Oboe Reed-Making: An Analysis and Discussion of Current Practice, Limitations, and Technology Associated with Mass Production

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A thesis presented to the Honors College of Middle Tennessee State University in partial fulfillment of the requirements for graduation from the University Honors College

Spring 2024

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Acknowledgments

I’m deeply indebted to Dr. David Cyzak, an invaluable mentor to me since high school. Thanks for believing in me unfalteringly and helping nurture a lifelong love for the oboe, music, and the arts. This project would not be possible without Dr. Keith Sorrels. Thank you endlessly for sharing your vast oboe-wizardry knowledge, and for your enthusiasm, encouragement, and kindness every step of the way.

Abstract

Unlike other instrumentalists, oboists are required to dedicate a portion of their practice time to reed-making rather than music-making. Many developments in reed-making equipment and research have been advanced in the 21st century, but reed-making is still an expensive and time-consuming endeavor. This thesis provides a synopsis of current oboe reed-making technology, innovation, and research. To consolidate both the artistic and practical nature of oboe reed-making, three interviews with leading oboe reed-makers were conducted. This project serves as only a preliminary investigation into a complex, multi-disciplinary topic; further research should investigate the unique qualities of the oboe reed and its potential for optimization.

Preface

This project does not aim to endorse any brands or products.

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List of Terms

Blank. A tied-on only, unscraped oboe reed.

Bore. The cylindrical, hollow interior passageway of a wind instrument.

Cane. The yellowish-brown bark resulting from processed *Arundo donax* grass.

Crow. An oboe reed evaluation method performed by blowing into the reed at the thread rather than at usual playing position.

Double Reed. A reed for woodwind instruments comprised of two blades of processed *A. donax* cane vibrating against each other.

Ears. The protruding material on either side of the tip of an oboe reed blank leftover from shaping the reed.

Embouchure. The position and use of the facial muscles, lips, tongue, and teeth to play a wind instrument.

Gouger. A machine with a curved blade designed to proportionally thin out double reed cane.

Guillotine. A specialized reed tool used for cutting split cane to the proper length.

Mandrel. A small, round metal tube with a handle used to seat an oboe reed while tying its thread.

Reed. A thin, vibrating piece of cane usually fastened to the mouthpiece of a wind instrument.

Single Reed. A reed that is comprised of a single, vibrating blade.

Tip. The topmost and thinnest section of an oboe reed.

CHAPTER I

Oboe Reed-Making: The Problems of the Long-Standing Tradition

> Please… I beg you… if there are any rich, entrepreneurial oboists or woodwind fanciers reading this… please find a way to invest in the immediate development of a sweet, instantly responsive, tonally, pure, utterly consistent, dynamically wide-ranging synthetic oboe reed with a guaranteed life expectancy of about 45 years. I should be dead by then.
>
> —Gregory Ward, *The Double Reed*, Fall 1995

Reed-making is an essential skill to the double reed player. While single reed players such as clarinetists and saxophonists may rely on mass produced boxes of reeds, most professional double reed players recognize that no such reliable mass-manufactured reed exists on the market. Although factory-made double reeds are available, they are typically marketed to beginning oboists. Mass-produced reeds have a reputation for exhibiting a short playing life and unrefined sound. As such, oboists and bassoonists dedicate a portion of their practice session to reed-making rather than music-making.

Before shipment to consumers, the cane used for instrument reeds is grown, harvested, and dried from the grass *Arundo donax,* which is native to Mediterranean climates. The cane is inspected for quality before it is split lengthwise into three equal sections. Each section is then trimmed to length, gouged to proper thickness, shaped, and tied onto a staple, a metal tube lined with cork, before it is finally hand-scraped into an oboe reed. This process often demands multiple hours over multiple days from beginning to end. Professional oboists spend thousands of dollars on reed-making equipment over their career.

The process of hand-making oboe reeds is both cost and time prohibitive to the student oboist's end goal of performing music. No other musicians in an orchestra, band, or ensemble endure the necessity of routinely crafting part of their instrument. To lessen the burden of reed-making, the 21st century has seen many advancements in the field. These have included innovations in new machinery and tools, pedagogy, and advancements in material technology to simulate a traditional cane reed.

This thesis aims to review the development of oboe reed-making inventions, especially those conceived since the beginning of the 21st century. Chapter 1 details the traditional, American oboe reed-making method and materials. Chapter 2 outlines significant technological developments in equipment such as gouging machines and profiling machines. In addition, the second chapter explores alternative reed materials. Chapter 3 discusses responses from three interviews with different oboe reed manufacturers. The final chapter summarizes and dissects the significance of these developments in oboe reed-making and provides suggestions for further research potential in the field.

CHAPTER II

The Traditional Oboe Reed-making Method

Oboists have been carefully crafting their own reeds since the development of the instrument. Although materials and equipment have advanced over the centuries, the basic process remains unchanged. It takes years of honing craftsmanship skills to transform raw organic material into a functioning, vibrant mouthpiece. Before shipment to suppliers, the cane used for instrument reeds is dried and cut from the perennial grass *Arundo donax.* Its utilization in the creation of music can be traced back 5,000 years. It is also commonly known as giant reed, elephant grass, wild cane, *cana brava*, and *carrizo*.[1] The plant thrives in sandy, alkaline soil near water in clumps up to ten meters tall. It is native to Mediterranean climates, but also grows across Asia, Africa, and North America. This giant cane has remarkable durability—historically, it has been used for manufacturing various products such as fishing rods, walking sticks, garden fences, baskets, lattices for drying fruits, and more.[2]

A. donax was brought to California in the 1890s by French immigrants for use as wind breaks, and probably again during WW2 by an employee of the *Rico* reed

[1] Pedro Falcón, "Harvesting Wild *Arundo Donax* in South Carolina," *The Double Reed* 46, no. 2 (2023): 61.

[2] Voichita Bucur, "Manufacturing of the Reeds for Reed Driven Instruments," in *Handbook of Materials for Wind Musical Instruments* (Springer, Cham, 2019), https://doi.org/10.1007/978-3-030-19175-7_14.

company.[3] *A. donax* is the principal source of reed material not only for oboes and bassoons, but also for other members of the woodwind instrument family such as clarinets, saxophones, and bagpipes. Larger reeds—such as those used by the bass clarinet—come from lower on the stalk of cane, where the diameter is wider. In contrast, oboe reeds use cane sourced from a higher part of the stalk. Growing conditions are numerous, but it's usually a multiple year long process from growing, drying, measuring, cutting, and testing—much akin to the labor of processing fine wine. Consistent cane quality has been a major complaint from most double reed players; an oboist may expect only 50% yield from purchased tube cane.[4] What's more, global warming may prove a serious threat to cane production. Along with optimum conditions of soil and sun, great cane requires a severe winter that lends resilience to the plant.[5]

An oboist purchases cane from retailers as a tubular internode of *A. donax*, usually between 15 and 30 centimeters in length and 10 to 12 millimeters in diameter.[6] Because cane quality varies across batches and individual pieces, the oboist must select the cane that will produce the best results according to characteristics such as color, texture, and size. Ideal cane has an even, smooth quality without mutations—although

[3] Graham Salter, Elaine Douvas, and Linda Strommen, *Understanding the Oboe Reed* (Biddles Books, 2018), 5A-158.

[4] Salter, Douvas, and Strommen, *Understanding the Oboe Reed*, 5C-165.

[5] Ibid., 5E-179.

[6] Julia Gjebic, "A Study of Oboe Reeds" (Student Summer Scholars Manuscripts, Grand Valley State University, 2013), 7.

some musicians regard slight mottling of the bark as desirable.[7] Some reed-makers prefer golden cane, while others like a paler color. Cane that is soft with loose fibers or overly porous is unsatisfactory.[8] Preferences in texture and hardness also vary across individuals.

Once the cane has been sorted, the tubes are then typically split lengthwise into three equal sections. There are two methods of splitting tube cane: using a specialized cane splitter or "plunger" tool, or using a single-edge, utility razor blade to divide each section. Once the cane has been split, it must be trimmed to the proper length using a specialized guillotine tool, which may range in price anywhere between $95.00 and $400.00.[9] Cane is then pre-gouged; a thin layer of material is removed from the belly of the cane. Pre-gouging tools are relatively simple, comprising of a small metal bed with a raised blade and a plunger-like tool to push cane through the blade. The average cost of a pre-gouger is $140.00.

Gouging is a crucial step of the reed-making process. During this stage, a gouging machine, or gouger, removes material from the inside of a piece of cane to a desired thickness. The gouge can affect properties of the reed that can't be altered later, such as

[7] Robert E. Perdue, "*Arundo donax*—Source of Musical Reeds and Industrial Cellulose," *Economic Botany* 12 (1958): 382.

[8] Ibid., 390.

[9] Price ranges stated here—and in subsequent sections—were gathered from reputable double reed product retailers such as Reeds 'n Stuff, Midwest Musical Imports, RDG Woodwinds, and Hodge Products.

structural strength. Vibrancy, pitch, and tone are also affected by the gouge.[10] A dial indicator is used to measure a desired thickness around 0.60mm in the center of the cane, and 0.45mm on the sides. While there are many gougers on the market, nearly all are designed with a curved blade resting in a moveable carriage and matching bed. Most gougers adhere to either a single radius or double radius model. According to a 2010 survey by Elizabeth Ann Young Rennick, most reed-makers have a clear preference for one of four different gouger brands: Ross, Gilbert, Innoledy, and Graf.[11] Some machines require the cane to be soaked in water for a certain length of time prior to gouging; others permit dry-gouging cane. Most oboists do not have the luxury of experimenting with different gougers due to their high pricing—even used, the machines sell for anywhere between $1,000 and $2,000. Crucially, reed rooms in college music programs help mitigate this expense problem by making a gouger available for communal use by student oboists. Repairing the machines can be tedious and expensive and is usually entrusted to machine experts.

After gouging, the cane is ready to be shaped. The cane must have been soaked for twenty to thirty minutes prior to this step, otherwise there is risk of cracking. First, the oboist lightly scores a thin, horizontal line across the middle of a gouged piece of cane. Using the gentle pressure of the edge of a razor blade or knife, the cane is folded in half into a "V" shape, making sure that it's a clean fold without splitting the fibers. Next, the

[10] Mark Stephen Ostoich, "The Influence of Gouge and Shape on Pitch and Tone Quality of the Oboe" (D.M.A. diss., Louisiana State University, 1980), 167.

[11] Elizabeth Ann Young Rennick, "Oboe Reed-Making Pedagogy in the United States: A Survey" (D.M.A. diss., University of Iowa, 2010), 21.

folded cane is seated evenly onto a shaper, a metal template of an oboe reed. Using one hand to grip the handle of the shaper, a razor blade is used to remove excess cane on the sides of the shaper. There are many shapes available to oboists, ranging in width and size. The average price for a shaper tip ranges from $100 to $300.

Some necessary items for tying oboe reeds may include: a staple, mandrel, beeswax, nylon thread, a millimeter ruler, clamp, and razor blade.[12] Of these items, staple selection is the most crucial. The staple, or tube, is a small metal tube which functions as an extension of the oboe's bore. The length and opening of the staple affect the outcome of the final reed: the more open the staple, the less open the reed, and vice versa.[13] The length of the staple affects the reed's intonation. Traditionally, oboists made their own staples from scratch sheets of metal—usually tin.[14] Tin staples are not commercially available. Nowadays, various types of staples and cork are manufactured commercially from a range of metals including nickel, silver, brass, gold, or a combination. Whatever the preferred material, the staple must be a perfect fit to the mandrel; a millimeter of difference can significantly impact the final reed.

The process of tying cane can be cumbersome, requiring considerable dexterity. First, the thread is tied onto a clamp (or any other stable surface) and secured with a few simple knots. Then, beeswax is applied to ensure that the thread tightly seals the cane and

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[12] Substitutions may be made for one or more items; for example, twine, wire, monofilament, or any of a variety of other materials suitable for binding may be used instead of nylon thread.

[13] Rennick, "Oboe Reed-Making Pedagogy in the United States," 34.

[14] Ibid., 26.

to help prevent slippage. The folded and shaped piece of cane is seated onto the staple at the desired measurement. Making sure that each side seals evenly, the oboist begins to wrap the thread around the blank, all while maintaining straightness and using a ruler to double check the total length of the tied blank. Finally, the wrapped thread is secured with a few knots.

After tying is completed, the "ears" must be removed if not done immediately after shaping. Generally, something referred to as the "overlap" or "slip" is desirable in a reed. By offsetting the two blades slightly to create a small overlap, the opening of the final reed is brought under greater control. It helps the pitch and stability of the reed and provides a better seal to protect against leaking air.[15] Oboists may choose to set the overlap just prior to tying, during tying, or after the blank is sealed—opting instead to click the blades into the slipped position.

[15] Jay Light, "The Scrape," in *The Oboe Reed Book: A Straight-talking Guide to Making and Understanding Oboe Reeds* (Des Moines: Drake University, 1983), 75.

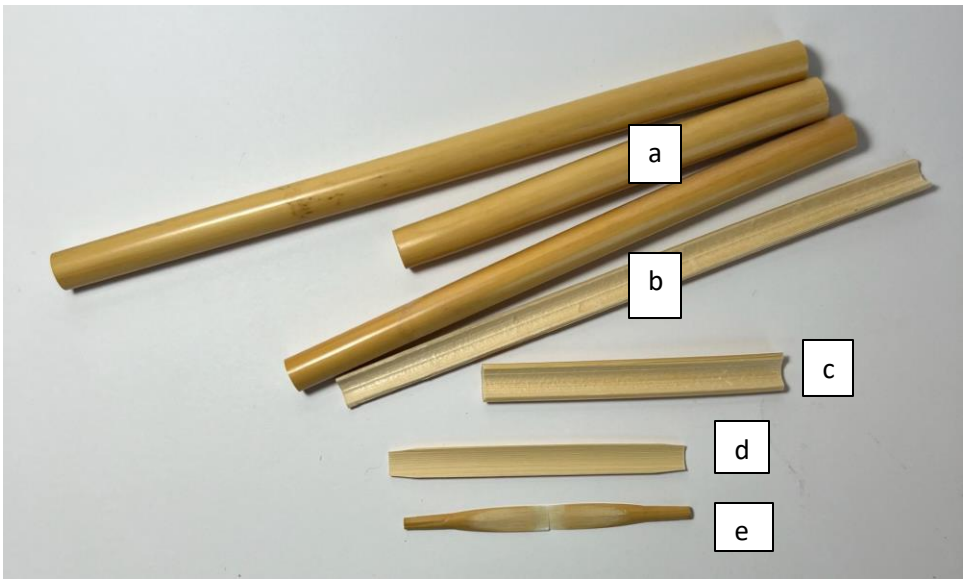

Figure 1. Stages of Cane Processing (a) Tube Cane; (b) Split Cane; (c) Guillotined Cane; (d) Gouged Cane; (e) Scraped Cane.

Scraping

From here, the oboist begins what is typically called the "blank scrape." This is a preliminary thinning and outlining of the reed. The purpose of the blank scrape is to remove enough cane so that the tip can be cut open—usually by removing the glossy, yellow outer bark of the reed.[16] During this stage, the oboist may also define the tip by scraping according to preference but does not define in detail the rest of the reed. Once the tip has been clipped open, many reed-makers consider it wise to allow the reed to dry

[16] David B. Weber, Ferald B. Capps, and Vendla K. Weber, *The Reed Maker's Manual: Step-by-step Instructions for Making Oboe and English Horn Reeds* (Phoenix: D.B. Weber and F.B. Capps, 1990), 61.

and rest for at least a couple of hours, or overnight. After all the manipulation from folding, bending, and scraping, it will invariably change the next day.

The scrape of the reed—the measurements and proportions of the finished, scraped reed—varies across oboists. The influential oboe reed survey and analysis performed by David Ledet suggests that the oboist in the Western world

> has at his disposal approximately five basic scrapes (styles) of reeds within a variable spectrum. At one extreme of the spectrum there is a dark, thick, tone quality; at the other extreme, a bright, nasal timbre. The five scrapes (styles) are merely discernible areas (clusters of examples with like characteristics) on a scale of an infinite number of differences.[17]

However, many professionals agree that long-established mainstreams in reed scrape styles have by now mostly merged since the Ledet book.[18] Oboist Eugene Izotov remarks, "Players of various professional levels have nowadays generally agreed on certain concepts—particularly what they expect of the reed and its function."[19] Regardless, there are ranges of measurements and proportions that are generally agreed upon to produce a vibrating, functional oboe reed. The American, or "long scrape" reed generally has three sections: a "tip," "heart," and "back," as opposed to the European "short scrape," which leaves more bark on the cane. Rather than being a single process, "finishing" the reed is usually done in multiple sessions, adjusting to how the reed plays, feels, and functions. The "crow" of the reed is an important analytical tool—it should

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[17] David Ledet, *Oboe Reed Styles: Theory and Practice* (Bloomington: Indiana University Press, 1981), 203.

[18] Salter, Douvas, and Strommen, *Understanding the Oboe Reed*, 4A-140.

[19] Ibid., 14-410.

sound tight and focused, usually pitched at "C" in three octaves. A finished reed may be evaluated according to criteria such as response, pitch, stability, dynamic range, and tone quality.[20]

Figure 2. Finished American-scrape oboe reed.

Knives

Knives are of utmost importance in making oboe reeds. If the knife is not sharp enough, the resulting reed is doomed. Scraping the reed requires a specialized reed knife, which is usually double-hollow ground or beveled. Most any oboe reed knife will suffice as long as well sharpened—which may be done using a combination of stones, rods, sticks, or a specialized sharpening 'jig.' Some oboists are fanatic about the knife, as Jay Light writes in *The Oboe Reed Book*:

[20] Jay Light, "Common Criteria for Evaluating all Double Reeds," *To the World's Oboists* 2 (1974): 4.

> The knife is the heart of the reedmaker's art. It is literally an extension of the maker's hand and figuratively an extension of his soul. It is the most personal and therefore the most critical tool he owns. It is with the knife that he remakes his instrument every day. The manner in which it scrapes the cane determines his destiny.[21]

There are innumerable variables in knife sharpening and dozens of methods—more than the scope of this project allows.

Figure 3. Oboe Reed-making Tools.

[21] Light, *The Oboe Reed Book*, 14.

Limitations of the Traditional Reed-making Method

Reed-making is embedded in a long-standing oral tradition; as such, various methods and ideologies exist across schools and teachers across the country.[22] Ask one hundred double reed players to describe the "perfect" reed and there will be a hundred different responses. For example, when discussing tone quality, terms used are often vague and localized: "Words like dark, light, full, thin, bright, dull, stuffy, focused, wild, centered, hard, spread, and all the others seem to have a specialized meaning significant to those who share a particular style, but mean something quite different to all others."[23] The subjective nature of reed-making extends further. Factors such as the pitch of the oboe, the oboe's bore dimension, the individual player's embouchure, oral cavity size, and more may influence a reed's functionality and sound.[24] Many oboists have remarked that they could not play on their colleague's reed.

What's more, many professional oboists use different reeds according to the specific demands of repertoire. For example, if a piece requires the oboist to play lots of high notes in the topmost register, they will need a reed more carefully attuned to playing comfortably in the extreme octave. A reed for a solo performance or concerto might be more robust than a reed used for playing a pianissimo second oboe part. To complicate matters, the professional oboist must also account for extraneous factors such as altitude, humidity, and barometric pressure—especially if traveling to a region with a different

[22] Bucur, "Manufacturing of the Reeds for Reed Driven Instruments," 561.

[23] Light, "Common Criteria for Evaluating all Double Reeds," 4-5.

[24] Salter, Douvas, and Strommen, *Understanding the Oboe Reed*, 3-110.

climate. Each factor will affect the performance of the reed and may require further adjustments. Alternatively, some oboists simply make fresh reeds in the new environment or carry a different set to allow for the inevitable gross changes.

There is often a nebulous spoken or unspoken "mystery" encircling oboe reed-making discussion. Marcel Tabuteau, the founder of the American school of oboe playing, was constantly miserable over the quality of his reeds. The great oboist Heinz Holliger joked, "I make my reeds on a full moon, after a black cat has walked three times around a well…. No, I try to spend only three minutes or so on a reed. I am a musician: forget the reed and forget the oboe. We spend too much time over a primitive technique, over scraping the reed."[25] Martin Schuring empathizes with a similar statement: "[Reed-making] is not a black art; it is not swayed by astrological forecasts; it does not require even the smaller, less severe ritual sacrifices to the reed gods."[26] In fact, there is little mystery about cane or oboe reeds. The source material is a natural substance and is bound to have variation across each product of the plant. Since cane needs to be wet for playing, its elastic properties are constantly changing between wetting, drying; wetting, drying. The past few decades have shown significant advancements in reducing the mystery of oboe reed-making through new equipment, manufacturing methods, and materials research.

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[25] Salter, Douvas, and Strommen, *Understanding the Oboe Reed*, 3-110.

[26] Martin Schuring, *Oboe Art and Method* (New York: Oxford University Press, 2009), 101.

CHAPTER III

Technological Developments

For decades, single reeds such as those used for the clarinet and saxophone have been successfully manufactured and sold in stores by companies such as Vandoren, Rico, and D'Addario. These reeds are typically sold in different strengths and cut to different sizes according to each instrument. While many professionals own personal equipment to adjust and refine these manufactured reeds, they are typically suitable for playing as purchased. However, quality still varies across each reed, even within the same batch or box. The performer must adapt to differences each time a reed is changed. Aside from the material's inconsistency, traditional reeds are not ideal in other ways. To work, they need to be wet— altering the reed's elasticity properties between its dry and wet states. Prolonged exposure to wetness makes the material disintegrate, and the bacteria present in saliva alters some properties in the reed over time, decreasing its lifespan.[27]

Given the material's variability, many attempts have been made to find a suitable alternative for the traditional reed-making cane. Since the early to mid-20th century, woodwind instrumentalists have attempted to form reeds from a wide variety of materials including metal, boxwood, ebony, heather root, lancewood, teakwood, celluloid, hard rubber, ivory, silver, artificially treated and molded reeds, polycarbonate, polyacrylate,

[27] Enis Ukshini and Joris Jan Jozef Dirckx, "Longitudinal and Transversal Elasticity of Natural and Artificial Materials for Musical Instrument Reeds," *Materials* 13, no. 20 (2020): 4566.

and fiberglass reeds.[28] However, many of these materials have proved to be insufficient in imitating the desirable properties of cane, lacking the tonal qualities, dynamic range, and ease of playing which traditional cane reeds provide. Notably, during World War II, the U.S. Department of Agriculture experimented with several substances to develop a tasteless water-proofing material for cane reeds. Reports found that ethyl cellulose-treated reeds could be used for this purpose, but, again, this method failed to receive acceptance by the most critical musicians.[29]

Experiments from about 1975 in the construction of anisotropic synthetic materials and polymers to simulate the structure of *Arundo donax* have appeared to be the most successful—in particular, by leading manufacturers Fiberreed and Légère. Fiberreed consists of a Hollow Fiber Foamresin Compound (HFC), and Légère reeds are composed of a thermoplastic material—uniaxially or biaxially oriented polypropylene.[30] Unlike plastic materials such as polycarbonate or polyacrylate, which have isotropic material parameters, plastic reeds composed of polypropylene fibers are much better simulants of natural reeds because of their comparable elasticity parameters.[31] Synthetic reeds of this variety pose multiple potential advantages over cane, promising higher consistency, reliability, and longevity. Because the reeds do not absorb water, they do not require pre-

[28] Perdue, "*Arundo donax*—Source of Musical Reeds and Industrial Cellulose," 391.

[29] Ibid.

[30] Harry Hartmann's Fiberreed, https://www.fiberreedusa.com/; Guy Légère, Oriented Polymer Reeds for Musical Instruments, U.S. Patent US6087571, filed 12 February 1999, and issued 11 July 2000, https://patents.google.com/patent/US6087571A/en.

[31] Ukshini and Jan Jozef Dirckx, "Longitudinal and Transversal Elasticity of Natural and Artificial Materials for Musical Instrument Reeds," 2.

conditioning before playing. They are more resistant to changes in weather, humidity, and altitude. They can easily be sanitized and disinfected and are much more durable than traditional cane. In a 2020 study performed by Ukshini and Jan Jozef Dirckx, both the longitudinal and transversal elasticities of wet cane reed, dry cane reed, Légère reed, and carbon Fiberreed were evaluated and compared. Out of the four materials tested, the wet cane reed was the most flexible. In the longitudinal direction, the stiffness of the Carbon Fiberreed was six times higher than the stiffness of wet natural cane, while in the transversal direction, it was more than fifty times stiffer. In the longitudinal direction, the Légère reed proved most alike to the elastic properties of cane. In the transversal direction, however, it was nearly twenty times stiffer than the wet cane.[32]

Indeed, the use of polypropylene as a substitute for cane poses significant advantages and has seen much successful application by musicians—at least among single reeds.[33] However, the line of synthetics available for oboe reeds are more limited and appear to be in early stages of development. Fiberreed does not currently offer synthetic double reeds. In 2016, Légère released its first synthetic oboe reed: the "classic European scrape," which is now available in three different strengths. The company has not yet released an American scrape version of the oboe reed. In 2022, the manufacturer Silverstein Works released its first American Scrape Ambipoly Oboe Reed, which

[32] Ukshini and Jan Jozef Dirckx, "Longitudinal and Transversal Elasticity of Natural and Artificial Materials for Musical Instrument Reeds," 10.

[33] Bucur, "Manufacturing of the Reeds for Reed Driven Instruments," 563.

received mixed reviews in an illuminating article by oboist Khara Wolf.[34] One reviewer gave the Silverstein reed credit for leaving opportunity for adjustment, designing an interchangeable staple. The material also supposedly can be scraped like cane, allowing further customization—there is extra material intentionally left on the tip to account for desired adjustments. Others commented that the price does not reflect the product's quality, and that the reed is too taxing on the embouchure—potentially reinforcing poor playing habits.[35] Wolf lists a few scenarios in which a synthetic reed may be useful— but always as a backup, inferior option to seasoned professionals looking for every possibility in an oboe reed. The reviews are mixed, but one opinion evidently prevails over all: synthetic oboe reeds are not yet a viable replacement for traditional cane reeds.

Why, then, are oboe reeds not manufactured at the same scale and success as single reeds—in both traditional and synthetic materials? Although oboe reeds are sourced from the same plant material as any other reed, the distinction between single and double reeds is profound.[36] Wolf comments that "oboe reeds have been difficult to manufacture with synthetic materials because the reed needs to be incredibly thin in some areas, the ratios are far more complex, and oboists are keen on their custom set-ups."[37]

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[34] Khara Wolf, "Playing on Synthetic Oboe Reeds: Reviews by American Oboists," *The Double Reed* 46, no. 1 (2023): 107-14.

[35] Ibid., 110.

[36] Légère's website lists a "reed personality" chart for each product rating qualities on a scalar basis such as bright vs. dark, flexible vs. resistant, projection, and response. Unlike the single reed products, all double reed products have an additional, unique qualifier: "Tonal qualities vary by reed, setup, and player embouchure." https://www.legere.com/products/oboe-reeds/.

[37] Wolf, "Playing on Synthetic Oboe Reeds," 107.

While this sentiment is true, musical acoustics may be the source for more empirical insight. For any conical woodwind instrument (such as the oboe) to work properly, the equivalent volume of the reed cavity added to the mechanical volume of its staple must closely match the volume of the missing part of the cone—meaning that for any given oboe, there is a mathematically derived ideal playing frequency of an oboe reed suited to the specific instrument.[38] Subtle combinations of reed dimensions, cane stiffness, staple material, and gouge thickness can be expected to influence the ideal playing frequency F_{rs} in a manner that is not equally applicable to single reeds.

Another potential factor to consider in the single versus double reed manufacturing discrepancy could be the inherent difference in elasticity of source material. In a study of the biomechanics of *Arundo donax*, Spatz et al. reported that the average longitudinal Young's modulus of elasticity was 9 GPa in the middle of the plant's stem and reduced significantly in the upper part of the stem (values of 1-2 GPa).[39] Since oboe reeds are sourced from the topmost section of the stem, it is possible that the elastic properties of oboe reeds are indeed significantly different from those of clarinet or saxophone reeds—but further comparative studies should be pursued. Undoubtedly, because of the highly intricate nature of oboe reeds, their manufacture has largely remained in the hands of the individual reed-maker.

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[38] Arthur H. Benade, "The Woodwinds: II," in *Fundamentals of Musical Acoustics* (New York: Oxford University Press, 1976), 470.

[39] Ukshini and Jan Jozef Dirckx, "Longitudinal and Transversal Elasticity of Natural and Artificial Materials for Musical Instrument Reeds," 10.

In terms of equipment, gouging and profiling machines have developed the most in the past two decades. Originally, oboists gouged totally by hand. Now, there are many gouging machines available on the market. Older gouging machines require the reed-maker to center the cane on the gouger bed by eye, allowing the possibility of the cane shifting out of place. Traditional gouging machines are also often difficult to adjust. Several different screws and mechanisms are necessary to change one dimension; therefore, the task is often left to a machine expert. More recent gouging machines have clamps to keep the cane secured and are much more user-friendly. Various profiling machines have also been developed, which use a tiny blade supported within a carriage to define the scrape of a reed. Although the machines are expensive, they can save hours of work by repeating subtleties precisely and generally without error.[40] In addition to new gouging and profiling machines, the recent use of Computer Numerical Control (CNC) machining to make oboe reeds has contributed to the increased output by manufacturers. Under the control of software commands, the machine moves the tool bit as defined to fabricate an oboe reed. The computerized reed fabrication system may also include a reed splitter, a reed cutter, and/or a pre-gouger.[41]

Researchers at the Institute of Musical Acoustics in Vienna, Austria developed a prototype for a single-reed mouthpiece for the oboe, imitating a clarinet mouthpiece.[42]

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[40] Salter, Douvas, and Strommen, *Understanding the Oboe Reed*, 13-324.

[41] William L. Richey Sr., Method of Manufacturing Double Reeds, U.S. Patent US9586337, filed 19 May 2014, and issued 7 March 2017, https://patents.google.com/patent/US20150328797.

[42] Sandra Carral, Christophe Vergez, and Cornelis Nederveen, "Toward a Single Reed Mouthpiece for the Oboe," *Archives of Acoustics* 36, no. 2 (2011): 1-16.

The advantages of a single reed mouthpiece may include greater accessibility to other woodwind players desiring to learn the instrument, less pressure and support required to blow, and, most importantly, it could eliminate the need for making reeds. The prototype was tested by a professional oboist and compared to a traditional double reed of her choice. The single reed mouthpiece lacked the nuance of a traditional double reed, sounding too bright and pitched a whole fifty cents flatter. However, the researchers noted that modifications like reducing the volume inside the mouthpiece cavity and changing the shape of the mouthpiece could bring the prototype closer to producing a desirable oboe sound and tone quality.

CHAPTER IV

Interview Methodology and Process

To address the paper's objective of reviewing technological developments in oboe reed-making since the onset of the 21st century, methodologically the project has undertaken two components of research. First, existing literature on both traditional and 21st century oboe reed-making technology and equipment was summarized in the previous chapters. In addition, three different oboe reed-making companies were interviewed. Through this dualistic approach, in supplement with reviews of existing literature, patents, and pedagogical studies, this project strives to gain further practical insight through these interviews with a small selection of leading American oboe reed manufacturers.

The following five companies were contacted by one or more methods including official website contact form, email, phone, or social media messaging to schedule an interview via Zoom: Silverstein Works, Légère Reeds, Jones Double Reed Products, Marlin Lesher Reed Co., and The Reed Whisperer. These businesses have been selected by one or multiple of the following criteria: a) comprising a significant volume of market share of oboe reed sales in the U.S., b) producing some variation of an oboe reed made from synthetic or non-traditional material, or c) generating a substantially large volume of oboe reed output. Out of the five companies contacted, only three participants responded and were interviewed: Jones Double Reed Products, Marlin Lesher Reed Co., and The Reed Whisperer.

The goal of each interview was to learn as much as possible—as each company permitted—about their equipment, unique processes, and reed-making philosophies. Each meeting was audio and video recorded with the interviewee's consent for the sole purpose of transcription accuracy. No IRB approval was deemed necessary for the scope and nature of these interviews.

The Interviews

Mr. Jake Swartz of Jones Double Reed Products

Mr. Jake Swartz has been the general manager of Jones Double Reed Products for over ten years. Jones Double Reed Products is based in Spokane, Washington and has produced oboe and bassoon reeds for over fifty years.

> Q: What parts of your process would you say require human intervention vs. automation?
>
> A: "Every step requires both a human and a machine until the testing process—that one is all human. We use routing motors to shear off the sides in the shaper. We use a person who's putting pieces of cane inside a gouging machine and removing them and checking the thickness of the gouge on each piece. The profiling is done on a CNC machine, so the only real human intervention is putting the part on, taking it off, sanding the sides down so you don't have splinters hanging off, and then checking the measurement and viewing the profile to make sure it looks even."
>
> Q: Have you experimented with synthetic reeds at all?
>
> A: "I have some friends in the single reed markets and a couple of them have started doing some synthetic material. For us, it's got to be the right material. Polymers are so different from one to the next, and even within a batch they can be very different—it's almost like cane. For me, at least, I've been waiting to see if somebody can recreate the vascular structure of the reed because I think that's what gives it its vibrancy. One single reed manufacturer I know has started to try to do that. Nobody's re-created the sound of a cane reed exactly yet. If we could figure out a way to make it sound like a cane reed and last longer, be able to play at different temperatures—that'd be wonderful."

In 2006, David Goza, director of orchestral activities at the University of Arkansas, published an article titled "Coming to Grips with the Oboe." In this article, he claims that becoming an expert reed-maker "will take years of practice and untold expense and will impose far too much grief and frustration for all but the most committed

to endure. The oboe is obviously not an instrument to be chosen lightly."[43] In response, Mr. Swartz says: "While I can understand the perspective, the problem is if I say something like that to a 10-year-old who's excited about the instrument, they're not going to be excited about the instrument anymore. That's kind of a driver for me— I want to make a manufactured reed that can be trusted and can be counted on in a way that students are going to be able to love the instrument and keep playing."

Both Goza and Swartz are right. Manufactured oboe reeds promise greater convenience, affordability, and accessibility to beginners who may not have access to a local oboe teacher. However, they lack the nuance and quality of an oboe reed made by professional oboists who have dedicated years of practice and study to the craft. Perhaps the inevitable "grief and frustration" posed by Goza is more of an indication of pedagogical limitations than anything else.

[43] David Goza, "Coming to Grips with the Oboe," *The Double Reed* 37, no. 2 (2014): 114.

Mr. Ben Krabill of Marlin Lesher Reed Company and Advantage Double Reeds

Ben Krabill is the Vice President of Marlin Lesher Reed Co. and the owner of Advantage Double Reeds, based in Port Townsend, Washington.

Q: In as much detail as you're willing to provide, what stages of the process use automation vs. human involvement?

A: "Well, human involvement is there for all the machines. Without going into too fine of details, we have one-off proprietary machines that can produce whatever step very quickly. I saw the cane to the correct length and then I have an air piston driven splitter that splits the cane. The gouger is a 700-pound machine that can gouge 500 pieces an hour."

Q: Have you had any experience with synthetic reeds?

A: "We do sell synthetic reeds. They're garbage. I assure you that if somebody asks about the synthetic reeds that I sell on my website, I tell them, "look, these things are garbage." But the student ones are nice for tester reeds— they're easy to disinfect, they're fairly durable… so when you're trying to see what instrument fits what kid, you know, the plastic is nice for that. They play easily. They're not quite as affected by weather. But then when you get into the nicer reeds like the Légère reed—they're pretty good. I think they just came out with an American [scrape], but I haven't tried it. Still sounds like the [reed] is fairly limited in what it can do."

Mr. Krabill expressed concern over climate change's impact on future cane supply: "Certain cane fields are often near coasts, like in the Mediterranean area. But do rising water lines, hotter summers, or droughts and fires affect our cane supply? That's a legitimate worry. Do we make up for it with synthetic materials, and does my business become totally unviable? I don't know."

For Mr. Krabill, reed-making is more of a formula than an art: "There's this debate that when you're making functional art, like a violin bow, that it should be beautiful. An oboe reed is in your mouth, so it doesn't matter what it really looks like." Although Mr. Krabill's mother and sister are both oboists, he

himself is a percussionist. He often considers their feedback in improving the company's reed-making process.

Dr. Joseph Wenda, "The Reed Whisperer"

Dr. Joseph Wenda, also known as "The Reed Whisperer," has been learning how to make reeds for almost twenty years. He is based in Eugene, Oregon. Dr. Wenda actively performs and teaches the oboe and is passionate about reed-making: "There's a lot of work that goes into making a good reed. I don't make reeds super-fast. I can't. I don't like to do that. I don't send a reed out after making it. Once I make the reed, I set it aside to dry. The next day I test it and make it play well. I set aside to dry again, and then the next day I play, test again. Sometimes I use a drying lamp to speed up the process. You can't just go to a store and know that your reed that you pick up in the music store around the corner is going to be half decent. There's no guarantee of that."

Q: If you had to estimate, about how many reeds do you sell per month?

A: "I've got fifty, sixty regular clients (somewhere in there), and they order reeds every month or every two months, or just randomly throughout the year in big batches, so I have no idea. But if I were to venture a guess, I'm in the realm of 100 to 200 reeds per month. I have some friends that make 4,000 reeds a year."

Q: Do you use any machines like profilers to help speed up your reed-making process?

A: "Yeah. I have basically every machine on the Reeds 'n' Stuff catalogue, except for the industrial-grade stuff. Their pre-gouger planes the cane, and it cuts in to almost gouged. So that saves a lot of time and a lot of energy with the gouging machine. Additionally, I do use a profiling machine. I take about a minute to profile the reed. I take another minute to clean up the profile and thin the tip and clip it, and then it's remotely playable— so that could be, minimum, 3 minutes from blank to playable. Split up over several hours— because I only do one step at a time. So, that's the best-case scenario. Worst case scenario, we're talking more like 10 minutes from blank to playing. Worst case scenario making by hand is probably in the 10 to 12, maybe even 15-minute range."

> "So, it's not saving that much time, but it's saving me enough time that I continue to use it. And it has a level of consistency to it, so I don't have to measure every time. I also use a clipping tool, and it's set to a specific length, so I don't even have to measure that, either. It's little things that you can do here and there to save 30 seconds; 2 minutes… and that adds up when you're trying to do it a thousand times a year."
>
> Q: How do you deal with the high variability in cane? Are there any unsavable characteristics that you watch out for in reeds?
>
> A: "I do use a hardness tester. At the pre-gouged stage, I sort each piece of cane by hardness, and I throw it into a cane organizer with each number labeled. I like the middle hardnesses (not super hard; not super soft). And that's what gives me a little bit more consistency than somebody just making reeds on whatever cane comes out of their gouger. So, the answer to your question about 'what do you do about the variability' is: nothing. I make sure that I'm using a hardness that is going to yield good results. And then I just make the batch."
>
> Q: What are your opinions on synthetic reeds?
>
> A: "I do know some people who use them in emergency situations, or in musical pits where you don't need to sound beautiful; you just need to play. At high elevation like 6,000 feet plus, cane just does not cooperate, and having a plastic reed as a backup can be an option. I'm in the reed business, but I would love a good plastic option. I haven't played a good one. They're acceptable at best, but they do make some nice sounds below high A."

While Dr. Wenda does not own equipment at the industrial scale, he uses newer equipment like a tip cutter and profiling machine to improve his reed-making efficiency. Unlike many industrial-grade reed companies, he likes to take his time making reeds—preferring not to complete the process in one continuous session. He ships reeds to customers of all playing levels and offers a return policy on his reeds.

CHAPTER V

Conclusions:
The Value of the Hand-made Oboe Reed Tradition

While oboe reeds have not yet been successfully manufactured at the same scale as single reeds, there has been much research and innovation in the last few decades to improve the oboe reed-making process. While many attempts have been made to form oboe reeds from alternative materials, none have gained widespread acceptance by musicians yet. Successful developments in oboe reed-making equipment have included improved gouging machines, profiling machines, tip cutters, and shapers. At the industrial level, CNC machining technology is a particularly interesting development. Many of these new machines, however, remain costly to the individual reed-maker.

Some may point to an increased globalization in oboe reed-making style as an opportunity for an industrialized oboe reed market comparable to that of single reeds. However, because of the apparent complexity of oboe reeds, perhaps the best solution to aid oboists lies outside of mass manufacturing. The double reed community should pursue continued collaboration with the material science, agricultural, and engineering communities. To serve the flexible and individual needs of oboists, further studies should target solutions rooted in pedagogy and equipment—particularly, solutions for reducing the high costs of reed-making and improving the efficiency of process steps such as tying.

It is worth examining attitudes among oboists and reed-makers about whether oboe reed-making should be treated as more of an art, a science, or a craft. Current discourse appears to vary among professionals: acclaimed oboist Gordon Hunt remarked, "Above all, I think that reed making is more of a craft, or perhaps even an art, than it is a

science."[44] When prompted in an interview, leading oboist Alex Klein stated that "I do not believe two people should have the same reeds or even the same sound."[45] Attempts to analyze oboe reed-making by a rocket scientist have often resulted in similar conclusions: it is too subjective.[46] Likely, oboe reed-making does not fit neatly or proportionally into these categories. Undoubtedly, there are many advantages to hand-making reeds despite—or perhaps because of—the immense skill, time, and scrupulosity required of the oboist.

Reflection

This project was motivated by a long-standing frustration with the variability in woodwind reeds—first with clarinet reeds, then amplified tenfold by the intricacy of oboe reeds. It felt like a great injustice that double reed players alone were required to painstakingly re-craft part of their instrument, while flute players could simply pull the instrument out of a case and play music. In this research, I sought knowledge about a quick solution to reeds; I wanted a product with all the desirable qualities of a professional, hand-crafted reed, but at a cheap cost. I wanted to know why double reeds have not met the same standardization expectations as single reeds. The solutions posed

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[44] Salter, Douvas, and Strommen, 14-390.

[45] *Double Reed Dish*, episode 10, "Alex Klein," hosted by Galit Kaunitz and Jacqui Wilson, featuring Alex Klein, June 25, 2019, on YouTube, https://www.youtube.com/watch?v=gtSO7tp5_7k.

[46] Malcolm W. Browne, "The Shaping of Oboe Reeds: Maybe It Is Rocket Science," *New York Times*, October 21, 1997, https://www.nytimes.com/1997/10/21/science/the-shaping-of-oboe-reeds-maybe-it-is-rocket-science.html.

by industrial oboe reed companies were not satisfying—although these reeds offer students greater affordability and accessibility, they are still inferior to a hand-made oboe reed crafted by a professional. Through this research and in multiple conversations with oboists and reed-makers, I've softened my attitude about reed-making and gained a deeper appreciation for the process. A great oboe reed takes great time, skill, and dedication. The oral tradition of reed-making helps establish unique mentor relationships between students and teachers that is not found among other instrumentalists. It allows the oboist a fine level of control and an intimate understanding of the instrument. As echoed widely among the oboe community, reed-making is both the burden and gift of the double reed player.

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Appendix A: Interview with Jake Swartz of Jones Double Reed

Date of interview: November 28, 2023

Good afternoon,

I am a student at Middle Tennessee State University working on an undergraduate thesis project about modern oboe reed making technology and manufacturing methods. As an oboist myself and a struggling reed-maker, I'm particularly interested in some of the ongoing challenges and solutions presented by mass reed production.

I'm reaching out in hopes that someone from Jones might be able to offer some insight, anecdotes, or general process information from the unique perspective of a manufacturer—especially since you all have been in the business for quite a while. I'd love to chat over a short Zoom session and ask a few questions for my project, if possible - I know you must be very busy!

Please let me know, and thank you for your time.

Leah Piccirillo

(LP = Leah Piccirillo; JS = Jake Swartz)

JS: I'm sure you have lots of questions, and I'm happy to share. I actually have the presentation that I gave to the folks at UT Knoxville that I'm willing to share, if you want. I can't send it to you because it's some things that I can share one time over a Zoom, but I'd rather not let the file get away from me. The nice thing about doing what we do is everything requires both a human and a machine. A lot of equipment that we use is basically what you would use, automated. I mean, we have our proprietary stuff and things that people would not be used to seeing, but oboists have been figuring out ways to do it for a long time and so there's easier ways to make it go faster by doing it not exactly the same way as an oboist would do it, or bassoonist, for that matter. Most of the things are modified from techniques that you would already normally use, just power driven. For example, like winding: instead of wrapping it around time and time again, we'll wrap the first couple wraps around to make sure that the staple—the top—seals, and then we put it on a drill and use the sewing machine foot pedal to mop hold. So, we're holding the thread spool and letting the drill turn at the last 10 or so times.

LP: That's really cool.

JS: Yeah, there is something that we do quite a bit differently. We flat shape, which a lot of Europeans do, but not a lot of Americans do. Normally, you'll fold your cane over a shaper and then slice it so you can fold it over, and then you'll tie it on without any profile being cut into it yet. So, we'll flat shape and we'll profile it before we fold it.

LP: Oh, really? Wow, and what's the advantage of doing that?

JS: Well, I don't know if there's an advantage to it as much as there is just... the profiling machines that we use; we use CNC technology, and it makes it a lot easier to do it that way. And you'll see in the video some of the things that we use or the way that we use it, but there's disadvantages to that also. You have to then track the center point from one step of the process to the other, whereas when you shape it on a fold-over shaper, you may not get your gouge exactly in the right spot: which I'm sure you've experienced before. But if the center of your gouge is not at the center of your shape because your form is just a little off, then you can have some problems there. We've got a way to track the center point from gouge, to shape, to profile, then to fold—which we didn't always have. In fact, we've only had that in process for about seven years now.

JS: So, there are ways that you can do the process that we're doing now in not very good ways. We've kind of been striving for continuous change and improvement to try and make the profile what people want, and then make the process work smoothly: because if we don't make the process work smoothly in our end—the machining end—then testing the reeds becomes a real pain in the butt. So, as much as we want to make it likable for the people outside of our company, it's really advantageous for us to make the product good for the people inside of our company testing the product, too: because they're all oboists. Well, not all of them. We have one lead oboist and then we have other musicians that we train to test an oboe reed: play a scale, be able to feel the resistance, and things like that. So, it's hard to come by enough oboists to do what we do—as you can imagine.

LP: So, what parts of the process would you say have human intervention versus automation? Basically, when you test the reed, that's the human intervention part?

JS: Oh, no. You'll see in the video; every step requires both a human and a machine until the testing process: that is all human, there's no machine at all. Yeah, the process... we use routing motors to shear off the sides in the shaper. We use a person who's putting pieces of cane inside a gouging machine and removing them and checking the thickness of the gouge on each piece: things like that. So, there is a new thing in our process now that you're not going to see in the video because it's a machine we've been working on for just over four years now. We finally got it implemented about two weeks ago. We built a new gouging machine—so I'll be able to talk to you a little bit about that, but I don't have a video on that machine yet.

LP: That's awesome.

JS: Yeah, pretty exciting. The profiling—it's done on a CNC machine, so the only real human intervention is putting the part on, taking it off, sanding the sides down so things are smooth, so you don't have splinters hanging off from the shaping process, and then checking the measurement and just viewing the profile to make sure it looks even.

LP: What did you mean by, what did you say, a routing machine?

JS: When we shape—and you'll see it... so, a router is kind of a table-mounted device that has a spinning cutter on the top. So, we clamp down the shape in a shaper die—the flat shaper die—and then we'll press it up against that router and it'll shear off whatever's hanging off the shaper die. Basically, you use a razor to shear it off; we use a diamond that spins around and cuts the same kind of contours. So, it's just more precise. Yeah, there's better precision, and there are some problems with it. For example, the shaper has to have—we call it a yoke—that presses up against the shaper dye so that when the shaper dye moves across the yoke, the cutter is spinning inside the yoke. That cutter can get closer to the dye or further away from the dye because there's just a little bit hanging off. We can't—like you would—press that right up against the metal, because then we're banging the cutter into the steel rather than just cutting off the cane. So, if that shaper or the cutter gets too far away, then you'll have a wider shape. If it gets too close, then you'll have a narrower shape. Whereas, you're going to have essentially the same shape every time: although with hundreds or thousands of shapes that you might do, you could wear out that steel, too—it just would take a little bit longer. So, there are some variants that could be problematic.

LP: Okay—that's interesting. And are there any variables that the machines might not be able to account for? For me, there's this kind of mystery to reed-making sometimes: like cane quality, and why can't it be perfect every time? I don't know if you feel that way.

JS: Yeah, cane is the biggest variable. We primarily use Rigotti cane. We've tried and we also use Oboe-Shop and Medir, and all three of those used to be very similar in their hardness, which didn't require much adjusting with our gouge thickness or anything like that. But now, oboe shop and Rigotti are pretty close. Medir tends to be a little bit softer now. When you have a softer gouge, or softer cane, you've got a gouge thinner so that you're dealing closer to the bark. Otherwise, when you profile into it, you're getting too much into grainy stuff and the film of the plant doesn't hold together as well. So, there are problems that you get with softer or harder cane and then even within a batch, as you've experienced; you get some that's softer, some that's harder, some that cracks very easily—which is always a p but can't help that. There was one we tried a while back, and it was just so soft. We couldn't use it for our processes. I'm sure plenty of people enjoy it, but it was just too soft for us. So, we've tried different cane because the cane quality is probably one of the biggest struggles that we have. Anytime we process cane, if we throw stuff away that's lost labor hours and that makes the reed more expensive. We don't want that. We want very much to keep the price of the reed as low as possible, and that can be a challenge when you have high reject rates.

LP: Yeah, that makes sense. And besides cane hardness, what other factors do you look for when selecting cane?

JS: Sure. Obviously, the twisty cane can make for a bad gouge. A lot of that stuff we don't have people necessarily looking for right away, because it's hard to tell how that's going to affect some of it: because it's a fast process for the most part, and to try and sort it out as you go can be more cumbersome than it is helpful. So, a lot of the cane will put through, and then when they come to the profiling machines, we'll view it in the light

before we send it on to the next person. If there's bark up one side, that means the gouge is too thin on that one side which makes it imbalanced. Usually, it'll make the sides open up on the reed, so we'll get rid of that at that point. Some of them do great. Some of them that are twisty, we hold down with vacuum suction on the gouging and the profiling. When they're held down like that—even though they might be twisty—if there's enough flexibility in the cane, sometimes they'll be just fine. So, it's hard to tell if a twisty piece of cane is going to be good or not.

LP: That's clever, though: bend it into shape.

JS: Yeah, it helps. You're forming it eventually anyway, right?

LP: Right; that's true.

JS: When you soak it up and tie it on, you're making the cane do what you need it to do. So, in a lot of processes that don't have the vacuum suction, you might have to weed something out because you didn't have the ability to fixture it down. And that's one of the things we'll talk about when we get to the new gouger: I'll show you what we've done there to try and minimize some of those problems.

LP: Cool! Have you guys experimented with synthetic reeds at all?

JS: Not yet. I've kind of been waiting. I have some friends in some of the single reed markets, and a couple of them have started doing some synthetic material. For us, it's got to be the right material. Plastic polymers, they're so different from one to the next—and even within a batch, they can be very different. It's almost like cane. So, if you don't do a polymer just right, it could be problematic. For me, at least, what I've been waiting for is to see if somebody can recreate the vascular structure of the reed, because I think that's what gives it its vibrancy. And one double—or one single reed manufacturer I know has started to try to do that. I'm trying to get some samples from them. They've patented it, which is fine—I expected them to—but if they can sell me something, it'd be really fun to try out. What they've done is: they've recreated, they've layered the vascular structure of plastic, but in little mini tubes. So, they've extruded plastic and then piled them all together and glued them: similar to the way the plant's designed. That seems like the best way to do it, if you're going to do it.

Just using plastic, I've seen Legere's attempted a double reed: and while it's not terrible, it's hard to work on if you don't use a reed-geek—you can't scrape on it. I don't know if you know that, but reed-geeks work really well in plastic, which is great. But they're so expensive. And then when you start to scrape on them, the tips curl and they kind of open up on the sides, strangely. So, it's got to be the right fit. I'd love to try some: like I said, I'm trying to get my hands on some to see where it goes—even just to put it in my process and say, "all right, let's try it and see." If it goes through the process and it makes a reed, then great—but we haven't put any of that in our regular process yet.

LP: Yeah, I've played on Legere before. It's not very flexible. And I've seen people try 3D-printing, too, which is interesting.

JS: That is, yeah. One of my friends here, she's the principal bassoonist in the symphony. And there's a group of bassoonists that gets together, and one of the bassoonists that she plays with started playing on a Légère reed. After about a year and a half of playing, she tried to go back to cane reed, and her embouchure was shot. She can't play on a cane reed anymore. And she's in her 60s, so she doesn't have a ton of time left to play. But she didn't realize that it was going to be so easy that she would lose some of her embouchure. She would have to work very hard to get it back, and she didn't have the patience to do that. So, there are a lot of reasons not to go that way, and nobody's recreated the sound of a cane reed exactly yet.

LP: Yeah, that's true. I hope one day it'll be better.

JS: Yeah, it' be fun. I mean, it'd be great if we could figure out a way to make it sound like a cane reed and last longer, be able to play indoors at different temperatures, and not have a problem—that'd be wonderful.

LP: Do you think in reed-making: is there any aspect of artistry in it, or is it basically a formula that you stick to every time?

JS: So, we do stick to a formula to a degree—but there's an art in developing that formula. You know, trying to find the balance of what is your staple like, how does that mix well with your shape, how does that mix well with profile, what your tie-on length needs to be. Sure, there's got to be a formula somewhere, but we've had to go through a lot of different iterations to try and get to what we have. And that takes a lot of energy for sure. Once you dial something in that works with your shape, your gouge thickness, and your staple setup, and you get a profile that matches all that, I think there is a point where, “okay, now I know pretty much what I can do every time and stick to that profile.” I think that's what a lot of artists do. You'll see some of the reed books that people have made, like Linda Strommen’s book that we kind of use as the Bible of reed things. All the people that they used: basically, they want to go with the same staple, the same gouge thickness: they get used to something that works for them, and then they want to be able to keep on recreating that. It's essentially the same kind of idea where we're trying to dial into something that works well—that we know that's going to serve the students that use our reeds, and then just kind of keep reproducing that. So, the art comes ahead of the production, basically. Then, when you dial in something that works, you're now able to roll that out in a way that can be consistent. And that's really our biggest focus: we realize people get used to something, especially teachers. They want to be able to teach kids, “hey, you know, we can get a Jones reed and we can make these couple adjustments and that'll work for you.” So, if we start changing things all the time in a way that's so drastically different that they've got to reformulate their brain, that's not going to work for care teaching a student. There's kind of an art in getting it this the same way every time, but there are lots of adjustments that we’ve got to make in the testing, too.

LP: How do you decide which adjustments to make? Because, I know between person-to-person, people have different preferences and mouth shapes and everything. How do you make that come together?

JS: So, on our artist reeds we tend to believe that people who are using them at least have a teacher, have been playing a while, and have general expectations of what that reed's going to do—but can make adjustments to tailor to themselves. So, we'll leave a little bit more thickness in the tip, and we'll leave a little bit more thickness in the body of the reed so that if somebody wants to make an adjustment, they're able to do that. Medium-softs in general, though: we set them up so that they're going to play right out of the box. They're going to usually play very easy, and there's not going to be much adjustment left in them. Mediums maybe a little bit of adjustment, but basically, they're going to be a very good sounding, consistent reed. And then medium-hards: we kind of just expect that if somebody's gonna buy—nobody plays on a medium hard—they think they do, but they don't. Everybody's making adjustments that make it easier to play. So, on the medium-hards, we make sure that they crow in tune. But if they've got that much resistance, then you know somebody's going to adjust it. And that's usually something that we leave for a person or a player to tailor to themselves, where it's got enough bulk on it that they can scrape in different places and make their own adjustments to make the reed play like they want it to play. So, that's for the artist. For the student reed, we really try to make it out of the box playable for the medium-soft, and medium just a little bit more resistant. But it's going to allow them to use a better range of the instrument; it's not just going to be the duck sound right out of the gate. A lot of people are buying the medium-hard student reeds without the windows, so they can carve the windows in like they like it—they can make the adjustments that they want. So, we do kind of leave them in a place that people can adjust. We try to tailor it the same way every time for those. But like I said, leaving medium-hard student medium and medium-hard artist with at least some to adjust so that people can tailor it the way they want.

LP: Yeah, that's smart—a little bit of flexibility for whoever's buying.

JS: Yeah, it's impossible to try to make a reed that everybody's gonna want to play with everybody's mouth's difference. So, we kind of realized that, and that makes it hard for us when we hire an oboist because oboists, when they've been playing for a long time: they have their own style that they like, and when they come in there's a tendency to want to make it their own rather than make it what we make it. So that's always a learning curve around here.

LP: That's very interesting. I think that's all the questions I have on my document. Would you mind talking a little bit more about the gouger?

JS: Sure. So, our new gouger—and I'll have a slide with it in my presentation. Do you want me to jump in the presentation? We can get to that.

LP: I would love that.

JS: So, it's been about two years since I've been through this. Dr. Jones is the one that started it; he made this machine. In 1963, he was a teacher at the University of Arizona in Tucson. And he got an order for a couple reeds, made some, and then the guy came right back and ordered a hundred from him. And he said, “I don't want to hand-scrape all these things.” So, he walked down the hallway to the engineering department: and basically, this was a project from engineering that he gave to them to do. So, it turned into the machine that we use now. You see the black motor on the left, and the controls on the right? Those were added in 1994. We've got two of these machines: one was made for bassoon, one was made for oboe—now, they both do oboe. That black motor was added in 1994, the other one was added in 2014. But before that, they were on a hand crank so go back and forth and rotate to copy if you see I don't know if you can see my mouse.

LP: Yes.

JS: Okay. So, right there behind that door is a cam shaft. That cam shaft is basically a blown-up cutout of what the reed is supposed—what we want the reed to look like. Behind that, when it rotates around: this area here is where the cutter is. And this whole tower here with the cutter on it moves in and out because there's a roller that presses on this cam shaft, and basically traces it. This is a vacuum control: it controls vacuum, and that vacuum—there’s holes across there behind the reed that hold it down while it's in motion.

So, Dr. Jones moved to Spokane in 1968, and in 1980 he had his first building. For the first 12 years, he was doing [business] out of his house, making his wife crazy. They went out of business [and] went into bankruptcy, and Dr. Jones purchased them sometime in the late 70s, early 80s. And that brought in some other machines that they had never tried before. Some of the stuff that they were buying, they were outsourcing including the staples. They no longer did after they acquired me on because he had the staple-making technology. Then, a guy named Bill Hogeboom was brought in as the general manager in the 80s and started to learn from Dr. Jones. He was an engineering student. Bill Hogeboom, he passed away in 2013. He owned Jones from 2000 to 2007, so Dr. Jones tried to retire and sold it to this guy who'd been managing it. And then in 2003, unfortunately, as you can see in the background: he bought a minor league baseball team.

LP: Wow.

JS: All his money, time and energy poured into that, and it bankrupted Jones.

LP: Oh my gosh, I didn't know that.

JS: Yeah, kind of crazy. So, in 2007 we went bankrupt, and the money stopped and Dr. Jones came back and bought it back out of bankruptcy again he is another company bought out of bankruptcy and tried to restart it and the man so the man on the left is Dr. Jones in his 80s, and the man on the right is Bill Hargrove, who helped him restart the company in 2008. When he found out that things were not good, his wife made the

comment to him: “you got to go back there and make it right by the employees.” And that's our name. So, he came back and his sole focus was to make the company salable to someone who is actually going to treat the employees well. The next three years was really just kind of building it back and getting it ready to go for somebody else. And it was kind of sad that was his wife's command to him, but when they came back up from Tucson, she was a clarinet player, but only had three-quarters of one lung and half of another capacity. She had some damage earlier in her life and was still a very excellent clarinet player, but when they came back in their 80s, she caught pneumonia within the first six months and passed away. So, then it was even more of a focus of “I got to do what my wife wanted me to do before much longer.” Yeah, the four guys on the left he met in 2011 at the NAMM show.

LP: And you on the right?

JS: That's me on the right. So, in 2011 these guys decided to purchase the company. And then that guy on the left there—that's my uncle. And so in 2012, I started working on a project for my master's degree and the project was to do kind of a business plan for a business that was in a big transitional stage. So, I called him up and asked him, “hey, can I interview you about this new company you bought?” And when we got done, I realized that the guy that helped Dr. Jones restart the company: he basically had given them two years, and said, “look, I'm 74. You got me for two years, and then I'm retiring. I'm going fishing.” So they were in a pickle trying to find somebody to run the business. I offered a couple friends of mine and all of them said, “I'm not moving to Washington.” Then I looked at a little bit more and I asked my uncle: I said, “what about me for the job?” And he said, “I thought you'd never ask.” So that's it's when I came out here so other partners liked me and we came out.

JS: So, this guy here: this is Michael. He was the VP for marketing at Yamaha. The guy in the middle: that's Bill Gray. He kind of organized the sale. His business started with financing band equipment for schools. So, schools will get their budget for five years, but they all want to frontload and buy everything at once, and then finance it. Over those five years of their budget, his company makes that happen. And then he got involved with Yamaha doing school band lease programs. And then this guy here, Gary Winder, was the sales VP for Yamaha, is my understanding. And then Greg, my uncle, came on board. Bill invited him in when he started the BGE stuff and then these guys got involved through a relationship that Michael had with Vandoren. They got involved with importing Vandoren reeds, and that's their primary business. And then when they found out about Jones, they liked Dr. Jones's story and wanted to help him out. And so that's why they got involved there.

JS: So, that's the new Jones. And this was me back when I had hair still. 2015, we brought in our brand-new CNC to do bassoon profiling. That was me on the first day as we were getting it all set up and ready to start running. I met an oboist in Chicago at the Midwest Clinic, and we got talking about it and I asked him where he taught. He said, “well, I teach privately, but I'm not really a teacher by trade.” He built custom CNCs, so that's really exciting—that's exactly what I needed at the time. We got talking more, and

figured out what he could do to help us out. It's been a pretty good chunk of change getting this machine in. so awesome wow so those four guys that you saw next to me: they the last they own the company since 2011. They've taken a total of $10,000 off the business—that's it. All the rest of the net profit they've reinvested in the company to try and get it to where we all believe it should be.

JS: So, some of the challenges that we have: obviously, there's that manufactured reed negative connotation. There's a lot of people that will not like the manufactured reed, and so we've got to battle with that. And you know what people expect from a manufactured reed, and then the struggles that we need to meet the needs of various elevations and climate. That's also a struggle that we certainly have, because we're in a very dry, kind of high place so our relative humidity usually hangs around 20% or below, very much below in the summertime. So that's definitely a difference our reed goes from here to Southeast Florida. The reed can open up sometimes, or just not play the same way. And then I think we're also at 2600 feet, so half a mile up. That can make for some challenges, too. So we've been trying to foster relationships with universities and support a bunch of double reed tech classes across the nation. I've made a lot of connections over the years with different double reed professionals who provide feedback. When we make an adjustment, I'll send some reeds out to people like John Dee, who's the teacher at University of Illinois. Or the guy who made the CNC machines—he's still an oboist and gives me some Chicagoland feedback. Then, I've got a couple guys on the east coast that help us out. And I've worked well with the folks at RDG—they've given me a lot of feedback, too, over the years. And we've done some internships: we've had two interns so far.

JS: Here is the rough piece of the gouger. So, this gouging machine will have—so you see the piece of cane in the middle looks a lot different than that now, but we have actually added vacuum underneath it. We didn't start out that way, but either side of this actually clamps down the cane into the bed. So, it pushes it down in a way, and we dampen it just slightly enough that it forms into the bed before it goes through the cutting tool. So now it'll pass through the cutter there and then go on to this next station. So, it'll get all the way down there and stop. On this next station, there's actually two lasers that carve in little tabs on either end of the cane for my centering so that Center that grabs the center of the gouge, and then that allows me to transfer it with posts in my shaper die that that then Center the gouge to the shape and then that transfers to the profiling machine with posts also that centers the shape and the gouge to the profile and then we use that to fold it as well. So, the big thing is the clamping down, where you actually form it into the bed: if you got twisty cane, it doesn't matter because it's still going to gouge it evenly. The other nice thing about it is this is kind of like a routing motor, so it spins in a way that you're always going to keep the same dimension. We use a carbide cutting tool there. The round blades that we used in the past; you know I'm sure you probably use a round blade now [in a gouger]. But after a couple thousand pieces of cane gouge—or maybe even a couple hundred—that round blade isn't round anymore. That's a big problem. and that's a problem that that we've kind of made us want to build this machine because from the moment you put the blade on till you change it, your gouge is changing: so, there's no consistency there that you can rely on, which is really frustrating. So that's what this

machine is. We can pause here if you want and kind of talk about that, if you have any questions on this gouger. So, it's automatic: you don't move the bed back and forth; the bed is belt-driven. You don't see in here there's a belt attached right there, and it goes down here and there's a motor on the end there and all the operator does is put the piece of cane in there, clamp it down, and then there's a green button right here that they push, and it'll start the process. So, it drives right through the U cutter right there, and then pause at the end gets its hole and then returns to the operator and they pull it out and put the new one in, really very neat. All, right, any other questions on that guy before we move on?

LP: I don't think so.

JS: Okay so the other thing that we're doing—we're seeking to add more good players we know. I met with Linda Strommen the same time at Indiana that I met with the folks at UT Knoxville, and so just trying to get more good players that we can rely on for feedback. And then connecting with a few colleges is important for us as well. The next thing we're gonna jump into an actual video of how we make a reed. Now this doesn't have a new gouger in, this has the old gouger but it kind of goes pretty quick, so I'll let you I'll let you keep an eye out on it all right.

LP: Oh, you make your staples?

JS: Yep, we make our staples from beginning to end. We have a Lorée receiver that you'll see or put it in and just to make sure that it fits a standard. That receiver right there was actually given to us by Lorée because they buy our reeds. It's another custom machine that we designed. It's got a double-bladed table saw and then a ram that pushes it past a splitter, so it cuts and splits. This machine here pre-gouges. They're flexible enough to do the gouging that we need. We used to actually drill holes to keep the position instead of the lasers. This was the Reeds 'n' Stuff gouger. Then, shaping. Then the CNC machine, and this one here is one of the new ones. We bought two of those expensive machines from that guy. And then we fold them with this jig here. We used to have to clip off the ends where the hole was but now, with the lasers, we don't have to do that. Then, we sand the ends to make sure that flows nicely down. Here's our winding, that's a jig she's measuring to make sure she gets the right length every time. So, she starts it and then it just keeps it going. She'll just tie it right there by hand the first three or four wraps, and then put it on the drill and finish it out.

LP: Oh wow, that's awesome.

JS: And then she checks to make sure it doesn't leak and ties the knot, too. Then they just play a different diddy and a scale. We used to stamp. We no longer stamp; actually, we have new stickers that go on the case. They just get stickered and they're ready to go.

LP: Wow, look at that. That's awesome – my curiosity is definitely satisfied.

JS: That was the presentation, outside the bassoon. But it's basically the same thing, only there's the hand forming of the bassoon reed.

LP: Awesome, that's super informational, thank you.

JS: What other questions might you have?

LP: I think that's it; that was a lot more than I was expecting.

JS: I'm glad to help you as you get through it. You know, as you work on your project whatever if you got other questions feel free to email me and I'm happy to try and answer when I can.

JS: So, there's a guy named David Goza that wrote an article—well, it wasn't an article, I think it was a master thesis. He complained about the problem with the manufactured reeds, and he argued that there's no good manufacturer reeds whatsoever. If you're gonna be a real player, you gotta make your own reeds. Later on in his paper he basically says, "oh, and by the way you're not going to be good at it for twenty years," and while I mean I can understand the perspective that people have the problem is if I say something like that to a 10-year-old who's excited about the instrument, they're not going to be excited about the instrument anymore. That's where I've really tried, I mean as a manufacturer, I've used that article as kind of a driver for me. I want to make a manufactured reed that that can be trusted, can be counted on in a way so that students are going to be able to love the instrument and keep playing.

JS: If you tell every kid that wants to play the oboe that thing where you're not gonna be good at it for 20 years and you got to do it or you're not going to be a good enough player, boy, it just takes away the beautiful instrument from ever being played. I think that's a really narrow-minded thing to say. The better option would certainly be: "okay, well, somebody's got to make these reeds, and so why not instead partner with them to make them do it better?" I can't tell you how many teachers I see at the trade shows all the time. Every trade show I go to I'll get a new teacher that will come up to me and say, "give me something that I can trust because I don't have enough time to do this. I don't have enough time to make these reeds for my kids, or I don't have the patience to do it anymore, or my hands don't want to let me do it anymore, or I've got too many students."
JS: Helping manufacturers to do better seems like the better approach. Anyway, that was one of my frustrations and I appreciate that he wrote the article in the IDRS journal. It's been well-publicized. It's made its rounds for sure, so I'd encourage you to check out that article and just see what he says. His name was David Goza. I want to say it was either University of Arkansas or Alabama, I can't remember—it's been seven or eight years since I've read it. I think I still have it saved somewhere and if I can find it, I'll email it to you.

LP: Oh, that would be great.

JS: It was interesting. He makes some claims about cane and how certain suppliers will hold back the good stuff. Honestly, maybe that was true at some time, but it's not true anymore. If it ever was—I don't know if it was. But in 2016, I went to France and Spain and met with Rigotti. I met with Carlos Medir and got to see what they do. And there's just no room in their operation to do something special like that. So, if it ever happened in the past, it doesn't happen now.

LP: Yeah, I'm with you there. We want it to be more accessible to people getting into oboe. And we're a community—it's not supposed to be guarding your secrets and all that.

JS: No, it's not elitist in the way that he was making it out to be. Like I said, maybe it was at one time, but it's not now: not with Daniel Rigotti and Carlos Medir, for sure. So, take that for what it's worth. I've been there; I've experienced it.

LP: Thank you so much, that was very informational.

Appendix B: Interview with Ben Krabill of Marlin Lesher and Advantage Double Reed

Date of interview: November 30, 2023

Good afternoon,

I am a student at Middle Tennessee State University working on an undergraduate thesis project about modern oboe reed making technology and manufacturing methods. As an oboist myself and a struggling reed-maker, I'm particularly interested in some of the ongoing challenges and solutions presented by mass reed production.

I'm reaching out in hopes that someone from Marlin Lesher Reed Co. might be able to offer some insight, anecdotes, or general process information from the unique perspective of a manufacturer—especially since you all have been in the business for quite a while. I'd love to chat over a 30-45-minute Zoom session and ask a few questions for my project, if possible—I know you must be very busy!

Please let me know, and thank you for your time.

Leah Piccirillo

(LP = Leah Piccirillo; BK = Ben Krabill)

LP: I think that's working, okay, got it. So, how involved are you with the manufacturing process with Marlin Lesher?

BK: Oh, yeah. I'm from ordering and sorting cane to splitting it, gouging it, shaping it, profiling it. Yeah, I do everything but test the reeds; somebody else, T, my sister, tests the reeds.

LP: Is she an oboist?

BK: Yes. The best of both worlds—minds working kind of like the musician, yeah.

LP: So, I guess I want to ask, in as much detail as you're willing to provide, of course: what stages of the process use automation versus hand or human involvement?

BK: Well, the human involvement is there for all the machines. What we have, without going into too finer details, are one-off proprietary machines that can produce whatever step it is that you're trying to do very quickly. You know I saw a cane to the correct length, and then I have an air piston-driven splitter that splits the cane. And with the gouger, the gouger is a 700-pound machine that can gouge 500 pieces an hour.

That's good. So, what pretty much my specialty in my very small niche in this world is knowing the machines well enough to make sure that the measurements are coming out

correctly and knowing when parts are wearing out and knowing when to fix things when they break.

Yeah. And then she just tests the reed at the end just to make sure. What does she look for?

BK: She strength tests them. You know, we sell from soft to hard, medium soft, medium, medium hard, hard. And of course, that's still such an arbitrary thing: a medium soft from a Jones might not necessarily be a medium soft from the, from a leer. There's no international strength guide, so that's all relative. So, she tests for the strengths, and she also tests to make sure the reed plays. because when a reed is tied and we have three reed tires and they, it, no, sometimes the, the reed will crack when they dry. Sometimes, those first three reeds at the top haven't sealed the reed well enough, so they simply don't play. And sometimes, you know, a piece of cane shows up and it's garbage: it's just a garbage piece of cane. And so, she's testing to make sure the reeds are playing and are playing to a certain strength. And then she packages the reeds and ships them out.

LP: Okay, cool. So, those factors like cane quality and splitting are things that your machinery might not be able to account for, you would say? Are there any other factors that we're not able, that we're not able to account for, or, oh, but I guess like unsavable in a reed?

BK: Oh, yeah, sometimes the reed just, I mean, it's ugly, sometimes it just doesn't play well. And the problem is like, there's, you know, there's always this debate, like when you're making functional art like a violin bow is beautiful. So, it's making a beautiful sound for it's also beautiful, uh, so I can see like you kind of want to have a beautiful piece of artwork for a violin bow. An oboe reed is in your mouth, you know, so what, what it really looks like doesn't matter what it really looks like. Unfortunately, when you're, you can't really explain that to like some parent who doesn't know that maybe the reed's a little ugly, but it plays really well. But most parents, especially who are buying the student reeds, they don't really have a connection with what is high quality—they just sort of judge it by outward appearances. So, if the reed is ugly, kind of gotta get rid of it because somebody will complain.

LP: Yeah, that's funny that they mention that because I wonder, too: is there any artistic element in reed-making, or is it just a formula that you get right for the manufacturing?

BK: Yeah, it is a bit of a formula. And that's just sort of why our business is viable, why we can sell our reeds for the price that we sell them. So, you see them in a store for whatever they're charging for them, but know that we sold it to them for as much as half of what they're selling it for. So, we're producing a lot of reeds and selling them at a very inexpensive price. So, you need to be able to do things quickly, and hopefully as consistently as possible. And that's just the other key with these machines: they do allow us to process things fairly consistently, which fits into the formula better. yeah, makes it more cost-effective too. That's good.

LP: Have you guys experimented at all with synthetic reeds?

BK: We do sell synthetic reeds. They're garbage. We don't actually; we have contracted that out. You know, if you see a synthetic reed for $13, it's not good. I assure you that. If somebody asks about the synthetic reeds that I sell on my website—I sell them at Advantage website—"look, these things are garbage." But the student ones, they're nice. Tester reeds are good if they're easy to disinfect, and they're fairly durable. So, when you're trying to see what instrument fits what kid the plastic is nice for that. They play really easily, they're durable, they're not quite as affected by weather and all that. So they play a role and I sell a lot of them, but garbage. But then when you get into the nicer reeds like the Légère reed, yeah, they're pretty good.

No, I'm not an oboist like I've said, but I have multiple oboists that I work closely with, and my mother was a professional oboist. That's how my parents met, in Canada. So I oftentimes bounce things off my mom, bouncing things off Cooper. I've got a professor in Texas that I work closely with. But the Légère reed, it's a European scrape. I think they just came out with an American one, but I haven't tried it. They worked with a guy named, what's Christoph's last name? Christoph [Hartmann] is the second oboist of the Berlin Philharmonic, and my mom's friends with him. I've met him before—we've talked about that reed. Still sounds like it's fairly limited, what it can do. And then there's another company out of New Jersey: I can picture their logo, but I can't remember their name. Do you know what I'm talking about?

LP: It's not Silverstein?

BK: Yeah, I think so, I think that's what it is. And they're using some interesting synthetic material that they claim will absorb water, which claims that's why it'll act like a normal reed. I bought one of them last year to give to my mom. Actually, I bought one of their bassoon ones to give to my dad, too. It was a $300 investment. My dad said that the bassoon reed was total garbage. In fairness, they did say it was still sort of in a prototype mode and my mom said the oboe reed was fine, my only, she play on a concert or anything like no, no, but it was a good experiment, whatnot, the pushback I will always have with those reeds if they're $150, you know that's why because the material seems kind of cheap, it's plastic, I don't know, do you know anybody that golfs?

LP: No.

BK: Okay, well, golf balls vary in price and quality, and a golf ball is essentially a stamped piece of rubber. They make them in the same factories that they make tires. The material to make a high-quality golf ball—for a dozen it's like $3, but they sell them for $60, and the whole reason behind that is they hide behind the research and development. It costs this much money to come up with this final product, so we need to recoup those costs. It's like the same thing, too, if you ever hire somebody to run an excavator: let's say you buy a home someday, and unfortunately something happens, like a pipe breaks or something and you have to hire an excavator to come in and dig out. They're going to

charge like $400, $500 an hour. It doesn't really seem like they're doing that much work, but what you're doing is you're paying for your share for the inevitable breakdown of a part or the machine of the otherwise very expensive excavator. With all that said, that's probably their justification for spending $150.

LP: Yeah, I really hope the price might go down one day. I mean, the single reeds they make—I know a lot of people who really like them. Like the clarinet reeds, jazz artists play them, and I have a friend who only plays their reeds. I'm optimistic about that. But the double reeds, I don't know—maybe one day.

BK: Yeah, and I know you had in the email sort of propped some questions for me, and one of them was like, "what's one of your concerns about oboe reed-making in the future?" And part of that is cane supply and how that'll be affected by climate change. Do we get to a point where—cane fields are oftentimes near coasts, like in the Mediterranean area: France, Spain, and Turkey. This is where most of the cane that I use is, that I've had luck with. I've tried other cane that hasn't come from Mexico came from China, but if rising water lines: does that affect cane fields? Or do hotter summers, or fires and drought affect our cane supply? And that's a legit worry. And do we make up with it with synthetic materials, and does my business become totally unviable? I don't know.

LP: Wow, I didn't even think about that, because it's catching up fast. It's getting hotter and hotter every year, and I wonder if anyone's ever tried growing it in a laboratory setting, like a greenhouse.

BK: Yes, and here's the problem: have you ever heard this: the story is about how a tree grown in a greenhouse versus the same type of tree grown outside—just outside the greenhouse. The tree grown in the lab in the greenhouse is not as strong. The reason being is that the fibers strengthen the more that they get blown by the wind. So, when you're in a coastal area, it's going to be really windy, right? That cane is going to create more fibers to accommodate being blown back and forth, and those fibers and that strength building is what makes it good.

LP: Oh, wow, so that could be a problem. Because it grows in the Mediterranean, I've always wanted to try to just grow it in Tennessee and just see what happens.

BK: I mean, give it a shot. Be careful, though—it's tenacious. Those root systems—once it gets a stronghold, that stuff's never going away.

LP: Let's see what other questions I have. So, Marlin Lesher: your demographic is student reeds for the most part, you'd say?

BK: Yeah, that's exactly what...student reeds, production for you, for the masses. But with my other website, Advantage—I'm selling cane, I'm selling staples, and I'm selling a lot of pro reeds. I will sell to higher level players. Most of those higher-level players, though, are hobbyists: people playing in community orchestras who have other jobs, and simply don't have the time to make reeds at the same level.

LP: Yeah, that makes sense. And is Advantage more of just a supplier type of deal?

BK: Exactly.

LP: Do you have any other ideas about...since the 21st century, there's been all new gougers that have been made, profiling machines, shapers, tip clippers. I don't know if you guys have ever used something like that.

BK: We've got a—and I have to be careful just because, you know, proprietary information. We have a shaper that can shape cane quickly. It's a pretty ingenious design. I have three siblings besides me, so four children overall. My parents—my dad just made all of us work an hour a day in the shop while we were growing up. As we all went off to college and whatnot, he would have new machines designed and made. My dad would just describe what he needs done to a particular machinist, and this guy was like a genius—like legit genius—came up with these designs. The reason why I say he was a genius: I had a machine break down—the gouger broke down a couple of years ago, and I just could not figure it out. And I called this guy, and he was driving to a rehearsal, and he's like: “oh yeah, well, you need a 5/32” wrench to loosen this, and if you look here, you'll see a little notch, and if you put a bolt in there, that'll stop it, release that part...” And this guy hadn't seen the machine in 20 years.

BK: So, we have these pretty ingenious machines. And I will say, we use synthetic diamond cutters for a lot of the process where you would use a knife—where you're sharpening it always. We have industrial, synthetic diamonds that are doing all the cutting. The nice thing about the synthetic diamond cutters is that they don't have any imperfections: lab-grown diamonds, they don't have any imperfection, so they won't crack and break. And trust me, I've been near a spinning diamond that's cracked and broken—it was quite scary. And you have to resharpen those—I don't resharpen them, I send them back to the factory that makes them or put a new diamond in them. It's pretty expensive, but the price of doing business.

LP: So, these machines are kind of unique to you guys?

BK: Yeah, unique to us. It is cool—the only problem is when something happens to them. It's not like you can YouTube it. Oftentimes it's just myself in the shop just tinkering and praying and hoping.

LP: Well, awesome! I’m trying to think if there are any other questions that come to the top of my head, but that was really what I was interested in—kind of 21st century, new tools, technology and all of that. That was awesome; thank you so much for your time and your insight into the process. This has been really, really eye-opening.

BK: Yeah, absolutely—thank you. Thank you for reaching out to me, this is fun. Take care, and maybe we'll be in touch again soon.

Appendix C: Interview with Joseph Wenda of The Reed Whisperer

Date of interview: February 14, 2024

Good afternoon Dr. Wenda,

I am a student/oboist at Middle Tennessee State University working on an undergraduate thesis about modern oboe reed making methods and technology. I've collected interviews from Jones Double Reed and Marlin Lesher Reed Co., but I'm looking for insights, anecdotes, etc. from an individual reed-maker, too. My professor, Dr. Keith Sorrels, recommended that I contact you for an interview because of your prolific reed output.

I'd love to chat over a short Zoom session and ask a few general reed questions, if you'd be willing to do so. I know you must be very busy!

Either way, please let me know. Thanks, and let me know if you have any questions!

(LP = Leah Piccirillo; JW = Joseph Wenda)

JW: Hello!

LP: Hello! How are you?

JW: Good, good! Let me just get you set up on my computer here.

JW: How are you?

LP: Pretty good. How are you?

JW: Doing all right, had a productive morning. Looking forward to talking with you. Tell me about your project. How's it going?

LP: Oh, yeah. So basically, my project's about recent advancements over reed technology research. Synthetic reeds, even new gougers and profiling machines being developed. It all originated from frustration with making reeds, to be honest. I came from playing clarinet. So, it's not something...I'm used to where you can go to a store and buy a box of them. So, that's kind of where this all originated.

JW: Yeah, for sure. I mean, part of the reason why reed businesses work is because of that interesting thing. I would say is that you can't just go to a store and know that your reed that you pick up in the music store around the corner is going to be half decent. There's no guarantee of that.

JW: But that's not to say that there aren't good reeds in stores sometimes. I just find that usually, it's a safe assumption to probably guess that they're not. But again, that changes sometimes.

LP: And do you think that's because of the subjectivity of everyone's playing preferences and everything?

JW: No, I don't think so. I just think that there's a lot of work that goes into making a good reed, and I think a lot of the reeds out there are made very quickly to make them cheap. That's how things go, right? I mean, in the system that we live in, you have to pay for something. Either you charge more for the item so that it pays for the labor, or you make the labor fast enough that you can sell it for cheap. That's like a basic business tenet. And so, a lot of companies do the cheap, fast labor to get the cheap item en masse, and you just sell lots of them for cheap. That's how some of the big reed companies work. They make very fast reeds and they make lots of money, and they're fine. But for me, I'm not quite like that. In fact, I don't make reeds super fast. I can't. I don't like to do that. I find that when I make reeds too quickly, I end up getting a lot of people saying, "Hey, this reed's not amazing." And I think something that sets my business apart from especially the big reed companies, obviously, but even some of the smaller reed manufacturers is that I just take my time with it. I don't send a reed out after making it. Once I make the reed, I set it aside to dry. The next day, I play-test it, make it play well, set it aside again to dry, and then the next day, I play-test it again. You know what I'm saying? It's a little bit of work, and that makes it more expensive, but it also ensures a more consistent product, which is what I'm going for personally. So, there's the way that you build the business. Does that answer the question? I'm sorry.

LP: Yeah. So, it's a multiple day long process, right?

JW: Yeah. For me personally, that's how I do it. So, the thing that happens in the cane is actually it's on soaking and drying cycles. As the reed soaks, it changes. When it dries, it changes. When it soaks, it changes. When it dries, it changes. So, you could do that overnight, or you could do it like me. Sometimes to speed up the process, I use a drying lamp, like one of those heat lamps they use for livestock—like for chickens. It dries the cane faster, and then you can soak it up again, and it's almost as if it dried overnight. But it's just faster. But that's if I'm desperate, like if I'm just doing a big batch. Maybe I spend all day, and I do one part of the reed-making process on a hundred reeds. Then the next day I do the next process on those same hundred reeds. You don't have to speed it up every time. But if I'm desperate or somebody's like, "Hey, I need a reed sent out tomorrow," I'd be like, "Okay, here we go." And then that's what I would have to do.

LP: Wow! Goodness!

LP: I was gonna say, by estimation, how many reeds do you think you put out in a whole year?

JW: It's hard to say. I just got started with this, like, being serious about it, probably like 2 or 3 years ago. And so, I don't really have a set quota. Some people send 20 reeds per month per manufacturer, and they have 5 manufacturers or 6 manufacturers that they send reeds to. Okay, that's 120 reeds per month times 12 months. That's it. Boom, end of

story. That's how many reeds I make. For me, it's... I've got 50, 60 regular clients somewhere in there, and they order reeds every month or every 2 months, or just randomly throughout the year in big batches. So, I have no idea. But if I were to venture a guess, I'm in the realm of 100 to 200 reeds per month, depending on how busy I am with my personal schedule—because I also do perform and some other things. So, it's in addition to those, right? If you wanted to call it 150 times 12, that would be approximately something more or less.

That's still pretty insane. It's a lot. But there are some people that do even more than that. I mean, I have some friends that make 4,000 reeds a year. Those are the types of people that probably do almost nothing but reed-making and family time, obviously.

But for work stuff, I only make reeds. I make them very quickly. I sell them to one client; they buy all of my reeds. A big reed company like, for instance, Bocal Majority sells thousands of reeds. So, if you wanted to just sell to Bocal Majority and nobody else, you could make a deal with them to do that, or Forrests. There are a bunch of people who do just that. I found that, personally, I made a lot more money for myself when I just sold directly to the customer because those big reed companies, the way that they worked—I mean, obviously, to make a profit, they have to charge more than they're paying you. And it eventually got to the point where I was selling a reed for half the price to a big company that I would make personally if I just sold directly to the consumer. So that's why I decided to...I started with my cheapest clients. I was like, "I'm sorry, I can't afford it anymore." And then I started only selling to one big manufacturer. And then now, I'm just not doing it anymore because I couldn't fit it in. It was a lower and lower priority, based on how much money they were paying me per reed.

LP: They take their cut of the profit, right?

JW: I mean, and that's normal. That's part of business. I understand that. I just couldn't personally afford it, like people who don't have the time or the marketing to have specific customers go straight to their website and would much rather just send their reeds to somebody who already has a website and a customer base. Then it's a lot less work on the back end to do. So, I understand that. So that's something you have to learn if you want to do a business: how to do that back-end stuff like, how does one make a bunch of USPS labels? How do you do it cheaply? How do you do it quickly? What do you do for packaging? Because my post office closes over the weekend, on most Mondays I'm sending out somewhere in the realm of 12 packages to 12 different places, with a reed order in each of them going to just a singular customer. As opposed to having one box per month that you send to Bocal Majority. Right? So, if I never really think about, you know...

LP: It's all part of it, I guess.

LP: And how many years have you been making reeds?

JW: I started learning how to make reeds when I was taking lessons in Junior High School. My teacher and I would learn together. She was not an amazing, amazing reed-maker. So, we would go through the books and kind of learn together. And it was a good learning experience. But then I got more serious about reed-making in my undergrad because I was a performance major. I would say I wasn't a great reed-maker until probably 2019. I made some... I don't know... personal discoveries. I bought a new oboe, and that really taught me a lot of things about reed-making. So, I would say, how long have I been making reeds? Ever since Junior High School for me. That would be... oh, goodness! Apologies! I have no idea. Like to 2005. So, almost 20 years.

LP: Wow.

JW: Yeah. But making good reeds, I would say, about 5 years or 4.

LP: That gives me encouragement, then, because I'm an impatient person.

JW: So, yeah, it's a long process. And a lot of times you start learning how to make reeds. But you use that knowledge for practice or use it to adjust the reeds that you purchase as they get older, especially. Something else that I have a belief about reeds is that a reed is never just done, right? It's not like it's a done reed, and then it's consistent for the rest of its life. And then what happens? Right? Because that's how it works. You make a reed, it gets better and better and better and better, and then at some point it kind of plateaus, right? And then it gets worse. And so, I try to sell it right at the plateau. If you're a really good reed-maker, you can make it even better. And you start playing on it. It sounds great, it sounds great, and then it starts playing... Not so great.

JW: Beginners even can use their reed-making knowledge to just take that slightly, not so good reed, maybe the response is not so good anymore. And then you just make the response better. And it's back to playing like normal. Okay? And then more time passes. It goes worse again. Use that reed-making knowledge to make it better again. So, I don't feel like reeds are stable in that way. I feel like it's more like a parabola: goes up, it plateaus, and then it goes down, and it's up to you to try and fix it when it goes down, or buy new ones.

JW: So that's when you're beginning. Reed knowledge really does help. But as you grow as a reed-maker, you're not going to be making amazing, beautiful reeds right away. People go to school for years and years and years to do that. In fact, I think that one of the things that sets good oboists and great oboists apart is their reed-making.

JW: You go to master school, and your tone is good, but it's not excellent—and you want to make your tone excellent! Is it going to come from the way that you play? Yes. Is it also going to come from your reeds? Yes! So, I think it's a never-ending learning process, and I even still learn things about reeds. Now, every batch that I do, I learn something new that I didn't know before, and that informs how I move forward.

LP: And I'm sure you've had a lot of different teachers, too, over the years. Have they had more similar reed-making styles? Or, how do you consolidate that?

JW: No, none of my teachers made reeds the way that I did, And again, like I said, I graduated with my doctorate in 2019: which means that my reed style now is not what it was when I was in school. And my reeds when I was in school were not the type of reeds that my teachers would make, but I think they did help guide the biggest issues that I had in my reed-making at the time. So, maybe one of my teachers noticed that my reeds had this measurement that was just not working, or the tips were too thick, or the hearts were too thin, or the staple was not the right thing for my oboe-or any number of like issues. The teacher can help you diagnose, even if they're not forcing you to make reeds. And none of my teachers made me make reeds their way, which I appreciated because I know that there are some teachers that do have that mentality. And I think there are some places where that is a good mentality for beginning reed-making. It's like, "just stick with the measurements that I give you, and then you can branch out and see why these are my measurements," right?

LP: Right.

JW: But there are places where I'd say that that's a good thing. I was coming in as a pretty good reed-maker—not amazing, but pretty good. So when I was went to my master's, I was a pretty good reed-maker. When I went to my doctorate, I was a pretty good reed-maker, but I wasn't perfect. Those teachers helped me out a lot in diagnosing what was an issue, and then thinking about how to solve this issue while not forcing me overtly to just make reeds exactly like they do, if that makes sense.

LP: Yeah, that makes sense. And what demographic would you say that you sell reeds to, mostly?

JW: I still do sell to a lot of adults. My reeds are not super expensive, but they're on the more expensive side, and that's happened due to supply and demand, basically. So, this is not ideal. I don't like this, but it's just the way it is. It's the way it has been for about a year now. I've got about a 7-week processing time. And it gets to be a little bit more than that or a little bit less than that based on if I can keep up with reeds, because I'm just a one-man band. And so, when that gets more like, maybe instead of 7 weeks, it's like 9 weeks, 10 weeks; I have to do something to slow down the orders. So, I charge more, and hope that that means that fewer people will order, which has sometimes worked. So that's the reason why my prices go up: if I just simply can't keep up with orders, I raise the prices, so fewer people order. And, essentially what that means is that a lot of my customers are adults who don't want to make reeds, or they do make reeds, but they just do a little tweak to it, and then it's done.

JW: I've got a lot of customers like that. Let's see, I'm just like looking through my order list. It's actually just mostly people who play in community orchestras, or even professional orchestras, and they like the convenience of not having to make the reeds all themselves. They can just take mine, and they tweak it a little bit and turn it into a good

concert reed or a good rehearsal reed as opposed to having to make all of those themselves.

JW: So, I've got different levels on my website. The top level is a reed that I would personally take to play a concert on. I actually charge a lot of money for them, and rightly so: because it's a concert reed, and those are rare. And then, my regular premium reed is something that I would take to a professional orchestra rehearsal. Personally, I would play this in a rehearsal. And my lowest level is the student reed, and that's the one that I wouldn't play in a rehearsal. But it's still a fine reed. And if you're a student, it's fine, and all of those reeds sell. People buy them. I have a satisfaction guarantee, so people can return them if they want, or not return them. We get a refund or have me replace them. And very few people ever do that. So, I think they're doing okay?

JW: My price point's pretty high for a student—especially a high school student, what money do they have? Right? But I do have some. Their parents are invested in their musical journey, and they know that having a good reed helps them learn—which I'm also an advocate for. I feel like I learn how to play music better when I'm playing on better reeds, if that makes sense.

JW: I feel like I learned a lot when I made that breakthrough in 2019 that I told you about. I learned a lot about the oboe by playing on those reeds. And then I learned how to do it consistently. So I feel like some of the parents that buy for their sons or daughters, or whatever they understand that level of: if they're playing on really good reeds, they'll win auditions. If they're playing on really good reeds, they'll learn about the oboe faster. If they're playing on really good reeds, they'll be accepted at a better school. But that's not a common thing that parents think about. It's usually just, "hey, what can I afford and sounds good?" And for me, sometimes, I'm not that because my reeds are a little bit more expensive just because of the supply and demand; because I'm just a one-man band here. I mean, I've got some help every now and then, but it's basically just me here. So, I can only keep up with so much.

LP: I thought it was really cool on your website how you have so much customization available for your reeds, like the staples and the measurements and everything. I rarely see that.

JW: Yeah, that's something that I've actually done less of over time. But when I first started I was like, I've got all these shapes that you can choose from. I've got all these staples you can choose from. You can choose your type of gouge, you can be more open or less open, and that was fun. I learned a lot doing that. But I also learned that it's helpful to prioritize one line, so I can do a batch of 100 of one thing and know that out of those 100 reeds, some will go to those concert reed customers, some will go to the rehearsal reed customers, and some will go to students—and I don't have to worry about anybody being left out.

JW: So, when I have super customized orders, I do charge up for them. If I make a batch of 10 reeds and I know that 5 of them are going to this customer, the other 5…maybe it's

on the Chiarugi adjustable staples. I do a few orders of those. Have you heard of those, by the way?

LP: I think so.

JW: They're pretty cool. So, they come in 2 parts, and the bottom part is interchangeable. The top part has the reed on it, and you just screw it onto the bottom. It's really cool. I've got a couple of customers that really love those, and they do pay for some. But they're more, because guess what: if I make a batch of 10 for a customer that's only getting 5, then the other 5 reeds are my wasted time, right? So I do have some customizability. I charge up for it because it's wasted time. The way that I make reeds—it's not just, "oh, I'm making your reed. Here it is." I'm gonna make a batch of reeds, and the best ones go to the best customer. The concert reed customer's specifically paying for it to be a concert reed. So, I'm only sending them the concert reed. But then the others I'm utilizing, as well. It's like a business decision. It is something that I like about like my business.

JW: Number one in that regard is that I can't go too customizable and promise more than I can deliver for a certain dollar amount. And it sounds cynical to think about it that way. And it might be a little bit cynical. But if you're doing business, and this is your business, then you have to think about things in terms of that, like how many hours did I spend this week making reeds? How many reeds did I make? How many dollars were paid for those reeds? How much time? What is my hourly rate? How much am I paying towards taxes? What about shipping costs and shipping materials? All of that working into that, right?

JW: So, you kind of have to separate the business from the art a little bit. I do have customers, or friends, that want a certain reed a certain way. And at some point you do have to say no, because it doesn't work out in your hours. For instance, I've got customers that really want sharper reeds, because my reeds on their setup play flat. So, I'm like, "Okay, I can do a little bit sharper. So, I make a sharper reed. But then it's not the quality I would like, because when I play on a sharper reed, it sounds different to me, and so I'll leave my tuner on and running all day long. And I just look at it. It's playing 444. But to me, it sounds brighter. It sounds different. But I have to send it. And if I send it, and then they don't like it—sometimes, you just have to pick your battles a little bit with the customizability, and I think the ones that I left on the website as far as customizable options are things that I can promise.

LP: As far as your reed-making process goes: so, you hand-make them. Do you use any equipment like profiling machines, or anything like that to help speed it up?

JW: Yeah. So, I'm not sure if you've ever perused the Reeds 'n' Stuff website. But I have basically every machine on the Reeds 'n' Stuff catalogue, except for the industrial-grade stuff. So, for instance, the pre-gouger that they have—I'm not sure what type of pre-gouger you use. But a lot of pre-gougers, they plane the cane, and it's flat. The Reeds 'n' Stuff pre-gouger does that, and then it cuts in to almost gouged. It cuts into like .85, and a

finished gouged piece of cane is .60, right? So, .85 is just .25 remaining for the gouger to do.

JW: So that saves a lot of time and a lot of energy with the gouging machine. Additionally, like the profiling machine—I do use one, and I have it set so that the channels of the heart are exactly or a little bit thicker than finished. But that also means I have to scrape the windows and tip. But I measure in such a way that, after it's profiled, all I do is make the windows, scrape the tip, clip. And hopefully, if everything else went good, it plays well, or it plays. And then I leave it to dry and do the same play, test, make it play better; dry, play, test, make it play better, dry a couple of times.

JW: But that profiler: I did the math on it. Oh, shoot! Do I have the math in the document? I'm just gonna eyeball it; I don't have the document on me right now. But I take about a minute to prepare a blank for the profiler. I take about a minute for profiling the actual reed. I take another minute cleaning up the profile and thinning the tip and clipping it, and then it's remotely playable: so that could be a minimum 3 minutes from blank to playable.

JW: Split up over several hours, right? Because I only do one step at a time. So that's best-case scenario. Worst-case scenario, we're talking more like 10 minutes from blank to playing: which is still not that slow, but it is slow in terms of business. So, every minute saved per reed is 100 minutes in a batch of 100: it adds up. Now, if I was making them by hand? I can make one by hand in about 5 minutes. So, best-case scenario it saves me 2 minutes, and worst-case scenario making by hand also is probably in the 10 to 12, maybe even 15-minute range.

JW: So, it's not saving that much time, but it's saving me enough time that I still continue to use it. And it has a level of consistency to it, so I don't have to measure every time. I'm not sure if you measure your reeds. For instance, I used to always measure where the tip starts and started at exactly 65 and a half every time. And then, it takes like 30 seconds to get exact. And then you do that, and 2 minutes later the line's gone. So, you have to remark it.

LP: Oh, I know, it's the worst.

JW: Yeah. So, I like the profiler in that it has a location where the tip is. I also use a clipping tool, and it's set to a specific length so that when I've scraped open my blank. I just clip it open, and it's always the same length to put onto the profiler. And so, I don't even have to measure that, either, and that's how the tip measurements are always the same. So, it's little things that you can do here and there to save 30 seconds, 2 minutes: and that adds up when you're trying to do it a thousand times a year.

LP: I've never seen those tip clippers in person—pretty cool.

JW: Yeah. I mean, it's pretty silly, you think: "Why would I need this? I can just use a razor blade. But, for instance, right before I profile, I have to clip it to exactly—I forget

the number—70 and a half. It has to be exactly that to put the measurements the way that I like them on the profiler. So, to clip a batch of 10 reeds to 70 and a half by hand with ruler and pencil would take a lot longer than just throwing it in this, clipping it open, and moving along to the next one.

JW: I'm not sure if you remember the compass from middle school math class, but you can use them. I can actually mark the inside of the cane where the tie point is, so that I don't even have to measure my blanks either. I just throw it in this, make a quick mark, and then I line up the pencil mark with the staple on the inside of the cane.

JW: But I'II make the difference for myself personally that I want to make things faster as long as they're not worse, right? So, if they're faster and worse, then I don't want to do it. And that's just a personal boundary for myself. I tried making reeds faster, like much faster and worse—and I found that I wasn't happy personally. As a business person, you do have to make those sorts of decisions: what makes things worse, what makes them better, what makes them faster. All of that has to balance out at the end of the day.

LP: And there are so many variables to it. How do you—are there any points of no return in your reeds, like unsavable characteristics? You know, "this one's going in the trash for this reason."

JW: So, you'd also brought up in your email that I wanted to address—you said that there's a lot of variability in reeds. Some of them just work, and some of them just don't. And I do have an answer to that, and you may or may not like it. We'll see. So, first of all, I have learned a lot about reeds in the past years so that I know that the stuff that I choose to tie on the cane can make, at worst, student reeds. Or if I mess up: trash. Part of that is I do use a hardness tester. Okay—what do you think about hardnesses? Because that'll change what I have to say.

LP: I don't think my teachers have ever used them, but I can definitely see how that can be useful to filter out cane that you should use for this reason. I'm all for anything you can use to make the process more consistent.

JW: Yeah, I think you're exactly right. If you were an individual reed-maker and you were just making reeds for yourself, maybe a couple for students: you don't need a hardness tester. But for me personally, because I'm making so many reeds I throw in a hardness tester at the pre-gouged stage. I haven't spent very much time on this individual piece of cane at all: I throw it in the hardness tester. It takes 5 seconds per piece, so I can do 20 in a minute. And then I sort the cane by how it comes out of the hardness tester, and I throw it into a cane organizer with each number labeled off.

JW: So, for instance, negative point .8 is a very hard piece of cane, as in the dent that the hardness tester made on the piece of cane was 0.8, which is a small dent in this machine. Here are other pieces where you get a negative .20, so that's .20 of a dent that the hardness tester makes in the center of the piece of cane, which is a very soft piece of cane.

LP: It’s a big difference.

JW: It's a huge difference. And the thing that people don't understand about hardness testing that I wish they did understand is that every batch of cane has every hardness—each piece could be any hardness. People say, “Oh, this brand that I like—it’s a very hard cane. But then you try it out, and you're like, “Okay, there's some point 0.8s. in here, there's some 0.9s, and then there's all these 22s and 23s. What's going on here? So, it’s the yield of the hardness of cane that you like that is the most important.

JW: So, for instance, the cane that I use, Lorée —I did a study a couple of years back where I took a bunch of brands of cane, and I analyzed their yield of the hardnesses that I like, which are the middle hardnesses. I don't like super hard cane. I don't like super soft cane. I have these drawers and drawers full of that cane. I try to make reeds on it and that doesn't work. So, of the middle hardnesses, Lorée is the most consistently in that window, and I know that I'm getting more pieces per pound in the hardness realm that I like. And when I tie reeds on, I always tie on one hardness per color: I’ll know that the blue batch is 16 and the red batch is 14, or something.

JW: For me personally, those numbers tell me a lot about how I'm gonna make the reeds. Like, “oh, this is a batch of, for instance, really soft cane. I don't want to go too deep in the channels here, because it doesn't have the strength for it”—because it's a softer, acceptable realm, right? Or a harder, acceptable realm. I know that I'm gonna have to scrape a bit more just for it to get working. So, I think there are a lot of misconceptions about hardness in that realm. That's why I do hardness test every piece. And that's what gives me a little bit more consistency than somebody just making reeds on whatever cane comes out of their gouger.

JW: So, the answer to your question about what do you do about the variability is: nothing. I’ll make sure that I'm using a hardness that works; is going to yield good results. And then I just make the batch.

JW: And then, if a reed is playing well enough that I would personally take to a professional orchestra rehearsal, I call it a premium reed. If the reed is good enough for a professional orchestra concert, I put it as a diamond premium. If the reed is not good enough for an orchestra rehearsal, but good enough for practice—I call it a student reed. And if there's something fundamentally wrong with it, like it leaks, or it's cracked—obviously, I don’t send it out.

JW: But that's actually how this business got started for me. Personally, I was making reeds for myself, and I would play out of a batch of 10 reeds. I would play on the best 2: I would take those to my concerts and rehearsals, and then I had 8 reeds that I was like, “what do I do with these? I was like, how about I sell them?” Right?

LP: I guess the last question I have: Have you ever played on a synthetic reed?

JW: Oh, yeah, we were gonna talk about that. So, I have played on the 2 synthetic reeds currently on the market. There's the Légère, and then there's the Ambipoly, right? The Légère reed is designed for European embouchures. So, you kind of have to use that different embouchure. And it's very uncomfortable for me: personally, even thinking about it makes me uncomfortable. And that makes the high notes really sad, like, especially A is just super low. You've got to really control it, and I'm not used to controlling the notes up there. I want them to blow freely.

JW: So, until they release that American version, I don't think they're a great option. I do know some people who use them in emergency situations, or in musical pits where you don't need to sound beautiful; you just need to play. Or at elevation, if you're at 6,000 feet plus then sometimes cane just does not cooperate, and having a plastic reed as a backup can be an option.

JW: Look: I'm in the reed business, but I would love a good plastic option, so I'm not trying to poo-poo on them because I have an agenda. I haven't played a good one, you know. They're acceptable at best. They do make some nice sounds below high "A". But high "A" is where it turns, and I would call unusable.

JW: Ambipoly is an interesting reed. I do like the fact that you can switch up which staple it's on. I fixed one up for a customer before, but I had to go through all of my different miscellaneous staples to find one that worked, and it was literally only one that worked. It was a (Glotan?) that was the only one, but that was just on that reed. Who knows if it works with other reeds? I did some manual scraping on it before I clipped it and switched the staple. It was horrible, and I was able to fix it to be remotely passable.

JW: But it also took somebody who makes reeds professionally and had a drawer full of random staples to try to fix it up. So, for somebody who's not a reed-maker, who doesn't have a drawer full of a variety of staples that could just magically fix a reed: I still wouldn't recommend it. It's just not to that point yet. There are a bunch of people who have reviewed them. Katherine Needleman has reviewed both, I think, and neither of them were good. And she found the same things that I found: it's just flat.

JW: You can clip it, and that'll fix some things. You can put it on different staple. That'll also fix some things. But at the end of the day, the reed's not in tune. And that's kind of the antithesis of what I do as a reed-maker.

JW: We haven't talked much about actual reed-making technique or philosophy, but the one thing that I do feel is maybe a little bit different from other people is that I don't like to think of the reed in terms of, "How does it sound?" I like to think of the reed as, "How in tune does it play?" naturally on its own. So, I start with a pretty middle-of-the-road note, like G—does it play in tune? Put my embouchure in the position where it plays in tune: Is it comfortable? Okay, play some low notes: are those comfortable? Are they in tune? Start playing up the register—are those notes comfortable? Are they in tune? If they're comfortable, but not in tune—in which direction?

JW: For instance, there's a place that I can scrape on the reed to fix that note if it's sharp. The 2 finger "C," if it's sharper than the notes around it, I know exactly where to scrape to lower it. So, as I'm playing a scale all the way from low register to high register, I take note of which notes are in tune, and which notes are out of tune while I'm playing with a remotely comfortable embouchure. and then I can fix the reed beyond that point. But I don't really care necessarily about the tone. By fixing the intonation, the tone will also be fixed.

JW: Another big philosophy as a reed-maker that you should know—and I'm sure you might have heard this before from someone else—is that a bad reed takes twice as long to make as a good reed, and at the end of the day, it's still a bad reed. That's one of my favorites. So, I try to avoid that by just cutting my losses at some point; calling it a student reed. That was a big thing for me to learn.

LP: Super interesting. So even if you do the hardness, testing, and everything else, even at the end of the stages, you still might not have a great reed, right?

JW: Yeah. And then you just sell it as a student reed if you want to cut your losses. And the reed—you make it playable by a student. So, think of yourself in the feet of a seventh grader who just wants something that squawks and doesn't take all that much effort, and it's more or less in tune. That's your student. It's a seventh grader. Do they care if it can play La Scala di Seta? Do they care if it sounds beautiful playing the Mozart Oboe Concerto? No, they want to play, you know, Pirates of the Caribbean. They want to keep up with the trumpet players and the trombone players that don't know how to play soft yet.

JW: Yeah. So, even with the hardness testing, I know that I'll have a yield somewhere between playable and excellent. But again, this would be the sort of thing that you would only know by using a hardness tester, because there's so many misconceptions about what hardness is. People are like, "Oh, this is a hard cane," and then I test all the pieces, and half of them are soft. There's a literal number that dictates how hard this piece of cane is. You can say whatever you want about the qualities of the cane subjectively. But objectively, this is a 13.

JW: There's so much philosophy that goes into reed-making. And actually, I try to be open about this—and I'm not sure if you want to put this in the paper or not—I have a bit of ADHD, and it makes some things very difficult. You might have been able to tell. It makes some things difficult for me to really grasp, and other things very easy to just simplify.

JW: So, for instance, when somebody's telling me about the qualities of the cane and the vascular bundles, it goes over my head a bit. That doesn't resonate with me.

JW: But if you give me a machine and the machine tells me 13, it's a lot easier for me personally with that. Now, a lot of people are more qualitative with their analysis of reeds and cane. I can't do that, personally. That's why I use machines to help me out: "Okay,

this drawer is of cane that reads 13. This drawer of cane reads 17. This gouge has this curve to it because I have a measurement that actually shows that curve. That's the level that resonates with me personally, my learning style. So, I try not to stigmatize. I'm not sure if you want that part in.

LP: I don’t know if there’s an hour limit on this Zoom; they might kick us out.

JW: I’m fine going more if you have more questions. This has been a lot of fun, regardless.

LP: I think that’s really all the main points I wanted to hit there. Definitely very informative!

JW: Awesome, I’m glad it was helpful. Best of luck with your paper and be sure to send it my way when you’re done with it.