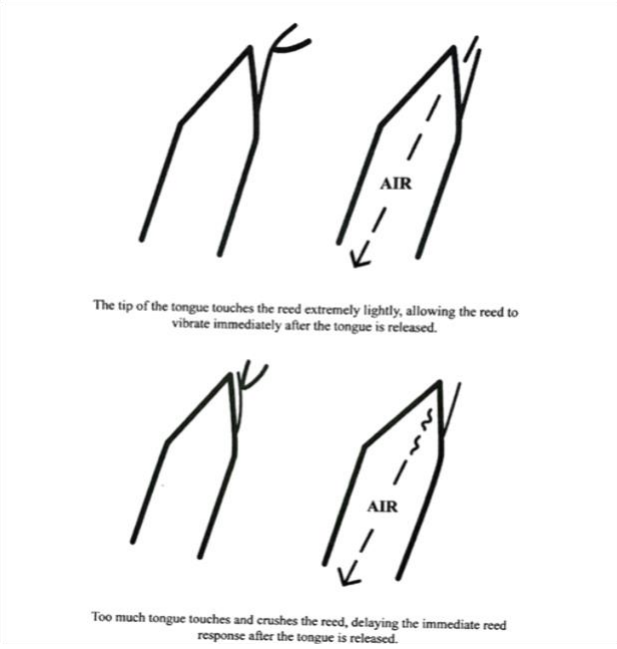

Figure 10: Comparison of tongue placement during single articulation on the clarinet. Diagram adapted from Michèle Gingras, *Clarinet Secrets: 100 Performance Strategies for the Advanced Clarinetist*, 2nd ed, Lanham, MD: Rowman & Littlefield, 2017, 14.

[134] Turino, "Signs of Imagination, Identity and Experience," 226.

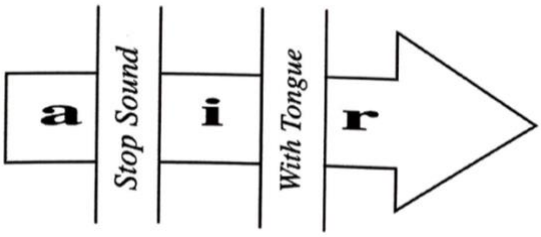

Figure 11: Air during single articulation on the clarinet. Diagram adapted from Michèle Gingras, *Clarinet Secrets: 100 Performance Strategies for the Advanced Clarinetist*, 2nd ed, Lanham, MD: Rowman & Littlefield, 2017, 16.

Similarly, Anderson also provides a diagram in "Concepts for the Clarinet Teacher" to illustrate the tongue and embouchure, as seen in Figure 12. Given the lack of ability to view inside the mouth without special techniques, such as ultrasound, these diagrams and images serve as icons for the intraoral mechanics of single articulation. Interestingly, in the observed literature, similar diagrams for other types of articulation are not present. Perhaps, developing diagrams for multiple, flutter, and slap can provide pedagogical benefits. Metaphors are another type of icon that is frequently used in articulation pedagogy. For instance, Gardner and Hansen, use a "flag flapping in the wind" as a metaphor to describe pushing air to aid the tongue motion of single articulation.[135] Gingras also uses this metaphor in her writings.[136]

[135] Gardner and Hansen, *Extreme Clarinet*, 17.

[136] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 2.

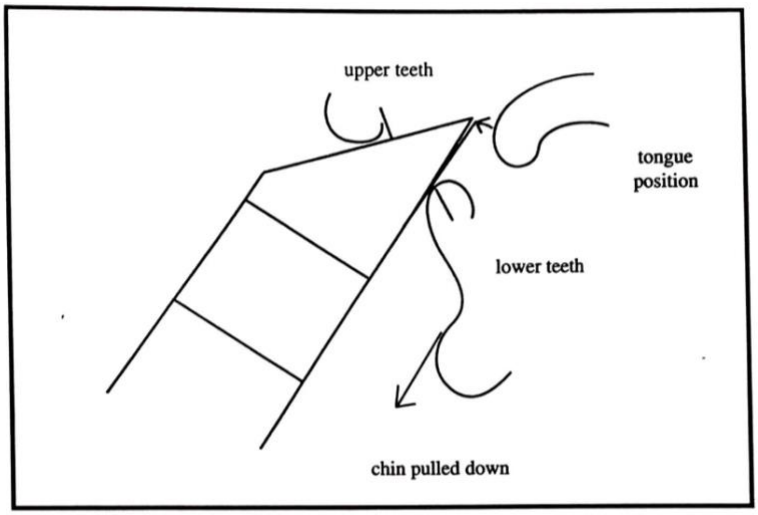

Figure 12: Embouchure formation on the clarinet. Diagram adapted from John E. Anderson, *Concepts for the Clarinet Teacher*, 3rd ed. (Minneapolis, MN: Jeanné, 1996), 5.

Turino explains that an index "refers to a sign that is related to its object through co-occurrence in actual experience…the "Star Spangled Banner" may serve as an index for baseball games, Fourth of July parades, school assemblies, or imperialism depending on the experiences of the perceiver."[137] The important aspect of indices is that they are established in co-occurrences within one's own experiences. Aural cues are a sign with an indexical relationship to the object of certain articulation issues, such as too much tongue motion. However, the incorrect tongue motion associated with specific aural cues is established in one's own experiences. Therefore, it is up to the teacher to relay this to the student in order to establish the same indexical relationship with the sign (aural cue) and the object (incorrect tongue motion). For example, all pedagogues surveyed agree that a "thud" sound serves as an index that suggests more than just the tip of the tongue is contacting the reed. In a lesson, a teacher frequently replicates the student's aural cue for

[137] Turino, "Signs of Imagination, Identity and Experience," 227.

incorrect tongue motion followed by a demonstration of a correct articulation to serve as an index for what the student is to attempt to reproduce.

Peirce defines the symbol as a sign that points to its object by means of convention or habit. In this sense, teaching methods that rely on convention or habit to convey the physiological processes required to perform each type of articulation is a sign that is a symbol. In clarinet pedagogy, the use of conventional phrases, such as "tip of the tongue to the tip of the reed" are signs that serve as a symbol for the correct tongue motion of single articulation. Regarding the physiological process for multiple articulation, Gardner and Hansen explain, "The back articulation occurs when the middle areas of your tongue touches the roof of your mouth, interrupting the air stream."[138] Rehfeldt explains the tongue motion of flutter articulation as "rolling the tongue on the upper palate" or alternatively "an uvular undulation in the throat facilitated by raising the back of the tongue slightly in the mouth."[139] Slap articulation, according to Gingras, Rehfeldt, Roche, and Yoder, is the use of the tongue to create suction against the reed in order to pull it away from the mouthpiece to create a literal slap of the reed against the mouthpiece. These conventional phrases neither rely on resemblance nor contiguity/co-presence. Using signs with a symbolic relationship is useful for understanding the physiological processes required to perform each type of articulation in the abstract. However, for a newer student or a student needing to fix improper tongue motion, the correct tongue motion might be too foreign of a concept, and the aid of signs with an iconic or indexical relationship will likely be necessary.

[138] Gardner and Hansen, *Extreme Clarinet*, 18.

[139] Rehfeldt, *New Directions for Clarinet*, 63-64.

Feld's Metalanguage and Interpretive Moves Analysis

Metalanguage

Much of the difficulty when teaching single articulation on the clarinet stems from the fact that it occurs inside the oral cavity. This makes it difficult for teachers to diagnose and fix issues that arise in articulation because they are required to rely on mostly aural cues and any insight that the student can offer as to what is occurring inside their mouth. However, the student is also hindered when giving feedback. Similar to the issue that confronts teachers, the student cannot see inside their mouth as they play. Therefore, they are limited to their sense of feeling and their mind's eye when learning articulation. Hungerford describes this dilemma in the following:

> "Clarinetists are unable to observe inside the mouth with the physical eye while playing the instrument. The inability to see movement within the mouth affects teaching in two ways. First, teachers cannot accurately diagnose this aspect of their students' playing. Typically, teachers base their diagnoses on the appearance of external physical features or on the musical sounds produced by student performers. Second, teachers cannot observe their own oral cavities or those of other advanced players. Consequently, teachers tend to describe what they think happens in the mouth, often by saying, 'This is what it feels like.'"[140]

This is further complicated since the ability to accurately discern one's own tongue motions during performance varies by individual as observed in Patnode's study.[141] According to the ideas of Feld, articulation pedagogy is coded in a metalanguage. Because articulation occurs inside the oral cavity hidden from view, teachers have needed to create several methods for teaching and fixing articulation that circumvent the need for

[140] Hungerford, "The Use of a Flexible Fiber Optic Scope," 1.

[141] Patnode, "A Fiber Optic Scope Study,"144-145.

visual observation. This has led to conventional uses of terminology that clarinetists use to teach articulation.

Syllables are an example of the terminology clarinetists have codified to approximate the tongue motion for single, multiple, and flutter articulation. Gringas takes it a step further and suggests clarinetists have a sort of "articulation vocabulary" that assigns specific syllables for various scenarios of single articulation.[142] For example, she suggests the syllable "lah" for light motions during loud dynamics, "dat" for notes that require clear, resonant tones, and "tat" for short staccato passages.[143] In addition, the idea of a "legato stroke" or "legato tongue" is used by Gardner and Hansen, as well as Klug, to promote a relaxed tongue motion. This same idea is also used by Gardner and Hansen to aid in multiple articulation. The descriptions of Spanish "r" for a palatal tongue trill and French or German 'r' for a uvular trill are examples of codified terminology for flutter articulation tongue motion.[144] Because of the novelty of slap articulation pedagogy in clarinet literature, the language is not as codified in comparison to single, multiple, and slap articulation.

Interpretive Moves

The metalanguage that codes articulation pedagogy is understood through "interpretive moves."[145] According to Feld, locational, categorical, associational,

[142] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 17.

[143] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 17.

[144] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

[145] Feld, "Communication, Music, and Speech about Music," 24.

reflective, and evaluative, are the five interpretive moves.[146] In a lesson setting, the teacher and student are locked in a continuous "interpretive time" as the teacher attempts to convey the metalanguage of articulation pedagogy and the student tries to understand exactly what they are experiencing when attempting articulation.[147] Feld also notes that interpretive moves do not necessarily operate independently from each other. For example, he writes, "When people say 'it's different from…', 'it's a kind of…', 'it sort of reminds me of…', and things of this sort, they are creating discourse organization that has locational, categorical, and associational features."[148] This type of conversational language is common when teaching articulation.[149]

A locational interpretive move involves relating an object to similar or dissimilar items or events within a subjective field. The syllables used to teach single, multiple, and slap articulation are an example of a locational interpretive move. In the most basic sense, teachers are using articulatory phonetics to relate the object of tongue motion needed for articulation to the tongue motions of consonants and vowels used in language.

A categorical interpretive move relates an object to a class of things. The visual/aural cues and the issues with articulation they signal are an example of a categorical interpretive move. Pedagogues typically classify certain cues with possible tongue motion inaccuracies. For example, Anderson includes a table of cues and possible causes, as shown in Table 2. In a lesson setting, teachers are able to use this categorical

[146] Feld, "Communication, Music, and Speech about Music," 8.

[147] Feld, "Communication, Music, and Speech about Music," 14.

[148] Feld, "Communication, Music, and Speech about Music," 14.

[149] Hungerford, "The Use of a Flexible Fiber Optic Scope," 1.

interpretive move with relative ease because of their expertise gained through years of teaching and personal experience. However, a student may not have the knowledge to use a categorical interpretive move via aural cues as readily without the guidance from a teacher versed in the metalanguage of articulation.

Table 2. Articulation Issue and Probable Cause(s)	
Contains extraneous noises	1. Tongue placement incorrect (too low on the reed and/or too far back of the tongue 2. Reed tip out of balance
"Pecking" quality in staccato passages	1. Tone being stopped with the tongue
Too slow	1. Tongue muscle underdeveloped
Unclear, weak ictus	1. Tongue not being used (breath attack) 2. Insufficient air pressure against the back of the tongue during articulation

Source: Adapted from John E. Anderson, *Concepts for the Clarinet Teacher*, 3rd ed. (Minneapolis, MN: Jeanné, 1996), 52.

An associational interpretive move relates objects to particular visual, musical, or verbal imagery. The diagrams and images in the observed literature of Anderson and Gingras, shown in Figures 10, 11, and 12 above, are an example of a way for teachers to aid a student attempting to make an associational interpretive move. In addition, verbal imagery used by pedagogues, such as "a flag flapping in the wind," to signal how air aids the tongue motion during articulation is an example of associational interpretive move. Ridenour uses the following associational interpretive move to describe the same concept of air during single articulation.

> "An analogy that most young players understand readily is that of a water tap…The tongue, of course, is analogous to the tap, the air compares to the water, and the pressure (which makes everything work) relates to the proper blowing technique… Just as the water pressure continues when the tap is closed, so must

> the air pressure continue when the tongue is on the reed and no sound is being produced."[150]

Gingras provides an example of an associational interpretive move that utilizes musical imagery that relates syllables to musical notation, as shown in Figure 13 below. However, as mentioned before, the vowel component of syllable approximations is solely responsible for voicing, which changes depending on the range being played. The associational interpretive move in Figure 13 suggests that the articulation patterns dictate voicing, which poses problems in performance.

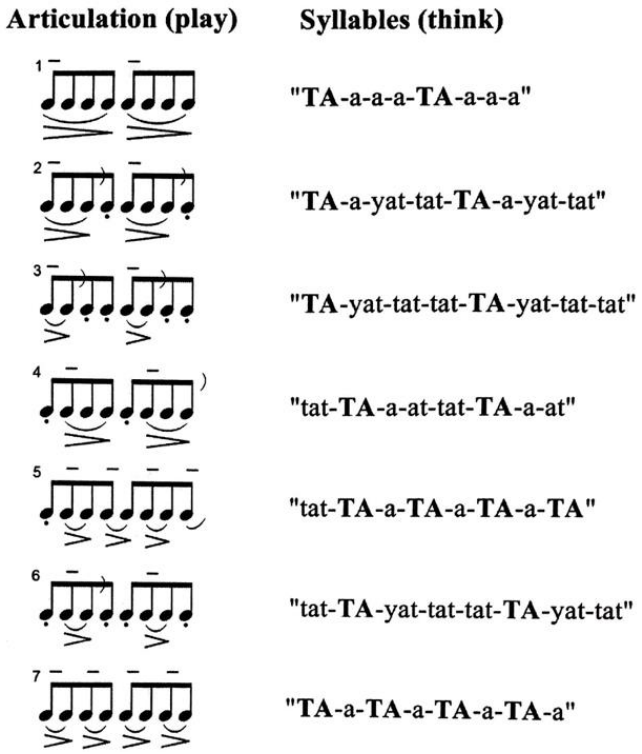

Figure 13: Musical notation and articulation syllable comparison. Diagram adapted from Michèle Gingras, *Clarinet Secrets: 100 Performance Strategies for the Advanced Clarinetist*, 2nd ed, Lanham, MD: Rowman & Littlefield, 2017, 18.

[150] Ridenour, *The Educator's Guide to the Clarinet*, 5.6.

A reflective interpretive move relates objects to personal and social conditions and experiences. Although not as common in the literature, reflective interpretive moves are sometimes used in a lesson setting in the form of an anecdote that might help a student understand a certain articulation concept. For example, Spring writes the following brief anecdote:

> "Use page 22 from the Langenus Book 3, for single tongue warm-up. Dr. John Mohler (my teacher, now retired from the University of Michigan) stressed this exercise as being the single, most important for developing speed with the single tongue. The aspect of tension and release, tension on the two fast notes, and release on the longer note, is the same idea as tension and release that weightlifters and body builders use. I have found that during the twenty-five years that I have been working on this exercise my tongue speed and accuracy have gone beyond my wildest dreams."[151]

Similarly, a student attempting a reflective interpretive move may recount their personal experience when attempting certain articulation techniques in a lesson to convey what they believe to be occurring inside their mouth. This type of reflective interpretive move particularly aids teachers when trying to diagnose problems with articulation.

An evaluative interpretive move relates objects in the form of a critique or assessment that draws on a recognition of other texts, experiences, or performances. As stated before, interpretive moves do not necessarily operate independently from each other. Similar to categorical interpretive moves, the cues developed by pedagogues in the articulation literature to identify tongue motion errors can be used in the case of an evaluative interpretive move. Teachers relate problems in articulation in the form of a critique or assessment of the quality or accuracy of articulation performed by the student. Additionally, recordings can also be used in an evaluative interpretive move. For

[151] Robert Spring, "Warmed-up Clarinet or How to Make Certain You Don't Just Have Leftovers!," In *The Woodwind Player's Cookbook*, (Galesville, MD: Meredith Music, 2008), 139.

example, Roche and Yoder provide audio and video examples of correct slap articulation in their blogs that can aid teachers and students in an evaluative interpretive move.

Porcello's Discursive Strategies Analysis

Similar to the five strategies for talk about timbre outlined by Porcello, clarinet pedagogy also uses the strategies of singing/vocables, lexical onomatopoesis, pure metaphor, association, and evaluation as tools for discourse about articulation. Singing/vocables use phonetic sounds to mimic the timbre and/or resonance of the musical sound being described. Lexical onomatopoesis use words that have a somewhat acoustic resemblance to the sounds they describe. Porcello distinguishes the difference between singing/vocables and lexical onomatopoesis stating, "they are different from the vocables described earlier in that they adhere to the normal pronunciation rules of English and also carry semantic information (specific denotative and connotative meanings), which the vocables do not."[152] Pure metaphors describe timbral characteristics. However, they do not resemble any acoustic similarities to the sound being described, which differentiates them from lexical onomatopoetic words. Association functions indexically by citing other musical styles, musicians, recordings, sounds, etc. Lastly, evaluation is described by Porcello as "used to establish a mutual sense of solidarity between the interlocutors, to mark a territory of shared musical aesthetics. Its function is therefore largely social, signifying an agreement on sonic goals."[153] In other words, through the evaluation of a previous performance or recording,

[152] Porcello, "Vocal Anthropology," 746-747.

[153] Porcello, "Vocal Anthropology," 747.

two individuals attempting to communicate come to a mutual understanding of the target sound being described.

Singing/Vocables

Comparable to Porcello's discursive strategy of singing/vocables, syllables are used in teaching single, multiple, and slap articulation on clarinet as an iconic sign that approximates the tongue motions of articulation. For example, plosive consonants, such as /t/ or /d/, require the tip of the tongue or slightly behind the tip of the tongue to contact the ridge on the roof of the mouth just behind the front teeth. This resembles the tongue motion of tongue to reed contact that occurs during single articulation. When sounding these consonants when playing clarinet, the reed and mouthpiece obstruct the path of the tongue, which causes the tongue to touch the reed instead of the ridge on the roof of the mouth just behind the front teeth.[154]

However, much debate exists regarding the syllables that produce the best results for teaching single articulation on clarinet. For example, Klug argues, "Use the syllable 'thee' instead of the more traditional 't' or 'd.' This will improve the tongue placement and lighten its touch. The traditional syllables force the tongue to leave the roof of the mouth too quickly, move too far, and misorient it spatially"[155] To add to the confusion, as mentioned earlier, some pedagogues also suggest having an "articulation vocabulary" that utilizes different syllables based on the articulation demands of different music.[156]

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[154] Gardner, "Ultrasonographic Investigation," 14.

[155] Klug, *The Clarinet Doctor*, 7.

[156] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 17.

For example, Gingras suggests using the syllable "lah" for light motions during loud dynamics, the syllable "dat" to produce clear, resonant, and full tones, and the syllable "tat" for short staccato passages.[157]

Similar to single articulation syllables, debate exists regarding whether /k/ or /g/ is more ideal to approximate the back-tongue motion necessary for multiple articulation. Roche advocates for the use of /k/, arguing "'too koo' [has] the nicest clarinet tone while double tonguing."[158] However, Gardner explains his reasoning for favoring /g/ in the following:

> "It may be pedagogically advantageous to use the voiced /dg/ consonant context to avoid alternating from voiced vowels to unvoiced consonants, as would be the case in the /tk/ context. Because the vocal folds neither engage nor alternate engagement and disengagement during normal clarinet performance as they do during normal speech, avoiding alternation may help eliminate potentially significant factors when using pedagogical speech models"[159]

In the semiotics perspective, Gingras's approach, which starts with using /k/ and implementing /g/ as an alternative to fix any extraneous tongue motion during multiple articulation, might be more advantageous to account for an individual student's own perceptions.

A linguistic approach supports the idea that not just one syllable is the most ideal for teaching single and/or multiple articulation. The consonants /d/ and /t/ have approximately the same place of articulation. The only difference is /d/ is voiced and /t/ is not. The same applies for the consonants /g/ and /k/, respectively. As noted in Schlafer's

[157] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 13.

[158] Roche, "how to improve your double tongue."

[159] Gardner, "Ultrasonographic Investigation," 115.

research, "A Linguistic Analysis of the Use of Vowels to Affect Voicing on the Bassoon," not all bassoonists recommend the same vowel for a particular register. However, using articulatory phonetics, Schlafer observed that all the vowels suggested shared a common goal in the oral cavity they attempted to approximate.[160] In a similar sense, all of the consonants for single and multiple articulation have the goal of approximating the tongue motions required while also preventing extraneous oral cavity motion. A consonant that produces the best result for one student might not be the same for another.

In the observed literature, "rrrrr," produced by either a palatal trill or uvular trill, is the primary singing/vocable used as a sign for flutter articulation. Additionally, Gingras uses syllables such as "tarr" and "harr" for describing the initial tongue motion when using flutter articulation. She writes, "For better results, start with the syllable 'harr,' rather than 'tarr.' Starting with an 'h' attack prevents the tongue from touching the reed, which would cause the sound to stop."[161] Again, because of the novelty of slap articulation pedagogy, singing/vocables are not observed in the selected literature. However, from personal experience, click consonants, which involve using your tongue to create a click sound in the oral cavity, are typically used as signs to represent the object of slap articulation.

[160]Schlafer, "A Linguistic Analysis of the use of Vowels," 62.

[161] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

Lexical Onomatopoesis

The discursive strategy of lexical onomatopoesis, such as "ping," "thud," "kwee," "bump," "slap," "ring," "thunk," and "peck," is used in literature about single articulation on clarinet. These are most commonly used when diagnosing problems in articulation. For example, Anderson describes, "A 'slap' effect…implies too much of the front part of the tongue is touching the reed."[162] In addition, he mentions a "peck" can be a sign of the tone being stopped with an excessive amount of tongue.[163] Similarly, Ridenour uses "thunk" as an indicator for the tongue hitting the reed below the tip. Klug uses "kwee" to describe the sound of a gliss that occurs at the beginning of an articulated note above the treble clef staff that is an indication of excessive horizontal tongue movement.[164]

On the other hand, lexical onomatopoesis is also used in the positive context of describing desired articulations. For example, Gingras explains, "An accented note also begins with a 'ping' attack but ends with a slow decay because the air column is being used instead of the tongue to stop the sound."[165] In this case, lexical onomatopoesis acts as a sign for teachers to diagnose the object of either correct or incorrect articulation. Although not readily found in the observed literature about multiple articulation, lexical onomatopoesis is also used when addressing tongue motion problems.

Lexical onomatopoesis, such as "thud," "pop," and "clack," are used to describe the sound produced when performing slap articulation. For example, Gingras writes,

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[162] Anderson, *Concepts for the Clarinet Teacher*, 6.

[163] Anderson, *Concepts for the Clarinet Teacher*, 52.

[164] Klug, *The Clarinet Doctor*, 76.

[165] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 15.

"Lay your tongue flat on a large portion…releasing your air and dropping your jaw, and make a slapping or 'clack' noise."[166] Similarly, Rehfeldt describes slap articulation as "a sort of dead 'thud'."[167] In the surveyed literature, flutter articulation interestingly does not utilize lexical onomatopoesis, most likely because of the salience of singing/vocables. Perhaps "zing" or "sizzle" can be utilized to describe the intensity of a flutter articulation.

Pure Metaphor

Unlike the terms used in the recording studio setting as described by Porcello that are "professional terms, codified among musicians," such as "boxy" referring specifically to an excess of sounds around 250-500 Hz, much of the pure metaphors used to describe articulation is not as specifically codified among clarinetists.[168] However, pure metaphors are frequently used in articulation pedagogy literature to diagnose problems, portray tongue motion, and describe the sound quality of articulations.

Similar to the use of lexical onomatopoesis to diagnose problems that arise in single articulation on clarinet, the discursive strategy of pure metaphors, such as "noisy," "light" "smooth," "stiff," "clear," "forceful," "soft," "heavy," "legato," "harsh," "woody," "dull," and "bouncy," are most commonly used to describe the sound quality of single and multiple articulations. For example, Rehfeldt writes, "The force and release of the tongue on the reed, coupled with the amount of blowing, determines whether the attack is loud and forceful, soft and legato, or somewhere between…"[169] Likewise, Klug

[166] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 22.

[167] Rehfeldt, *New Directions for Clarinet*, 65.

[168] Porcello, "Vocal Anthropology," 747.

[169] Rehfeldt, *New Directions for Clarinet*, 10.

observes, “Horizontal tonguing is slow, adds a heavy noise to the tone.”[170] Additionally, Ridenour uses “a woody, dull, percussive noise” to describe the sound caused by the reed touching the alveolar ridge instead of the tip of the reed.[171]

In single and multiple articulation pedagogy, the discursive strategy of pure metaphors, such as “legato,” “delicate,” “smooth,” “relaxed,” and “even,” are also commonly used to describe the feeling or type of tongue motion desired. For example, Gardner and Hansen write, “…delicacy allows for easier, more flexible multiple articulation in the altissimo register. They also allow for a very legato stroke, so you will be able to produce smooth and detached articulation.”[172] Roche notes “evenness” as an indicator for successful multiple articulation performance.[173]

Regarding flutter and slap articulation, pure metaphors are not as readily observed in the selected literature. “Rolling,” which is used to describe the tongue motion, is an example of a pure metaphor for flutter articulation.[174] Similarly, “percussive” is a pure metaphor used by both Gingras and Roche to describe the sound produced by slap articulation.

Association

The discursive strategy of association is also prevalent in the literature regarding single articulation on clarinet. Gringas relates single articulation on clarinet to “dropping

[170] Klug, *The Clarinet Doctor*, 73.

[171] Ridenour, *The Educator’s Guide to the Clarinet*, 5.3.

[172] Gardner and Hansen, *Extreme Clarinet*, 18.

[173] Roche, “how to improve your double tongue.”

[174] Rehfeldt, *New Directions for Clarinet*, 11.

a pencil on a hard surface…much like a stick hitting a snare drum to start a roll."[175] In addition, when describing a passage of continuous single articulation on clarinet, Gringas explains, "A comparison can be made to a cellist rolling the bow from the lowest to the highest string in one gesture."[176] Some of the same associations are made by different pedagogues. For example, Gardner and Hansen, as well as Gringas, relate the relationship between air and tongue during single articulation to "a flag flapping in the wind." Similarly, Gardner and Hansen associate the idea of "tension and release" to the muscle movement of the tongue during single articulation on clarinet.[177] Regarding the articulation exercise on page 22 of the Langenus Book 3, Spring supports this idea, writing, "The aspect of tension and release, tension on the two fast notes, and release on the longer tone, is the same ideas as tension and release that weightlifters and body builders use."[178] See Figure 14 below. These types of associations function indexically and employ sounds and/or different scenarios as a common frame of reference to describe various aspects of articulation.

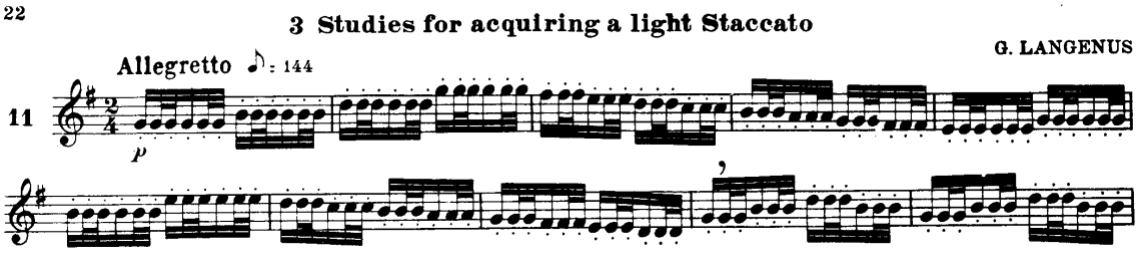

FIGURE 14: First two lines of articulation exercise on page 22 of the Langenus Book 3.

[175] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 1.

[176] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 3.

[177] Gardner and Hansen, *Extreme Clarinet*, 16.

[178] Spring, "Warmed-up Clarinet," 139.

Unlike the associations observed in the pedagogy for single articulation, the language used for multiple, flutter, and slap articulation pedagogy does not use association as commonly. However, the associations for single articulation can be applied to the front articulation of multiple articulation. Gardner and Hansen associate multiple articulation on other instruments, such as flute and brass instruments, to clarinet multiple articulation.[179] Rehfeldt similarly associates clarinet multiple articulation to multiple articulation on oboe and bassoon.[180] The palatal trill associated with the Spanish language and the uvular trill associated with either the French or German language are used to represent flutter articulation.[181] Gingras uses association referring to the feeling of the tongue suctioning to the reed during slap articulation. For example, she writes "Imagine your tongue is glued to the reed…"[182] In addition, citing recordings or performances of single, multiple, flutter, or slap articulation is also considered an example of association.

Evaluation

As previously stated, Porcello writes, "Evaluation is used to establish a mutual sense of solidarity between the interlocutors, to mark a territory of shared musical aesthetics. Its function is therefore largely social, signifying an agreement on sonic goals."[183] In terms of articulation pedagogy, the two interlocutors would be the teacher and student using the evaluation of a previous performance or recording to come to a

[179] Gardner and Hansen, *Extreme Clarinet*, 18.

[180] Rehfeldt, *New Directions for Clarinet*, 11.

[181] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 21.

[182] Gingras, *Clarinet Secrets: 100 Performance Strategies*, 22.

[183] Porcello, "Vocal Anthropology," 747.

mutual understanding of the target sound intended for the student to reproduce. During individual practice, recordings are used as tool for monitoring development over time. For example, Gardner and Hansen note, "Recording yourself can be a useful tool for evaluating your progress with multiple articulation." Although evaluation is not readily available in other pedagogy literature observed, from personal experience, evaluation is also frequently used in a lesson setting.

Articulatory Phonetics Analysis

Single Articulation Consonant-Vowel Combinations

The greatest revelation that articulatory phonetics offers is the disparity of articulatory motions and places of articulation among the consonants used to teach single articulation. Confirmed by clarinet studies using ultrasound and other oral cavity imaging, the vowel component of the syllables is solely concerned with voicing, which changes depending on the range being played.[184] Therefore, the consonant aspect of the syllables is of greater importance in an articulatory phonetics approach to teaching single articulation.

The vowel alone method and the use of the glottal fricative consonant /h/ (as in "ha"), as suggested by Gingras, do not involve the tongue. This could lead students to incorrectly stop their airstream when articulating because the vowel alone method and the use of the glottal fricative consonant /h/ stop the reed from vibrating by creating a stop in the air stream to produce a brief pause in sound production. Therefore, the vowel alone method and the use of the glottal fricative consonant /h/ should be avoided when teaching

[184] Gardner, "Ultrasonographic Investigation," 4.

single articulation. The most commonly used plosive consonants for teaching single articulation are /t/ and /d/ and the lateral approximate /l/. Gardner notes, "In the production of these consonants, the reed/mouthpiece is in the path of the tongue, allowing the tongue to touch the reed instead of the alveolar ridge."[185] However, in articulatory phonetics, /t/, /d/, and /l/ are all described as having the ability to be produced in a dental, alveolar, and postalveolar place of articulation. Furthermore, the lateral approximate, /l/, produces a change in the tongue shape to create lateral openings compared to the full oral closure of /t/ and /d/.[186] Students may produce these consonants at different places of articulation, which, depending on the individual, potentially leads to improper tongue motions.

Klug argues, "The traditional syllables force the tongue to leave the roof of the mouth too quickly, move too far, and misorient it spatially."[187] Instead, Klug recommends the fricatives /θ/ and /ð/ (as in "thee"). /θ/ and /ð/ are only able to be produced in a dental place of articulation, which could prove to be more pedagogically advantageous. As Rudy et al. suggest, "Fricative consonants…have been described as more precise with respect to their tongue position."[188] However, /θ/ and /ð/ are not immune to variations in production between individuals. As Johnson, Ladefoged and Lindau note, "Dental fricatives /θ/ and /ð/ are pronounced with the tongue tip protruding

[185] Gardner, "Ultrasonographic Investigation," 14.

[186] Hardcastle, Laver, and Gibbon, *The Handbook of Phonetic Sciences*, 681-68.

[187] Klug, *The Clarinet Doctor*, 72.

[188] Krista Rudy et al., "The Effect of Anatomic Factors on Tongue Position Variability During Consonants," *Journal of Speech, Language & Hearing Research* 56, no. 1 (February 2013): 146, https://doi.org/10.1044/1092-4388(2012/11-0218).

below the upper teeth by some Californian speakers of American English, while for others the tongue tip remains behind the upper teeth."[189] Therefore, experimenting with different consonants, such as /t/, /d/, or /l/, may serve as an alternative when a student is not responding well to the use of /θ/ and /ð/. This approach potentially lessens the amount of time spent playing the syllable "guessing game" that usually occurs when teaching single articulation.

Multiple Articulation Consonant-Vowel Combinations

The front tongue motion of multiple articulation can be approached in the same manner as single articulation. However, as previously noted, the back-tongue motion of multiple articulation is a source of debate. Pedagogues disagree on the use of the consonant /k/ or /g/ (as in "koo" or "goo," respectively) for the back syllable used to teach multiple articulation. As observed in the IPA chart (fig. 4), the consonants /k/ and /g/ are both plosive consonants produced in a velar place of articulation. As Rudy et al. observe, "Our data revealed no difference in tongue variability measures…between the pair of back consonants (velar /k/ and /g/)."[190] Therefore, the debate over which consonant to use is potentially unnecessary and either consonant can be used.

The only argument that can be made about the differences between /k/ and /g/ in articulatory phonetics is the unvoiced versus voiced nature of each consonant. /k/ is unvoiced, meaning it can be produced without the engagement of the vocal folds. On the

[189] Keith Johnson, Peter Ladefoged, and Mona Lindau, "Individual Differences in Vowel Production," *The Journal of the Acoustical Society of America* 94, no. 2 (August 1993): 701, https://doi-org.ezproxy1.lib.asu.edu/10.1121/1.406887.

[190] Rudy et al., "Effect of Anatomic Factors," 144.

other hand, /g/ is voiced, meaning that the vocal folds are engaged when producing this speech sound.[191] Thus, if a student has difficulty with avoiding vocal folds engagement when playing clarinet, /k/ is a more ideal choice. However, Gardner advocates for the use of /g/ in the following observation.

> "It is concluded that consonant context is likely not a significant factor. However, it may be pedagogically advantageous to use the voiced /dg/ consonant context to avoid alternating from voiced vowels to unvoiced consonants, as would be the case in the /tk/ context. Because the vocal folds neither engage nor alternate engagement and disengagement during normal clarinet performance as they do during normal speech, avoiding alternation may help eliminate potentially significant factors when using pedagogical speech models."[192]

There is pedagogical benefit to using /g/. As Gardner and Hansen also note, "We recommend Goo or Gee as a back syllable because their delicacy allows for easier, more flexible multiple articulation in the altissimo register."[193] The aurally perceived "delicacy" of /g/ compared to /k/ can be used to aid a student needing less tension or strain in the back consonant when performing multiple articulation.

Pedagogical Uses for Flutter and Slap Articulation

As with any muscle in the body, exercises can help build and maintain the ability to perform articulation techniques with ease. As Gardner and Hansen observe, "Since the tongue is a complex group of muscles that requires precise coordination when we play the clarinet, it would behoove us to exercise it in a corresponding manner. Daily articulation exercises will build and maintain tongue dexterity and speed."[194] Articulatory

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[191] Crystal, *Dictionary of Linguistics*, 515.

[192] Gardner, "Ultrasonographic Investigation," 115.

[193] Gardner and Hansen, *Extreme Clarinet*, 18.

[194] Gardner and Hansen, *Extreme Clarinet*, 16.

phonetics offers a means for creating exercises to develop and practice flutter articulation and slap articulation.

Flutter articulation can be performed with either an alveolar trill using the consonant /r/ (like a Spanish “r”) or uvular trill using the consonant /R/ (like a French or German dry “r”). The difficulty of flutter articulation usually stems from the need to continue a flutter while managing the different tongue shapes needed for the range being played. To alleviate this issue, students can vocally, without the clarinet, practice alveolar and uvular trills coupled with various vowels. This can help train the tongue muscles to accommodate the different shapes and motions needed when performing flutter articulation on the clarinet.

Slap articulation is achieved by shaping the tongue in a way that pulls the reed away from the mouth piece, much like how most of the click consonants listed in the IPA chart (fig.7) are produced. Slap articulation is perhaps the most foreign clarinet articulation technique for certain speakers because click consonants are not commonly found in most languages. Additionally, slap articulation places the tongue on the reed in a way that is traditionally avoided in clarinet performance. However, practicing click consonants can help strengthen the tongue muscles and familiarize the tongue motions needed to produce slap articulation.

CHAPTER 8

DISCUSSION

Pedagogical insights

The primary goal of the current research is to use an interdisciplinary approach to understand the language used in articulation pedagogy literature. The linguistic theories and concepts of Peircean semiotics, Feld's metalanguage and interpretive moves, Porcello's discursive strategies, and articulatory phonetics provided methods for analyzing the language used in the pedagogical resources of prominent clarinetists. The following discussion outlines the primary findings of such analysis. The secondary goal of this research was to create resources informed by linguistics to aid teachers and students learning and/or correcting articulation. The findings in the following discussion were used to construct these resources.

The main benefit from analyzing articulation pedagogy literature through the lens of Peircean semiotics is that it strives to account for the context of an individual's perception of the world. The debate over best practices when using syllables to describe tongue motion on clarinet is most likely a futile one. Some teachers experience different results when using the same syllables, and according to the ideas of Peircean semiotics, their personal experiences can be a possible explanation for their favored use of one over another. Additionally, using multiple syllables perhaps provides multiple signs for signaling the object of articulation, bettering the chances of accounting for students' variable perceptions. For example, the study conducted by Sullivan, which showed greater benefit to a multisyllabic approach when teaching articulation, supports this theory. Additionally, Budde's study, which also demonstrated that a combination of

teaching strategies was most beneficial for teaching articulation, further suggests using multiple approaches to teaching articulation is ideal.

Peircean semiotics also provides a method for categorizing signs and sign-object relationships. Knowing the kind of signs, such as qualisign, sinsign, and legisign, commonly used in clarinet pedagogy literature can help teachers vary the ways of representing the object of articulation. In a lesson setting, this may better the chances for success by attempting to account for each individual student's perception of the world. Additionally, knowing the sign-object relationship of certain teaching methods, such as icon, index, or symbol, informs teachers of the potentials for confusion or miscommunication. For example, aural cues signal improper articulation through an indexical sign-object relationship. These require an experienced teacher to recognize and relay this relationship to the student in order for them to establish the same indexical relationship between the sign (aural cue) and the object (incorrect tongue motion).

According to the ideas of Feld, articulation pedagogy is coded in a metalanguage. Teachers have needed to create several methods for teaching and fixing articulation that circumvent the need of visual observation because articulation occurs inside the oral cavity hidden from view. This has led to conventional uses of terminology that clarinetists use to teach articulation that are learned and understood through experience. The metalanguage that codes articulation pedagogy is comprehended through "interpretive moves."[195] In a lesson setting, the teacher and student are locked in a continuous "interpretive time" as the teacher attempts to convey the metalanguage of

[195] Feld, "Communication, Music, and Speech about Music," 24.

articulation pedagogy and the student tries to understand exactly what they are experiencing when attempting articulation.[196] Like Peircean semiotics, Feld's interpretive moves also provide a method for categorizing the teaching techniques used for articulation. This provides teachers a systematic way for approaching a concept to help students decode the metalanguage of articulation.

Clarinet pedagogy literature also uses Porcello's discursive strategies of singing/vocables, lexical onomatopoesis, pure metaphor, association, and evaluation as tools for discourse about articulation. Syllables used to approximate the tongue motions of single, multiple, flutter, and slap articulation are the most frequently used type of singing/vocables. Lexical onomatopoesis are commonly used when identifying the aural cues of improper articulation. Pure metaphors, such as "legato," "relaxed," and "delicate," are primarily used to describe the feeling of tongue motions or the timbre of the articulation performed. Associations, such as "a cellist rolling the bow from the lowest to the highest string in one gesture" and "a flag flapping in the wind," function indexically by employing ideas, concepts, and sounds in a common frame of reference to describe various aspects of articulation. Lastly, through the discursive strategy of evaluation, the teacher and student come to a mutual understanding of the target sound intended for the student to reproduce by assessing a previous performance or recording.

The consonant aspect of the syllables is of greater importance in an articulatory phonetics approach to teaching articulation because the vowel component of the syllables is solely concerned with voicing, which changes depending on the range being played.[197]

[196] Feld, "Communication, Music, and Speech about Music," 14.

[197] Gardner, "Ultrasonographic Investigation," 4.

Therefore, the greatest revelation that articulatory phonetics offers is the disparity of articulatory motions and places of articulation among the consonants used to teach articulations, which is outlined in further detail in the "Resource Tools for Articulation Pedagogy" section below. Additionally, as with any muscle in the body, exercises can help build and maintain the ability to perform articulation techniques with ease. Due to the lack of flutter and slap articulation pedagogy, articulatory phonetics provides a means for creating exercises to develop and practice tongue motions.

Resource Tools for Articulation Pedagogy

The following resources are intended to serve as a quick reference guide for teachers to use as a pedagogical tool informed by the linguistic theories and concepts previously observed. The first resource, "Categorization of Teaching Methods for Articulation," outlines seven common teaching techniques, as observed in the selected literature, and categorizes them by type of interpretive move utilized. Pedagogical considerations and Peircean semiotic labels are also described for each teaching technique. In addition, examples for each teaching technique are presented. This is not an exhaustive list of examples, but it provides a starting place for further exploration into approaches to teaching articulation.

The resources informed by Porcello's discursive strategies outline problems or visual/aural cues that may be present during single, multiple, flutter, and slap articulation as well as the probable causes that may be associated with such cues. Recommendations for correction are categorized by the discursive strategy used. Again, this is not an exhaustive list of recommendations, but it provides a starting place for further exploration into other solutions for articulation issues informed by linguistics.

Lastly, the resources informed by articulatory phonetics categorizes the common consonants used to teach single, multiple, and flutter articulation. The motion and the place(s) of articulation are noted as well as whether the consonant is voiced or unvoiced. Pedagogical considerations are also listed. Oral closure may affect the student's perception of their tongue shape. For example, /l/ is a lateral approximate, meaning air passes through the sides of the mouth, whereas other consonants, such as /t/ and /d/, exhibit full oral closure. Multiple places of articulation also pose the possibility for spatial misorientation of the tip of the tongue in the oral cavity. The vocal folds are not engaged during clarinet performance, much like unvoiced consonants. However, as it has been previously noted, avoiding switching between an unvoiced consonant and voiced vowel in a syllable setting may be pedagogically advantageous. Because of the novelty of slap articulation pedagogy, click consonants are outlined in a similar fashion as single, multiple, and flutter articulation, to serve as an additional tool for teaching slap articulation.

Table 3. Categorization of Teaching Methods for Articulation

Teaching Technique	**Interpretive Move**	**Sign Categorization**	**Pedagogical considerations**	**Example(s)**
Syllables	Locational	- Legisign - Icon sign-object relationship	- These are an approximation of tongue motions required for articulation	- Single: /t/, /d/, /θ/, /ð/, or /l/ - Multiple:/k/ or /g/ - Flutter: /r/ or /R/ - Slap: /ǀ/, /!/, or /ǂ/
Visual/ Aural cues	Categorical	- Qualisign - Index sign-object relationship	- Cues may be caused by multiple factors - Requires experience to recognize classifications	- See Resources Informed by Discursive Strategies
Visual Imagery	Association	- Legisign - Icon sign-object relationship	- Uses diagrams/images to signal intraoral mechanics	- Single: See Figures 5, 10, 11, and 12 - Multiple: See Figures 8 and 9
Musical Imagery	Association	- Qualisign - Index sign-object relationship	- More abstract in nature	- Single: See Figures 13 - “Legato tongue,” “pianissimo tongue,” or “forte air”
Verbal Imagery	Association	- Qualisign - Index sign-object relationship	- Relies more on relationship through co-occurrence	- Single/multiple: “A flag flapping in the wind” or “tension and release, like a body builder/ weightlifter” - Slap: “Tongue is like glue”

Teaching Technique	Interpretive Move	Sign Categorization	Pedagogical considerations	Example(s)
Anecdotes	Reflective	- Sinsign - Index sign-object relationship	- Mediates sign-object relationship through co-occurrence between teacher and student	- Telling of personal story/experience to explain a concept - Student recounting what they believe to be experiencing inside their oral cavity
Critique of Perform-ances	Evaluative	- Sinsign - Index sign-object relationship	- Mediates sign-object relationship through co-occurrence between teacher and student	- Use of reference recordings or recordings of student performances for evaluation - Demonstration/critiques in a lesson setting

Table 4. Strategies for Diagnosing and Fixing Single Articulation Issues		
Problem/ Visual or Aural Cues	**Probable Cause**	**Recommendations for Correction**
Motion in throat/ swallowing motion *(visual)*	- Too much tongue motion, especially in the back - Horizontal tongue motions (front to back)	- Reinforce only the tip of the tongue moves with syllable approximation *(Singing/Vocables)* - Emphasize "vertical" tongue motions *(Pure Metaphor)* - Keep tip of the tongue as close to the reed with a "legato stroke" *(Pure Metaphor, Association)* - Perform in front of a mirror to observe motion *(Association)*
Lip motion/chin movements *(visual)*	- Chewing of the mouthpiece - Extraneous jaw motion - Anchor tongue	- Reinforce only the tip of the tongue moves with syllable approximation *(Singing/Vocables)* - Maintain embouchure as if performing long-tones *(Association)* - Perform in front of a mirror to observe motion *(Association)*
"Scoop" or drop in pitch during articulation *(aural)*	- Too much tongue motion, especially in the back - Tongue contacting below the tip of the reed - See lip motion/chin movements	- Reinforce only the tip of the tongue moves with syllable approximation *(Singing/Vocables)* - Listen for "scoop" or observe with a tuner, *(Lexical onomatopoesis, Association)* - Observe tip of tongue to tip of reed outside the mouth *(Evaluation)*
Heavy "thud" *(aural)*	- Too much tongue contacting the reed - Horizontal tongue motions (front to back) - Tongue contacting the alveolar ridge and not the reed	- Reinforce only the tip of the tongue moves with syllable approximation *(Singing/Vocables)* - Emphasize "vertical" tongue motions *(Pure Metaphor)* - Keep tip of the tongue as close to the reed with a "legato stroke" *(Pure Metaphor, Association)*

Problem/ Visual or Aural Cues	**Probable Cause**	**Recommendations for Correction**
"Kwee" or small gliss, especially in the upper register *(aural)*	- Too much tongue motion, especially in the back - Horizontal tongue motions (front to back)	- Reinforce only the tip of the tongue moves with syllable approximation *(Singing/Vocables)* - Keep tip of the tongue as close to the reed with a "legato stroke" *(Pure Metaphor, Association)* Emphasize "vertical" tongue motions *(Pure Metaphor)*
"Click" *(aural)*	- Glottal motion	- Reinforce only the tip of the tongue moves with syllable approximation *(Singing/Vocables)* - Compare tongue motion with versus without the clarinet *(Association, Evaluation)*
"D-n-n-n," pitch sustains during articulation *(aural)*	- Tongue to reed motion is displaced laterally (either right or left)	- Compare tongue motions by displacing to the opposite until eventually bringing to center *(Association)* - Observe tip of tongue to tip of reed outside the mouth *(Evaluation)*
Excessive/ extraneous, "TTT" *(aural)*	- Too much tongue contacting the reed - Tongue to reed contact is not at the tip	- Reinforce only the tip of the tongue moves with syllable approximation *(Singing/Vocables)* - Emphasize "relaxed" tongue *(Pure Metaphor)* - Emphasize "vertical" tongue motions *(Pure Metaphor)* - Keep tip of the tongue as close to the reed with a "legato stroke" *(Pure Metaphor/Association)* - Observe tip of tongue to tip of reed outside the mouth *(Evaluation)*
"Too slow" *(aural)*	- Tongue is moving too far away from the reed - Underdeveloped muscle - Insufficient air	- Reinforce concept of "tension and release" like that of body builders *(Pure Metaphor, Association)* - Keep tip of the tongue as close to the reed with a "legato stroke" *(Pure Metaphor, Association)* - Emphasize "relaxed" tongue *(Pure Metaphor)* - Relate air and tongue relationship to that of "a flag flapping in the wind" *(Association)*

Table 5. Strategies for Diagnosing and Fixing Back Articulation Issues		
Problem/ Visual or Aural Cues	**Probable Cause**	**Recommendations for Correction**
Motion in throat/ swallowing motion *(visual)*	- Too much tongue motion, especially in the back	- Reinforce the velar place of articulation with syllable approximation *(Singing/Vocables)* - Perform in front of a mirror to observe motion *(Association, Reflective)* - Minimize tongue motion with a "legato stroke" *(Pure Metaphor, Association)*
"Kwee" or small gliss, especially in the upper register *(aural)*	- Too much tongue motion, especially in the back - Back of the tongue is moving too far forward away from the velar place of articulation	- Minimize tongue motion with a "legato stroke" *(Pure Metaphor, Association)* - Keep tongue "back" to minimize motion away from velum *(Pure Metaphor)*
"Click" *(aural)*	- Glottal motion - Back articulation is too harsh	- Experiment with /g/ for "delicacy" *(Singing/Vocables, Pure Metaphor, Association)* - Perform vocally without clarinet *(Singing/Vocables, Association)*
Uneven quality between front and back articulation *(aural)*	- Too much tongue motion, especially in the back - Insufficient air	- Experiment with /g/ of /k/ to match front articulation quality *(Singing/Vocables, Association)* - Perform vocally without clarinet *(Singing/Vocables, Association)* - Minimize tongue motion with a "legato stroke" *(Pure Metaphor, Association)* - Practice playing forte to encourage better air support *(Pure Metaphor, Association)*
"Too slow" *(aural)*	- Too much tongue motion, especially in the back - Underdeveloped muscle - Insufficient air	- Reinforce concept of "tension and release" like that of body builders *(Pure Metaphor, Association)* - Minimize tongue motion with a "legato stroke" *(Pure Metaphor, Association)* - Practice playing forte to encourage better air support *(Pure Metaphor, Association)* - Emphasize "relaxed" tongue *(Pure Metaphor)* - Relate air and tongue relationship to that of "a flag flapping in the wind" *(Association)*

Table 6. Strategies for Diagnosing and Fixing Flutter Articulation Issues		
Problem	**Probable Cause**	**Recommendations for Correction**
Squeaking or no sound using /r/	- Tongue touching the reed - Improper voicing	- Aim for a postalveolar place of articulation *(Singing/Vocables)* - Start with breath attack, such as "harrr" *(Singing/Vocables)* - Attempt to use /R/ instead *(Singing/Vocables)* - Perform vocally without clarinet using various vowels *(Singing/Vocables, Association)*
Difficulty in upper register /r/ or /R/	- Improper voicing - Insufficient air	- Start with breath attack, such as "harrr" *(Singing/Vocables)* - Perform vocally without clarinet using various vowels *(Singing/Vocables, Association)* - Practice playing forte to encourage better air support *(Pure Metaphor, Association)* - Play note before introducing flutter to achieve correct tongue placement (*Association*)

Table 7. Strategies for Diagnosing and Fixing Slap Articulation Issues		
Problem	**Probable Cause**	**Recommendations for Correction**
Difficulty creating suction with tongue	- Incorrect tongue motion/shape - Underdeveloped muscle	- Approximate tongue motions using click consonant *(Singing/Vocables)* - Practice creating suction with the tongue on a large reed, piece of glass, or small spoon (*Association)*
"Slap" not produced by the reed	- Vacuum created by lungs/air not tongue	- Practice creating suction with the tongue on a large reed, piece of glass, or small spoon (*Association)* - Create suction with tongue without forming embouchure (*Association, Evaluation)*
Quiet slap	- Incorrect tongue motion/shape - Underdeveloped muscle - Suboptimal tongue placement	- Approximate tongue motions using click consonant *(Singing/Vocables)* - Practice creating suction with the tongue on a large reed, piece of glass, or small spoon (*Association)* - Keep a "forward" tongue as if anchor tonguing" *(Pure Metaphor, Association)*
Difficulty maintaining embouchure	- Incorrect tongue motion/shape - Suboptimal tongue placement	- Experiment with different tongue placements on the reed with normal playing embouchure (*Association)* - Keep a "forward" tongue as if anchor tonguing" *(Pure Metaphor, Association)*

Table 8. IPA Categorization of Consonants for Single Articulation					
	Word example	**Motion of Articulators**	**Place(s) of Articulation**	**Voiced?**	**Pedagogical Considerations**
/t/	Tea	Plosive	Dental/ Alveolar/ Postalveolar	No	- Exhibits full oral closure, completely blocking the airstream - Multiple possible places of articulation - Vocal folds are not engaged
/d/	Dough	Plosive	Dental/ Alveolar/ Postalveolar	Yes	- Exhibits full oral closure, completely blocking the airstream - Multiple possible places of articulation - Vocal folds are engaged
/θ/	Throw	Fricative	Dental	No	- Interrupts airstream without complete oral closure - Less variation in place of articulation - Vocal folds are not engaged
/ð/	Thus	Fricative	Dental	Yes	- Interrupts airstream without complete oral closure - Less variation in place of articulation - Vocal folds are engaged
/l/	Lap	Lateral Approximate	Dental/ Alveolar/ Postalveolar	Yes	- Greatest amount of oral opening at the sides of the mouth - Multiple possible places of articulation - Vocal folds are engaged

Table 9. IPA Categorization of Consonants for Multiple Articulation					
	Word example	**Motion of Articulators**	**Place(s) of Articulation**	**Voiced?**	**Pedagogical Considerations**
/k/	Key	Plosive	Velar	No	- Exhibits full oral closure, completely blocking the airstream - One place of articulation - Vocal folds are not engaged
/g/	Good	Plosive	Velar	Yes	- Exhibits full oral closure, completely blocking the airstream - One place of articulation - Vocal folds are engaged

Table 10. IPA Categorization of Consonants for Flutter Articulation					
	Word example	**Motion of Articulators**	**Place(s) of Articulation**	**Voiced?**	**Pedagogical Considerations**
/r/	Rosa *Spanish for rose*	Trill	Dental/ Alveolar/ Postalveolar	Yes	- Interrupts airstream without complete oral closure - Multiple possible places of articulation - Vocal folds are engaged
/R/	Raben *German for raven*	Trill	Uvular	Yes	- Interrupts airstream without complete oral closure - One place of articulation - Vocal folds are engaged

Table 11. IPA Categorization of Consonants for Slap Articulation					
	Word example	**Motion of Articulators**	**Place(s) of Articulation**	**Voiced?**	**Pedagogical Considerations**
/ǀ/	Cela *Xhosa for ask for*	Click	Dental	n/a	- Motion is not initiated by lungs - Produced in the front part of the oral cavity - Less tongue, closer to tip
/ǃ/, /ǂ/	Xela *Xhosa for tell*	Click	Postalveolar/ Palato-alveolar	n/a	- Motion is not initiated by lungs - Subtle difference, /ǃ/ versus /ǂ/ - Produced further back in the oral cavity, respectively - More tongue, closer to middle

CHAPTER 9

CONCLUSION

The main goal of this research was to further the understanding of the language used to teach articulation in order to create pedagogical resources informed by linguistics. Linguistic theories and concepts provided a new lens for analyzing the language used in clarinet pedagogy literature. This interdisciplinary analysis of articulation pedagogy literature allowed for a systematic categorization of strategies used when teaching single, multiple, flutter, and slap articulation. Peircean semiotics, Feld's concepts of metalanguages and interpretive moves, Porcello's five discursive strategies, and articulatory phonetics were all used to analyze the relationship between language and articulation pedagogy in the literature of reputable clarinet pedagogues, such as John Anderson, Joshua Gardner, Michèle Gingras, Eric C. Hansen, Howard Klug, Phillip Rehfeldt, Thomas Ridenour, Heather Roche, Robert Spring, and Rachel Yoder.

Beginning with Peircean semiotics, the sign-object-interpretant trichotomy accounts for the individual's experience of the world. Pedagogically, this illuminated the potential reason or need for the various pedagogical methods used for articulation. One sign has the potential to correctly signal the tongue motions needed for articulation for one person, but the same sign can also signal incorrect tongue motions for another person, depending on their personal perception or experiences. The trichotomy of signs as qualisign, sinsign, or legisign were used to classify the signs used in articulation pedagogy. Lastly, the trichotomy of the relationship between sign and object as icon, index, or symbol provided an understanding of how clarinetists relate signs to objects.

Feld's idea of metalanguage, which is constructed from the conventional use of terminology regarding certain content that allows for meaningful discourse, was outlined for the observed articulation pedagogy literature. This revealed the various interpretive moves, such as locational, categorical, associational, reflective, and evaluative, that teachers and students use to decode the metalanguage of single, multiple, flutter, and slap articulation. In a lesson setting, the teacher and student are locked in a continuous "interpretive time" as the teacher mediates the metalanguage of articulation to the student.

Porcello's five discursive strategies singing/vocables, lexical onomatopoesis, pure metaphor, association, and evaluation were also used to categorize the teaching methods of articulation. The discursive strategy of singing/vocables was observed to be most evident in the use of syllables to approximate articulation. Lexical onomatopoesis and pure metaphor were primarily used to describe the quality of sound of the articulation in order to determine the accuracy of performance. Association was mainly used to illustrate the feeling or action of the tongue through an indexical relationship. Evaluation was not observed in the selected literature, but it is a prevalent strategy used in a lesson setting.

Articulatory phonetics, which is the study of the movements of the vocal organs during speech, offers insight into the consonants used to approximate the tongue motions of single and multiple articulation. According to articulatory phonetics, the consonants /t/, /d/, and /l/, used to approximate the tongue motions of single articulation and the front articulation of multiple articulation were observed to have the possibility of being produced in a dental, alveolar, and postalveolar place of articulation. Contrastingly, the fricatives /θ/ and /ð/ are only able to be produced in a dental place of articulation, which

could prove to be more pedagogically advantageous. Although the consonants /k/ and /g/, which are commonly used to approximate the back articulation of multiple articulation, were observed to have no difference in place of articulation, the unvoiced versus voiced aspect may have an effect on their pedagogical benefits. Lastly, articulatory phonetics also provided the possibility of creating exercises to aid the learning of flutter and slap articulation through the use of tongue trills and clicks.[198]

The present research also aims to incite further interdisciplinary research between linguistics and clarinet pedagogy. Because of the exploratory nature of this research, the clarinet pedagogy literature selection is fairly limited. Although the literature included in this research is from reputable clarinet pedagogues, the selected literature primarily consists of mostly clarinetists from the United States. Further research should include pedagogy from other countries and explore how different native languages affect articulation. Furthermore, the articulation pedagogy observed in this research excluded other articulations, such as tongue rams and smorzato. There is also much to be discovered in a linguistic analysis of the pedagogy for clarinet techniques other than articulation, such as voicing, glissando/pitch bends, and multiple sounds. Lastly, a linguistic analysis of clarinet pedagogy that utilizes methods for viewing the oral cavity, such as ultrasound, for comparison between pedagogical methods and actual physiological response may also prove to be beneficial.

In conclusion, Peircean semiotics offers the possibility to explore the effects that different signs in clarinet pedagogy produce in students and the potential reasons for these discrepancies. By analyzing the language used in the literature that deals with

[198] Keating, *Phonetics: Articulatory*, 11381.

articulation on clarinet, Feld's idea of metalanguage is apparent in clarinet pedagogy. An examination of how the language used in teaching articulation on clarinet maps onto the "five discursive strategies used for talk about timbre" presented by Porcello reveals a need for clarification or more codified use of terms.[199] Articulatory phonetics, which is the study of the movements of the vocal organs during speech, offers insight into the consonants used to approximate the tongue motions articulation. This is by no means a comprehensive look into the role of language in clarinet pedagogy. Further research is needed, but this serves as a starting point for continued exploration of the interdisciplinary application of linguistics and clarinet pedagogy.

[199] Porcello, "Vocal Anthropology," 324.

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