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THE DEVELOPMENT OF TWENTY-FIRST CENTURY ACCESSIBILITY TECHNOLOGY FOR TRUMPETERS WITH RIGHT-HAND INJURIES AND DISABILITIES: A CASE STUDY

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DREW MARTIN O'DELL
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A DOCUMENT APPROVED FOR THE
SCHOOL OF MUSIC

BY

Dr. Shanti Simon, Chair

Dr. Jake Johnson

Dr. Matthew Stock

Dr. Joseph Havlicek

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Abstract

This document chronicles the development of twenty-first century accessibility technology for trumpeters with disabilities and injuries through a case study; in particular, the study focuses on disabilities or injuries of the right hand. Though injuries and disabilities of the right hand are less frequently reported amongst trumpeters than other instrumental musicians, they can be exceedingly devastating to a trumpeter as the right hand is responsible for the operation of the piston valves when playing the modern trumpet. The case study is centered on the experiences of Greg Wing, a professional trumpeter and retired collegiate trumpet professor, and Peter Pickett, trumpeter, engineer, and entrepreneur. Together, the two pioneered the creation and development of the WingMaster, a unique and novel device combining motors, electronic components, and 3D-printed parts to operate the piston valves of the instrument with minimal effort or input from the musician. The practical uses for the device could transcend a wide variety of hand injuries or disabilities. Thus, an opportunity exists to preserve this knowledge for future engineers to improve upon, teachers to use with their students, and musicians to aid in the creation of their art.

Chapter 1: Introduction

Purpose

This document seeks to chronicle the development of twenty-first century accessibility technology for trumpeters with disabilities and injuries; in particular, the study focuses on disabilities or injuries of the right hand. Though injuries and disabilities of the right hand are less frequently reported amongst trumpeters than other instrumental musicians, they can be exceedingly devastating to a trumpeter as the right hand is responsible for the operation of the piston valves when playing the modern trumpet. The findings of this study are presented in the form of a case study centered on the experiences of Greg Wing, a professional trumpeter and retired collegiate trumpet professor, and Peter Pickett, trumpeter, engineer, and entrepreneur. Together, the two pioneered the creation and development of the WingMaster, a unique device combining motors, electronic components, and 3D-printed parts to operate the piston valves of the instrument with minimal effort or input from the musician. Though the impetus for the creation of the device was an undiagnosed injury in Greg Wing's right hand, the practical uses for the device could transcend a wide variety of hand injuries or disabilities.

An innovative device, the WingMaster combines several motors and electronic components and is thus quite revolutionary; by contrast, previous accessibility technologies for trumpeters with hand injuries or disabilities were often quite primitive or rudimentary in nature. This technology is quite new, having been developed within the last four years, and as such, no attempts have been made to document the processes or outcomes involved for the individual with an injury and his experience with the WingMaster device. An opportunity exists to preserve this

knowledge for future engineers to improve upon in terms of design and creation, teachers to use to enrich the lives of their students who may have disabilities or encounter injuries, and musicians to find assistance in creating their art.

The ultimate objective of this document is to provide a unique intersection of musicians, engineers, and teachers with a repository of information. Ideally, this study will serve as a springboard or source of inspiration for future research, development, and study of accessibility technology, both for trumpeters and other musicians as well.

Procedures

This document first presents a brief historical background of previously developed adaptive solutions and remedies for the general musician. Next, the document includes a brief overview and examination of historical accommodations and accessibility technologies specific to trumpeters with injuries and disabilities of the right hand and other upper extremities. These accommodations and accessibility technologies will also be evaluated in terms of effectiveness, accessibility, efficiency, and adaptability. The information for these historical contexts was sourced from a variety of journals, both musical and medical in nature, magazine and newspaper articles, dissertations, and interviews of professional trumpeters and teachers such as Robert Baca and Steffanie Skiles. Additionally, Greg Wing and Peter Pickett were both individually interviewed over Zoom regarding their experiences with the WingMaster device. The interviews examined both the nature of the injury incurred as well as the combined efforts of both men to remedy the situation and restore Greg Wing's ability to play the trumpet through accessibility technology. Finally, the document concludes with both a discussion regarding the future needs of

the adaptive technology community as well as a presentation of the outcomes provided by the WingMaster device.

Limitations

As the primary concern of this document is to record the creative processes and outcomes surrounding a specific piece of accessibility technology, the document is limited in scope in several ways. First, the document does not seek to draw heavily upon medical diagnoses, nor does it attempt to prescribe this technology as a viable solution to specific injuries or disabilities. In other words, this document is limited in the depth in which it explores medical diagnoses, terminology, etc. The document also refrains from surveying alternative medicines and excludes approaches or remedies that are primarily preventative in nature. Subsequently, the WingMaster device is presented as an accessibility technology that has the potential for multiple practical applications rather than a fix for specific injuries such as dystonia, broken bones, nerve damage, etc. While the document does reference earlier accessibility technologies, it only does so to place the WingMaster in the historical context of accessibility technology for trumpeters and musicians at large. In short, the study does not attempt to serve as a comprehensive, in-depth historical account or depiction of the development and implementation of accessibility technology for trumpeters and other musicians; rather, the study thoroughly examines one specific example of new technology through a solutions-based lens to illustrate potential future applications and outcomes of unknown scope and magnitude.

Chapter 2: Survey of Related Literature

This survey of literature examines several journals, articles, books, dissertations, and interviews. The available literature on accessibility technology for musicians is quite vast. However, the existing gaps in the collective knowledge, both in the form of raw data and depictions of solutions-based approaches, are equally numerous. In other words, there is no shortage of surveys, case studies, or data collections regarding injury and disability types, outcomes, etc., but these are often either very generalized and large in scope or extremely niche in nature. Further, much of the literature functions as an identifier of problems (i.e., types of injury or data regarding injury occurrence), rather than as proposed solutions to common injuries or disabilities. The combination of these factors has created a vacuum devoid of much extant literature on the specific topics addressed in this document: injuries and disabilities of trumpeters' right hands and technological developments to assist trumpeters.

As a collective entity, the field of accessibility technology for musicians and, more broadly, the study of injury and disability in musicians, could be characterized as an academic discipline still in its young stages, especially when compared to other academic disciplines. For example, one of the leading repositories of information on the subject and the first clinical medical journal addressing this unique subject matter, the journal of *Medical Problems of Performing Artists* (MPPA), was only established in 1986.[1] Another institution dedicated to the medical care of musicians, the Performing Arts Medical Association, was formed shortly

[1] Alice G. Brandfonbrener, "To Celebrate a New Journal," *Medical Problems of Performing Artists* vol. 1, no. 1 (March 1986), 1.

thereafter in 1989. In addition to collaborating with other groups for research and education, the association's diverse membership also oversees the creation of the *MPPA.*[2]

While *Medical Problems of Performing Artists* is a collection of knowledge that contains a wealth of information on disability and injury etiology, diagnoses, and suggested treatments, it also exhibits a few shortcomings or gaps in knowledge that are mirrored in the field of accessibility technology for musicians as a whole. These shortcomings or gaps of knowledge within the discipline are considered by many to be a direct result of several challenges for researchers and musicians alike.

First, many musicians either do not report their injuries or feel disinclined to do so. One study by Jonathan Newmark and Richard J. Lederman sought to examine the incidents of overuse syndrome in amateur musicians, building off the work of previous studies in Australia. This particular study made mention that one of the authors conducted a previous study that was hampered by an abysmally low response rate of just thirty percent amongst professional and conservatory musicians in Ohio.[3] Further, the authors hypothesized that the response rate was so low amongst professional and conservatory musicians because of an intrinsic reluctance to "admit that they have had 'real' problems or to risk public disclosure of these problems, despite researchers' assurances of confidentiality."[4] To support their hypothesis, the authors cited freelance musicians who "fear being 'blacklisted' as unreliable if their problems were to be known," and increased response rates in later studies that targeted only amateur musicians.[5] This

[2] Stephen A. Mitchell, "What is the Performing Arts Medical Association?" *International Trumpet Guild Journal* vol. 28, no. 3 (March 2004), 57.
[3] Jonathan Newmark and Richard J. Lederman, "Practice Doesn't Necessarily Make Perfect: Incidence of Overuse Syndromes in Amateur Instrumentalists," *Medical Problems of Performing Artists* vol. 2, no. 4 (December 1987), 142.
[4] Newmark and Lederman, "Practice Doesn't Necessarily Make Perfect," 142.
[5] Newmark and Lederman, "Practice Doesn't Necessarily Make Perfect," 142.

logic stands to reason as the musicians with arguably the most to lose are those engaged with music as a primary way of earning a living.

A study conducted by Hunter J.H. Fry found similar results but drew more striking conclusions from the data. Fry surveyed, interviewed, and examined eight orchestras from Australia, England, and the United States. Drawing upon his own findings as well as those of Leonard Essman, former tour physician of the New York Philharmonic Orchestra, Fry concluded the following: "An impressive clinical finding was the acceptance by many of the players that their condition of pain was a normal one. They had learned to live with it. The players tended to underestimate their problems or conceal them."[6] The conclusions drawn by Fry are quite bleak, depicting an entire industry in which approximately half of the workforce experiences significant to severe pain with little recourse for finding long-term relief. These conclusions highlight the importance and necessity of the technological development chronicled within this document.

In addition to the proclivity musicians have for under-reporting, underestimating, and accepting pain and injury as inherent to their craft and work as established by Fry, Newmark, Lederman, and others, the disparity between musicians of different instruments and their respective reports of injury incidences underscores the need for further study. A study conducted by Ralph A. Manchester followed university music students at both the undergraduate and graduate level over a period of four years. At the conclusion of the study, students had reported two hundred and five episodes of the occurrence of a hand injury at some point throughout the course of the study.[7] Of those reports, only two came from trumpeters, the lowest number reported by any individual instrument surveyed. A wide variety of hypotheses could be

[6] Hunter J.H. Fry, "Incidence of Overuse Syndrome in the Symphony Orchestra," *Medical Problems of Performing Artists* vol. 1, no. 2 (June 1986), 53.
[7] Ralph A. Manchester, "The Incidence of Hand Problems in Music Students," *Medical Problems of Performing Artists* vol. 3, no. 1 (March 1988), 16.

extrapolated from Manchester's data regarding links between certain types of instrumentalists and injury occurrences. However, one undisputable fact supported by the data is that trumpeters are disproportionately under-represented in this study, either because of fewer instances of injury or the more likely scenario of the under-reporting of injury occurrences by trumpeters. This under-representation, coupled with Manchester's conclusion that anywhere between five to eleven percent of music students at this institution encountered a hand injury each year, serves as a reminder that accessibility technology in the world of brass musicians is an overlooked need and should be provided with more attention and action.[8]

The fact that Manchester's study found fewer instances of injury among brass players compared to musicians of other orchestral instruments is neither unique nor uncommon. Another, more extensive survey was conducted by Anna Conti et al., in which nearly one thousand cases of Focal Task-Specific Dystonia of the musician's hand (FTSDmh) of the hand were reviewed. Unsurprisingly, the findings of this study mirrored that of Manchester and others in that brass musicians had fewer reported case incidences of the injury in question.[9]

A third study, conducted by Barry Knishkowy and Richard J. Lederman evaluated and treated a variety of musicians with musculoskeletal and neurological problems of the upper extremities. The fifty-two musicians seen by the authors represented a wide range of backgrounds, from student musicians, to amateurs, to professionals, all ranging in age from fifteen to sixty years old.[10] However, despite the various backgrounds of these musicians, none of them played a brass instrument. While the authors of this study were both constrained by and

[8] Manchester, "The Incidence of Hand Problems in Music Students," 18.
[9] Anna Conti, Seth Pullman, and Steven J. Frucht, "The Hand That Has Forgotten its Cunning – Lessons from Musicians' Hand Dystonia," *Movement Disorders* vol. 23, no. 10 (April 2008), 1402-1403.
[10] Barry Knishkowy and Richard J. Lederman, "Instrumental Musicians with Upper Extremity Disorders: A Follow-Up Study," *Medical Problems of Performing Artists* vol. 1, no. 3 (September 1986), 85-86.

had no control over the backgrounds of their patients, the absence of brass musicians, and more specifically, trumpeters, provides further evidence of a gap in the extant literature and knowledge in addition to a need for an underrepresented community.

While the true reasons for the distinct disproportion of reported injuries across various instrumental musicians may be impossible to discern one way or the other, some authors do make some interesting assertions on the subject. Two studies, one by Goodman and Staz, and one by Manchester, hypothesized or acknowledged the possibility that male musicians reported their injuries less frequently than their female counterparts.[11]Interestingly, the previously mentioned study by Conti refutes this argument, citing opposite trends regarding the relationship between gender and instances of reported injury among musicians.[12] While this premise may or may not be true, it could be one of many potential contributing factors toward fewer trumpeters represented in these studies, as a majority of trumpet players are male identifying.[13]

While much of the early literature in the performing arts injury and disability community focuses on outlining instances or occurrences of injury, much of the more recent literature centers on the prevention of injuries and solutions for those who are injured or disabled. Collectively, the more recent literature outlines many different types of recovery attempts from injury that are not exclusive to any one subsection of musicians. Some examples of this include the modification of practice and performing habits, the use of pain medication,[14] and even

[11] Glenn Goodman and Sheryl Staz, "Occupational Therapy for Musicians with Upper Extremity Overuse Syndrome: Patient Perceptions Regarding Effectiveness of Their Treatment," *Medical Problems of Performing Artists* vol. 4, no. 1 (March 1989), 12.
Manchester, "The Incidence of Hand Problems in Music Students," 17.
[12] Conti, Pullman, and Frucht, "The Hand That Has Forgotten its Cunning – Lessons from Musicians' Hand Dystonia," 1398-1399.
[13] Oliver Staley and Amanda Shendruk, "Here's What the Stark Gender Disparity Among Top Orchestra Musicians Looks Like," QZ.com, Quartz, October 16, 2018, https://qz.com/work/1393078/orchestras.
[14] Richard Hoppmann et al., "Pseudoephedrine for Focal Dystonia," *Medical Problems of Performing Artists* vol. 6, no. 2 (June 1991), 49.

elective surgery.[15] The consensus amongst the literature surveyed is that these solutions sometimes leave much to be desired but are nonetheless important to the community as a means to treat and remediate symptoms stemming from injury or disability.

In addition to the general solutions outlined in the previous paragraph, quite a bit of literature on accessibility technology for specific instrumentalists does exist. However, much of this subsection of the existing literature covers niche scenarios. For example, Richard N. Norris wrote an article on the effectiveness and proposed modifications to the Bo-Pep Thumb Guide to aide in the prevention and mitigation of right-hand injuries for flautists.[16] Likewise, Jon D. Marion and Joseph E. Sheppard wrote a case study that focused on the fabrication and modification of an AlumaFoam splint that was attached by Velcro to the hand of a keyboardist to mitigate pain and the progression of injury.[17] While these technological developments may not appear to readily lend themselves to assisting the needs of trumpeters, they do highlight attempts at creating assistive technology in other instrument-specific areas and thus showcase the need for more attention and action to these issues within the trumpet community.

Regarding trumpet-specific injuries, disabilities, and accessibility technology, the existing literature is sparse. Further, much of the literature on trumpet injuries and disabilities is concentrated on issues of the lip or embouchure; issues of the hand or upper extremity are often either ignored completely or treated with little consideration. Evidence of this can be seen in David Hickman's *Trumpet Pedagogy*, which is considered a leading source on all things trumpet and contains a large section on trumpet-related injuries, but barely mentions injuries that are not

[15] Alice G. Brandfonbrener, "Special Treatment for Musicians? Some Specific Hazards of Elective Surgery," *Medical Problems of Performing Artists* vol. 6, no. 2 (June 1991), 38.
[16] Richard N. Norris, "Design for a Right Thumb Rest for the Flute Based on Physical Analysis," *Medical Problems of Performing Artists* vol. 5., no. 4 (December 1990), 161.
[17] Jon D. Marion, and Joseph E. Sheppard, "An Orthotic Device to Prevent Thumb Joint Hyperextension Following Carpometacarpal Arthritis Surgery: A Case Study," *Medical Problems of Performing Artists* vol. 6, no. 3 (September 1991), 91.

of the embouchure.[18] Two of the most well-known examples, which may be a stretch of a characterization, of trumpeters with injury or disability are Joseph "Wingy" Manone and James "Jimmy" Burke. Wingy Manone was a Dixieland trumpeter who performed professionally for many years with a prosthesis after losing his right arm in a streetcar accident as a child.[19] Jimmy Burke was a famous virtuosic cornetist who lost the use of his right hand and arm when complications during his birth led to the use of surgical forceps that damaged his brachial plexus nerve in his neck.[20] As a child, Burke's father fashioned a type of stand using a tripod and rollers to hold the trumpet while Burke played.[21] It could be hypothesized that this invention influenced the modern day construct known as ERGOBrass Ergonomic Supports as the two systems are somewhat fundamentally similar.[22] In addition to the stand used as a child, Burke learned to play the cornet left-handed and even had a left-handed cornet created for him by the King Company.[23] Both examples illustrate the somewhat primitive nature of early accessibility technology for trumpeters. Additionally, the creativity and ingenuity exemplified in the creation of the device used as a child by Jimmy Burke is often seen in today's remedies for hand and upper extremity injuries in trumpeters. In other words, few mainstream accessibility technologies exist, so people with injuries and disabilities frequently must devise solutions on their own with whatever means

[18] David Hickman, *Trumpet Pedagogy: A Compendium of Modern Teaching Techniques* (Chandler, AZ: Hickman Music Editions, 2006), 252.
[19] Scott Yanow, *Jazz Kings: The Players Who Shaped the Sound of Jazz Trumpet* (San Francisco: Backbeat Books, 2001), 240.
[20] Wayne Clifford Bennett III, "James Franes Burke's *Zorita* (c. 1968): A Transcribed Edition for Solo Cornet and Brass Quintet" (DMA Diss., The University of North Carolina at Greensboro, 2013), 5.
[21] Wayne Clifford Bennett III, "James Francis Burke's *Zorita* (c. 1968): A Transcribed Edition for Solo Cornet and Brass Quinet," 5.
[22] Kevin Price and Alan H.D. Watson, "Effect of Using Ergobrass Ergonomic Supports on Postural Muscles in Trumpet, Trombone, and French Horn Players," *Medical Problems of Performing Artists* vol. 33, no. 3 (September 2018), 184.
[23] Bill Spilka, "Interview with James F. Burke, 1923-1981," *New York Brass Conference for Scholarships Journal* 10 (Spring 1982), 28.

available, which further proves the need for the WingMaster and is covered more in-depth in chapter three.

Chapter 3: Previous Accessibility Technologies and Adaptive Solutions

Though the field of disability studies for musicians is young, much work has been done in cataloguing the etiology, diagnoses, and remedies for a variety of injuries and disabilities experienced by musicians. This chapter examines several remedies and solutions that are commonly prescribed for musicians for a variety of injuries and disabilities. As mentioned in chapter one, the purpose of this survey of general adaptive solutions and previous accessibility technology for trumpeters is not to be comprehensive in scope. Rather, the goal of this chapter is to provide a brief historical context of the progression of remedies recommended by experts in the field of disability studies for musicians. Additionally, this chapter also illuminates some of the circumstances that impacted the creation of the WingMaster device.

This overview will be divided into two sections: General Adaptive Solutions and Historical Accessibility Technologies for Trumpet. Both sections will detail several adaptive measures commonly recommended for musicians and provide background information on each. Additionally, both sections will contain a brief discussion regarding the effectiveness, accessibility, efficiency, and adaptability of each technology or remedy. These terms have each been defined as they relate to this study on the following page **(See Table 1).** The characteristics of all referenced technologies, remedies, and solutions will be evaluated based on a rubric **(See Table 2).**

Table 1 Evaluation Term Definitions

Evaluation Term Definitions	
Effectiveness	Within the context of this chapter discussion, effectiveness relates to the alleviation of symptoms or side-effects, whether partial or complete, of an injury or disability.
Accessibility	Within the context of this chapter discussion, accessibility relates to the ease of obtainability and use of an adaptive technology, remedy, or solution.
Efficiency	Within the context of this chapter discussion, efficiency relates to the overall outcomes experienced by a user after both the challenges and benefits of a technology, remedy, or solution have been weighed and considered. In short, efficiency is the result of weighing accessibility against the effectiveness for a particular technology, remedy, or solution.
Adaptability	Within the context of this chapter discussion, adaptability relates to the ability of a technology, remedy, or solution to be beneficial or effective for multiple types of injuries and/or disabilities.

Table 2 Evaluation Rubric

	1	2	3	4	5	6
Effective	The device is **highly ineffective**, providing no positive outcomes or only negative outcomes.	The device is **ineffective**, providing very few positive outcomes or many negative outcomes.	The device is **somewhat ineffective**, providing few positive outcomes or several negative outcomes.	The device is **somewhat effective**, providing several positive outcomes or few negative outcomes.	The device is **effective**, providing many positive outcomes or very few negative outcomes	The device is **highly effective**, providing only positive outcomes or no negative outcomes.
Accessible	The device is **highly inaccessible**, presenting the user with overwhelming barriers to obtain or use.	The device is **inaccessible**, presenting the user with many barriers to obtain or use.	The device is **somewhat inaccessible**, presenting the user with several barriers to obtain or use.	The device is **somewhat accessible**, presenting the user with a few barriers to obtain or use.	The device is **accessible**, presenting the user with minimal barriers to obtain or use.	The device is **highly accessible**, presenting the user with no barriers to obtain or use.
Efficient	The device is **highly inefficient**, exhibiting overwhelmingly more barriers to obtain or use than positive outcomes.	The device is **inefficient**, exhibiting many more barriers to obtain or use than positive outcomes.	The device is **somewhat inefficient**, exhibiting slightly more barriers to obtain or use than positive outcomes.	The device is **somewhat efficient**, exhibiting slightly more positive outcomes than barriers to obtain or use.	The device is **efficient**, exhibiting many more positive outcomes than barriers to obtain or use.	The device is **highly efficient**, exhibiting overwhelmingly more positive outcomes than barriers to obtain or use.
Adaptable	The device is **highly unadaptable**, only able to be used for one type of injury or disability.	The device is **unadaptable**, only able to be used for a very small number of injuries or disabilities.	The device is **somewhat unadaptable**, able to be used for a few injuries or disabilities.	The device is **somewhat adaptable**, able to be used for several injuries or disabilities.	The device is **adaptable**, able to be used for many injuries or disabilities.	The device is **highly adaptable**, able to be used for an extremely large number of injuries or disabilities.

General Adaptive Solutions

Given the complex musculoskeletal and neurological requirements of playing a musical instrument, there are a wide variety of ways in which musicians can encounter injury or disability. Even though there are nearly as many unique injuries and disabilities as there are people, there are some adaptive solutions that transcend both a wide variety of types of injury and disability as well as a wide variety of musician specializations. These adaptive solutions are typically the first line of defense against or treatment prescribed for many types of injury and disability. Additionally, these general adaptive solutions are often utilized in conjunction with one another, either through a comprehensive treatment plan or through a process of trial and error. Further, when used in conjunction with one another to alleviate an injury or disability, these adaptive solutions are frequently prescribed in an order of least expensive and least invasive to interventions that are more involved or dramatic. Perhaps unsurprisingly, the general adaptive solutions examined in this section of chapter three exhibit a wide variety of outcomes associated with their use. This is primarily due to the high number of individuals with unique situations who have needed these solutions as well as the fact that some of these solutions are used as a remedy for several different types of injury or disability. For further consideration, it should also be noted again that many of these general adaptive solutions are used in conjunction with one another. It is therefore difficult to examine these adaptive solutions in a definitive manner; what may work for one individual or one type of injury may not be transferable to another situation. As such, the information regarding the effectiveness, accessibility, efficiency, and adaptability of this section could reasonably be consumed with a dose of skepticism. The information for these general adaptive solutions was primarily sourced from medical and

academic journals, such as *Medical Problems of Performing Artists*, the *Annals of Indian Academy of Neurology*, and *The Bone & Joint Journal*.

Non-Invasive Strategies

As previously mentioned, general adaptive solutions are often prescribed or implemented in an order that respects invasiveness and expense. In other words, the most cost effective and least dramatic solutions are often considered first, though overall effectiveness of the treatment is also heavily considered.

One of the most common non-invasive solutions is the alteration of habits with regard to practicing and performing. Depending on the individual and their needs, this solution can be implemented in several ways, including the following: a reduction in time spent practicing or performing, methodical management of practice time by increasing the quantity of breaks during practice, favoring practice sessions that are shorter but more frequent, or even a complete stop to activities for a given period of time. Though it can be used for a variety of injuries and disabilities, it is frequently associated with treating the effects of overuse syndrome, one of the most commonly observed injuries in the musical community. Interestingly, one study surveyed eight symphony orchestras and found that overuse syndrome had been experienced by over fifty percent of the musicians.[24]

In terms of evaluation, the act of altering practice and performing habits is generally effective for many individuals. In many cases, the solution is effective at mitigating pain and discomfort for musicians. One study noted that eighty-five percent of participants who were treated for upper-extremity injuries and disorders noticed either marked or slight improvement in

[24] Fry, "Incidence of Overuse Syndrome in the Symphony Orchestra," 53.

their condition.[25] However, it should be noted that some participants in the referenced study did also have access to or undergo additional treatment such as physical therapy. While it is difficult to ascertain the exact extent to which the alteration of practice habits contributed to the improved condition of these individuals, it is undoubtedly a contributing factor. It should also be considered that there are relatively few, if any, negative outcomes typically associated with this strategy. If anything, musicians seem to experience outcomes that are either positive or negligible in nature when utilizing this solution. It is worth mentioning that some musicians, such as some of the trumpeters mentioned later in chapters three and four, find this particular adaptive solution as well as others like physical and occupational therapy to be frustrating. This is perhaps due to a perception that these solutions focus on treating the symptoms rather than the actual cause of the injury or disability in some cases, a concern that certainly contains some level of merit.

In addition to being effective, this solution is also highly accessible. It can be readily implemented by any musician and requires no outside cost, though many musicians using this strategy are typically also being observed by a doctor. Interestingly, some applications of this adaptive solution call for the musician to spend considerable amounts of time away from their instrument. This is not feasible for all musicians of course, particularly those who rely on their craft as a means of making a living.

Because this solution is both effective and highly accessible, it is also highly efficient, though with a caveat. For most musicians who employ this adaptive solution, positive outcomes are experienced. Further, there is little risk involved in the implementation of this strategy. However, due to the nature of injury recurrence and disability, many musicians end up needing

[25] Knishkowy and Lederman, "Instrumental Musicians with Upper Extremity Disorders: A Follow-Up Study," 87.

the assistance of additional adaptive solutions to find sustained relief. Therefore, the efficiency of the solution diminishes with time in some cases.

As this solution only requires an alteration of the individual's habits, it is highly adaptable. It is commonly used in an attempt to remediate an extremely wide variety of injuries and disabilities. Additionally, it is also usually one of the first solutions to be implemented due to its extreme ease of access and adaptability.

Another non-invasive general adaptive solution is the utilization of physical and occupational therapies. Like the alteration of practice habits, this solution is also quite common amongst musicians experiencing injury or disability. In addition, this solution follows the trend of frequently being paired or used in conjunction with other solutions and adaptive technologies. While the goals and implementation of physical and occupational therapies are similar in many ways, the individual's specific case and unique needs often dictates which type of therapy is pursued.

In terms of evaluation, physical and occupational therapies are generally effective. One study found that sixty-five percent of the musicians who participated in occupational therapy considered it to be effective at decreasing symptoms and increasing work productivity. Further, many respondents indicated that their level of pain was diminished in multiple settings: at rest, while playing, after playing, and during activities.[26] The primary types of potential negative outcomes regarding the effectiveness of this solution are muscle soreness and the aggravation of existing injuries, the former of which being quite common. It should again be stressed that the effectiveness of this adaptive solution may or may not be consistent amongst various types of

[26] Goodman and Staz, "Occupational Therapy for Musicians with Upper Extremity Overuse Syndrome: Patient Perceptions Regarding Effectiveness of Their Treatment," 13.

injury or disability and may also be impacted by the individual's health, age, musical experience, and other factors.

In addition to being effective, this solution is somewhat accessible. The primary barrier to the implementation of this solution is financial in nature. In the United States, many people lack access to affordable healthcare, including the means to see a physical or occupational therapist. Additionally, this solution also frequently requires dedication and follow-through on the part of the individual seeking treatment. In other words, multiple visits or sessions with the physical or occupational therapist over the course of several weeks or months are often required, creating further burdens involving time commitments and travel that could be viewed as barriers depending on an individual's living situation.

Because this solution is effective and somewhat accessible, it is somewhat efficient. The solution contains the potential to provide many positive outcomes for the individual with an injury or disability by treating both the symptoms and causes of their situation, depending on their specific diagnosis. While the aforementioned barriers may seem insignificant to a professional musician, who would likely do anything to continue their career, or someone in a place of financial stability, they could potentially pose real challenges to a hobbyist or an individual facing financial hardship.

As this solution involves the rehabilitation of an individual with regard to moving their body or completing specific fine motor tasks, it is highly adaptable. There are a wide variety of musculoskeletal and neurological injuries, diseases, and disorders that could potentially benefit from implementing this solution. Further, this method of treatment encompasses little risk, especially compared to other potential solutions, for a wide variety of injuries and disabilities.

To conclude, the alteration of practice habits and seeing a physical or occupational therapist are both extremely common general adaptive solutions employed by a wide variety of musicians as a remedy to injury and disability. While both solutions are generally effective, their association with positive outcomes varies wildly depending on several factors, most notably the location and type of injury or disability. Though the solutions are both highly adaptable, they differ in terms of accessibility and efficiency with physical and occupational therapy being inherently linked to the potential for more barriers to access. More information on specific cases of the application of these general adaptive solutions can be found in the Left-Handed Playing section of chapter three, the Swiffer Device section of chapter three, and throughout chapter four.

Medicinal Approaches

For some injuries and disabilities, a medicinal approach is used to alleviate both the symptoms and causes of the affected individual's situation. These approaches are frequently used in conjunction with the non-invasive solutions previously discussed in this chapter. Additionally, medicinal approaches are sometimes utilized as a follow-up step in the treatment process if other solutions do not yield positive outcomes.

Not surprisingly, this general adaptive solution varies significantly depending on the nature of the injury or disability experienced by the individual. Two types of medications that are used to treat a variety of injuries or disabilities are analgesics and non-steroidal anti-inflammatory drugs (NSAIDs). These types of medications are primarily used to treat pain and inflammation associated with an injury or disability and are frequently used with other approaches such as physical therapy and practice habit alteration. As many different types of

injuries and disabilities exhibit pain and inflammation as symptoms, it stands to reason that these particular types of drugs are some of the more popular selections within this adaptive approach.

In addition to analgesics and NSAIDs, there are also several other types of medicines routinely prescribed for individuals with injuries and disabilities. Some of these medications include benzodiazepines and anticholinergic drugs.[27] Other medications, such as pseudoephedrine, have been prescribed less frequently or in an experimental manner.[28] While most of these medications are taken orally, there is also a precedence for the injection of certain medications such as steroids and botulinum toxin (Botox) to treat disorders such as focal dystonia.[29]

In terms of evaluation, medicinal approaches are generally somewhat effective. One study found that sixty percent of respondents noted that they experienced moderate or complete relief using nonprescription medications; likewise, sixty-four percent of respondents to the same study indicated that they experienced moderate or complete relief using prescription medications.[30] However, the extent to which these medicinal approaches are effective is largely dependent upon the injury or disability they are being used to alleviate. It should also be noted that medicinal approaches are commonly associated with negative side effects or consequences. For example, one reported potential side effect to the injection of botulinum toxin is muscle weakness, which can understandably be extremely detrimental to a performing artist.[31] The possibility of allergic reactions and other negative side effects ranging from insignificant to

[27] Sanjay Pandey, "A practical approach to management of focal hand dystonia," *Annals of Indian Academy of Neurology* 18, no. 2 (2015), 147.
[28] Richard A. Hoppmann et al., "Pseudoephedrine for Focal Dystonia," *Medical Problems of Performing Artists* vol. 6, no. 2 (1991), 48.
[29] Shahin Sheibani-Rad, Scott W. Wolfe, Jesse Jupiter, "Hand disorders in musicians: the orthopaedic surgeon's role," *The Bone & Joint Journal* 95-B, no. 2 (February 2013), 148.
[30] Susan Gail Stephenson, "Musicians' Upper Extremity Musculoskeletal Problems: Medical Care from the Patients' Perspective," Master's Thesis, (Western Michigan University, 1997).
[31] Shahin Sheibani-Rad, Scott W. Wolfe, Jesse Jupiter, "Hand disorders in musicians," 148.

severe is possible with any medicinal approach and is largely dependent upon the individual's unique medical history.

In addition to being somewhat effective, medicinal approaches are also somewhat accessible. As with the physical and occupational therapies examined earlier, one of the largest barriers to accessibility with this general adaptive solution is financial in nature if nonprescription medicinal approaches are momentarily disregarded. To put it simply, accessing prescription medication requires being seen and evaluated by medical professionals, which may not be a viable option for some of the affected population due to constraints on finances and time, such as the ability to take off work. In addition, the aforementioned potential for negative side effects produced by these medicinal approaches can also create a barrier to accessibility for some individuals.

Because this solution is somewhat effective and somewhat accessible, it is also somewhat efficient. Following the trend of general adaptive solutions, the efficiency of this approach is often dictated by the specifics of an individual situation. The relationship between the potential for positive outcomes and negative side effects with these medicinal approaches appears to be quite balanced in general. Therefore, whether or not this solution is a worthwhile pursuit depends almost entirely on the individual's circumstances, such as their specific injury or disability and the outcomes associated with other solutions they may have already employed or are in the process of employing.

As this solution can be implemented in many ways through a variety of different medications, it is adaptable. In other words, there are many different medications that can be used to alleviate many different types of symptoms and their corresponding causes. However, not all types of injury or disability can be improved through medication. For example, in the case

of some complex disorders such as focal dystonia, medicinal approaches are still being studied and a lack of definitive evidence exists regarding the effectiveness of these approaches.

To conclude, medicinal approaches are common general adaptive solutions sought by musicians for a wide variety of injuries and disabilities. They are a viable method of treatment for a range of ailments, though their effectiveness depends heavily upon the individual's unique situation. Additionally, medicinal approaches are frequently utilized in conjunction with other general adaptive solutions such as physical and occupational therapies as part of a comprehensive treatment plan.

Surgical Interventions

Though less common than the previously discussed general adaptive solutions, surgical interventions are sometimes utilized to assist musicians facing injury or disability. Though these interventions are often coupled with other general adaptive solutions such as physical therapy and medication, surgery is generally reserved for the most dramatic of situations or after several other solutions have been exhausted without positive outcomes. In musicians, one of the most commonly utilized surgical interventions is carpal tunnel surgery/release, used to alleviate the impact of carpal tunnel syndrome.[32] Other upper-extremity conditions that commonly warrant surgery for musicians include cubital tunnel syndrome, tendonitis, trigger finger, and broken or fractured bones, to name a few.

In terms of evaluation, surgical interventions are generally somewhat effective. However, the evaluation of this type of general adaptive solution is complicated. Just as with the other

[32] Daniel Y. Chu, Sahand C. Eftekari, Peter J. Nicksic, and Samuel O. Poore, "Management of common conditions of the musician: a narrative review for plastic surgeons," *Journal of Plastic Surgery and Hand Surgery*, vol. 58 (2023), 92.

general adaptive solutions, the effectiveness of surgical interventions is largely a function of the type of injury or disability being treated, the afflicted individual's overall condition, and several other factors. It should be further noted that some musicians experience poor outcomes with surgical interventions not because of unsuccessful or ineffective surgery, but rather because of a complex situation plaguing them such as chronic pain. In other words, some performing artists' situations are complex, sometimes involving multiple ailments or types of injury and disability that are poorly understood or difficult to diagnose. In those situations, surgical interventions are sometimes viewed as a last resort, setting patients up for disappointment.[33] Despite the fact that the occurrence of complications is usually uncommon, surgical interventions do entail inherent risk. Though this risk is often mitigated by the fact that the most common surgical interventions are quick outpatient procedures, the risk for complications such as infection will always be present. With that being said, many surgical interventions do yield consistently positive outcomes and are often considered routine.

In addition to being generally somewhat effective, surgical interventions are somewhat inaccessible for a number of reasons. First and foremost, surgical interventions are an expensive endeavor in the United States, even when partially covered by insurance. This is further compounded by the fact that some surgical interventions that do assist musicians return to a sense of normality are deemed elective in nature. Additionally, many implementations of this solution involve missed time from work and other activities crucial to an accustomed quality of life while recovering.

As this solution is somewhat effective and somewhat inaccessible, it is also somewhat inefficient. The number of potential barriers to accessibility and inherent risk associated with this

[33] Alice G. Brandfonbrener, "Special Treatment for Musicians? Some Specific Hazards of Elective Surgery," *Medical Problems of Performing Artists* vol. 6, no. 2 (June 1991), 37.

solution often outweighs the potential for positive outcomes for most individuals. This solution is best utilized when a clear and concise diagnosis has been attained and other general adaptive solutions have yielded less than stellar results.

Because this intervention can be implemented in a wide variety of situations through varied means, it is adaptable. There are several injuries, disabilities, and disorders that can be treated through surgical intervention. For example, this solution can be used to treat both musculoskeletal and neurological conditions. However, this solution is less adaptable than other general adaptive solutions examined because many common injuries and disabilities experienced by musicians can be remedied through other means with fewer associated risks and less invasiveness.

To conclude, there are some injuries and disabilities best treated through surgical interventions. For those situations, this general adaptive solution is somewhat effective at yielding positive outcomes. However, the solution does also pose an inherent risk to the individual should complications arise. Further, because of the combination of the nature of sensitivity with which musicians and performing artists regard the parts of their body responsible for their craft as well as the finality of this type of intervention, this solution is frequently sought as a last resort or as a treatment secondary to other adaptive solutions. In other words, musicians and performing artists are often hesitant to explore this type of adaptive solution, and for good reasons.

Historical Accessibility Technologies for Trumpet

Even though the modern piston valve trumpet began its development in the early nineteenth century, the earliest, and perhaps most well-known, examples of accessibility technologies for trumpeters were not seen until the early twentieth century. Each of the following examples of trumpet-specific accessibility technology is unique. However, most, if not all of them, share a few commonalities. First and foremost, most of the examples were either created in a non-commercial setting or no longer exist in a commercial capacity. In fact, most of the solutions and technological devices surveyed were created and implemented by the individual affected by the injury or disability or someone close to them. In other words, accessibility technology available to trumpeters is sparse; as such, many of the existing technologies, like those outlined in this chapter, owe their creative processes to a "Do-It-Yourself" nature.

Joseph Matthews "Wingy" Manone – Prosthesis

Born in New Orleans in 1900, Joseph Matthews "Wingy" Manone was a successful Dixieland and jazz trumpeter and singer. Influenced by the likes of Louis Armstrong, Manone had a vibrant career, touring across much of the United States in the 1920s and later frequently appearing on the radio with Bing Crosby in the 1940s. With that being said, Manone is likely best known for "Tar Paper Stomp," his hit instrumental piece from 1930 which contained a riff later used as the basis for Glenn Miller's "In the Mood."[34]

When he was ten years old, he was involved in a streetcar accident which necessitated the amputation of his right arm and gave rise to his nickname, "Wingy." As a result, Manone used a

[34] Scott Yanow, *Trumpet Kings: The Players Who Shaped the Sound of Jazz Trumpet* (San Francisco: Backbeat Books, 2001), 241.

prosthetic right arm for the rest of his life. Despite this, he was able to learn to play the cornet as a boy, later transitioning to the trumpet. He was able to do this by using the prosthetic right arm to hold the weight of the instrument while operating the piston valves with his left hand. Surprisingly, because he was a lively and engaging entertainer, it is alleged that most of his audiences did not realize he was using an adaptive solution.[35] Though it is somewhat unclear, the surviving video recordings of his early performances seem to imply that he rested the leadpipe on top of his prosthesis and did not have any semblance of a standard grip that involves wrapping the digits of the hand around the valve block. This playing position can be observed in Figure 1 below.

Figure 1 Joseph "Wingy" Manone Playing Trumpet[36]

[35] Scott Yanow, "Wingy Manone: Profiles in Jazz," *The Syncopated Times*, August 31, 2022, https://syncopatedtimes.com/wingy-manone-profiles-in-jazz/#:~:text=Growing%20up%20in%20New%20Orleans,the%20time%20he%20was%2017.

[36] Greg Poppleton, "Wingy Manone – One-Armed Trumpeter – Phantom Dancer," Greg Poppleton: From Another Time, March 12, 2024, https://gregpoppletonmusic.com/wingy-manone-one-armed-trumpeter-phantom-dancer/.

In terms of evaluation, the prosthetic was effective because it assisted Manone in playing the trumpet by facilitating the holding of the horn. It accomplished this by distributing the weight of the horn somewhat evenly across both his prosthesis and his left shoulder, arm, wrists, and hand. Further, it allowed his left hand to operate the piston valves without also having to contend with supporting the wight of the instrument, leading to a playing position that would be considered the inverse of a standard playing position.

In addition to being effective, this adaptive device was also somewhat inaccessible. Throughout history, prosthetics have typically been notoriously expensive and difficult to obtain for those not in a state of financial freedom.[37] In modern times, prosthetics can be quite difficult to obtain for people without aid from insurance and other support systems. In Manone's case, the accessibility of this solution would have been further impacted by his need for multiple iterations of his prosthesis as he grew. Another important consideration is that prosthetic devices of the early twentieth-century were often uncomfortable to wear for long periods of time. Though it is unknown if this impacted Manone, it is certainly not outside the realm of possibility.

Because this device was effective and somewhat inaccessible, it is also somewhat efficient. The device assisted Manone in being able to play the instrument with only one hand by virtue of assisting him in bearing the weight of the instrument. However, the device was likely expensive and certainly would not be within the financial means of some people. It should also be noted that a modern prosthetic device would likely be considered more effective than Manone's given that advances in technology have allowed prosthetic devices to perform more complex motions and tasks in an intuitive fashion.

[37] "Prosthetics Through the Ages," *NIH MedlinePlus Magazine* 18, no. 2 (2023), 22.

As this device acts as a replacement for either part of or an entire body part, it is somewhat unadaptable. In other words, the device can only be utilized where parts of the body are missing, presumably from injury. In situations where the body part in question is present, but not functioning, the device is essentially useless. This means that the device can't be adapted for use in many cases of the most common injuries and disabilities seen by musicians such as overuse syndromes or movement disorders.

To conclude, Wingy Manone was a professional trumpeter instrumental in the development of early American jazz. Despite encountering a tragic accident as a young boy that necessitated the amputation of his right arm, Wingy was able to learn how to play the instrument through the assistance of a prosthetic arm that held the bulk of the weight of the instrument. While this device was effective at assisting him in playing the instrument, it has historically been a solution that is not readily available to all, primarily due to inherent financial barriers.

James Francis "Jimmy" Burke – The Tripod Device & The Left-Handed Cornet

Perhaps more well-known than Wingy Manone, and certainly more visibly impacted by his condition, James Francis "Jimmy" Burke was a famous cornetist of the mid-twentieth century. Born in Port Jefferson, New York in 1923, Burke had an illustrious career that spanned several decades and included serving as principal trumpet with the Baltimore Symphony Orchestra from 1943 to 1949 and principal cornet soloist with the Goldman Band from 1943 to 1974.[38] As mentioned in chapter two, due to complications during his birth that required the use

[38] Wayne Clifford Bennett III, "James Francis Burke's *Zorita* (c. 1968): A Transcribed Edition for Solo Cornet and Brass Quinet," 11.

of surgical forceps, Burke suffered an injury to his brachial plexus nerve that left him without the use of his right arm throughout his life.[39]

When Burke was a young boy, his father fashioned an adaptive device to assist him in learning to play the cornet. This device was a camera tripod that was used to hold the weight of the instrument while Burke operated the piston valves with his left hand. The Tripod Device was further modified to include wheels, allowing for increased mobility and flexibility to match Burke's specific needs in terms of height and playing angle as he aged.

In terms of evaluation, the Tripod Device was highly effective in that it allowed Burke to learn to play the cornet as a young child with the use of only one arm. To do this, it acted as a stand, propping up the instrument and allowing Burke's left hand to manipulate the piston valves without also having to bear the weight of the instrument. The addition of wheels to the Tripod Device allowed for increased mobility and, coupled with the adjustable nature of camera tripods, allowed Burke flexibility with regard to his individualized needs as he grew.

Though speculative in nature, the device may have been poor at distributing the weight of the instrument; due to individualized habits and preferences, some players require, or may feel more comfortable with, a subtle level of pressure exerted on the lips that is created by holding the weight of the trumpet with both hands. In other words, the device may be more effective for someone new to the instrument rather than someone having to re-adjust and reconcile with their established nature of playing.

In addition to being highly effective, this device is also highly accessible. In modern times, camera tripods can be acquired for relatively low financial cost, which likely wasn't the case in Burke's time given that cameras were less omnipresent and less accessible themselves.

[39] Wayne Clifford Bennett III, "James Francis Burke's *Zorita* (c. 1968): A Transcribed Edition for Solo Cornet and Brass Quinet," 5.

Today, there are a wide variety of brands and retailers producing and selling tripods, making it quite readily available to most people. However, camera tripods with wheels built in as a feature are generally more expensive and could pose a financial barrier to accessibility. With that being said, it would still be possible for someone to use a standard tripod and add wheels themselves to circumvent the potential financial barrier mentioned.

Because this device is highly effective and highly accessible, it is also highly efficient. There are very few, if any, inherent risks for negative outcomes associated with the use of this device. The only potential negative outcome of mention could be an adjustment period for an already established player to contend with the difference in pressure exerted upon their embouchure. However, the potential for this occurrence is only speculative in nature and there is no evidence of that outcome occurring. In short, the device has a high likelihood of being helpful to the player without much risk of further complicating their situation.

As this device can hold the entire weight of the instrument by itself, it is also highly adaptable. It could be a viable solution to a wide variety of injuries and disabilities. Further, because the device creates a situation in which only one hand needs to be able to interface with the instrument, it could be utilized by people experiencing injuries or disabilities to either side of their upper extremities.

Interestingly, as Burke got older, he eventually quit using the Tripod Device and switched to a different, more subtle example of accessibility technology: the left-handed cornet. The left-handed cornet was an instrument crafted for him by the King Company at the suggestion of Burke's famous teacher and cornetist, Charles Delaware "Del" Staigers.[40] It consisted of all

[40] Bill Spilka, "Interview with James F. Burke, 1923-1981," *New York Brass Conference for Scholarships Journal* 10 (Spring 1982), 29.

the same features as a standard trumpet or cornet, just with the position of the bell and lead pipe inverted with respect to the valve block; this inversion is demonstrated by Figure 2.

Figure 2 James "Jimmy" Burke Left-Handed Cornet[41]

Additionally, the pinky ring on the instrument was also moved to the opposite side. These changes allowed Burke to play left-handed in a more comfortable fashion, without having to

[41] Wayne Clifford Bennett III, "James Francis Burke's *Zorita* (c. 1968): A Transcribed Edition for Solo Cornet and Brass Quinet," 9.

extend his fingers or contort his wrist into awkward or uncomfortable positions. It should be noted that the left-handed cornet is a different accessibility technology or solution from simply left-handed playing or one-handed playing, both of which are discussed later in this chapter. While these three solutions are all similar in some ways, the outcomes associated with each respective solution varies and contains unique considerations.

In terms of evaluation, the left-handed cornet was effective in that it allowed Burke to play the instrument without the use of a device some might consider bulky or unsightly. In Burke's case, the switch to the left-handed cornet was likely quite seamless as he had been playing left-handed all his life. However, it should be noted that the left-handed cornet or trumpet would likely be less effective for a trumpeter already well established in playing with their right hand. This is because the inversion of roles of the hands when playing the instrument can be associated with dramatic side effects such as mouthpiece shifts and retraining the fingers to play every single note. These potential negative outcomes are discussed more thoroughly later in this chapter as well as in chapter four.

In addition to being effective, the left-handed cornet was somewhat inaccessible for the average person. In Burke's case, the device was accessible as he was already an employed musician of high caliber when he made the switch to the left-handed cornet. However, for the average person, a left-handed cornet or trumpet poses a substantial financial barrier. Today, a left-handed trumpet or cornet is considered a custom instrument and is not mass produced in the same way as the instrument in standard configuration. In other words, the left-handed instrument is typically only made upon request by most manufacturers. For any established trumpeter facing new injury or disability, the notion of buying an entirely new trumpet is likely unfeasible, though

it is possible the instrument could be more accessible to a beginner who does not already own the instrument in a standard configuration.

Because the left-handed cornet was effective and somewhat inaccessible, it was also somewhat efficient. While the outcomes associated with this device are generally positive and contain very little risk for side effects, the lack of accessibility of this device makes it somewhat efficient. For most players, simply playing left-handed on a standard configuration instrument is a more efficient and popular choice, as is also explained later in the chapter.

As the device shifts the primary role of mechanical movement from one hand to the other, it is adaptable. Further, the device could be a viable solution for trumpeters facing a variety of types of injury or disability to the right hand, fingers, or wrist. For example, though inefficient, this device could theoretically be implemented to remedy the effects of chronic overuse, dystonia, amputation, and more.

To conclude, James Francis “Jimmy” Burke was a famous and wildly successful cornet soloist of the early and mid-twentieth century. Throughout his life, Burke was unable to use his right arm due to an injury incurred at birth. Because of this, he had to learn to play the trumpet with the assistance of adaptive technology built by his father. Interestingly, Burke employed the use of two different adaptive technologies at different points throughout his career. It is important to differentiate the second of these solutions, the left-handed cornet, from other similar adaptive solutions. One such similar adaptive solution is the act of one-handed playing, which is examined more thoroughly later in this chapter. While the two solutions are similar, their respective associated outcomes and considerations are different in several subtle ways.

Robert "Bob" Baca – Left-Handed Playing

One of the most utilized trumpet-specific adaptive solutions is undoubtedly the act of left-handed playing. Trumpeters typically operate the instrument by using the right hand to control the piston valves while the left hand bears most of the weight of the instrument and operates the first and third valve slides. By contrast, this adaptive solution involves the inverse: the right hand holds most of the weight of the instrument while the left hand controls the piston valves. It is important to differentiate between this adaptive solution and the left-handed cornet utilized by Jimmy Burke that was discussed and examined earlier in the chapter. In the case of Burke, an instrument was modified so as to be compatible with the manipulation of the piston valves by the left hand. In this case, the mechanics and design of the instrument remain unchanged. Instead, the player is responsible for the adaptive modification, thus yielding outcomes that differ from the examples of accessibility technology utilized by Burke.

Left-handed playing is an adaptive solution that exhibits several innate characteristics that lend themselves to being readily adopted by trumpeters with injury or disability, namely with regard to ease of accessibility. As such, there are a few well-known trumpeters actively employing this solution in their own everyday performance and practice. While there are multiple trumpeters currently playing left-handed to remediate injury or disability, the information used as the basis for the examination of this adaptive solution was primarily sourced from an interview with Robert "Bob" Baca, professional trumpeter and collegiate professor of trumpet at the University of Wisconsin at Eau Claire. The following information regarding Baca's condition, recovery, the effects on his ability to play trumpet, and his experience with accessibility technology was obtained in an interview via Zoom on Monday, September 30th, 2024, at 4:15 PM EDT. A full transcript of this interview can be located in Appendix B.

Unlike the experiences of some of the other trumpeters mentioned in this chapter, Baca did not encounter a need for adaptive solutions until much later in his career. Baca boasts an impressive career as a performer, having toured with the likes of Frank Sinatra, Buddy Rich, Tony Bennett, Mel Torme, and Blood, Sweat & Tears.[42] In addition, he has also performed with the Milwaukee Symphony, the Minnesota Orchestra, and in over one hundred Broadway shows.[43] Moreover, Baca has also served as a collegiate professor of trumpet and jazz for nearly four decades. Baca's status as an accomplished teacher and performer illustrates several important points: first, that an injury or disability can impact anyone at any time, inhibiting even world-class musicians from their craft overnight; and second, that the nature of Baca's outcomes was undoubtedly influenced by his dedication to, and knowledge of, his art form. In other words, his experiences and outcomes may or may not be typical of his particular situation.

Already an established professional musician and teacher with a track record of success, Baca's experiences with trumpet-related injury and disability began between late 2010 and early 2011. During this time, Baca noticed that it was becoming more difficult for his first finger on his right hand to operate the first piston valve on the instrument. To be more precise, he noted that his first finger on his right hand would involuntarily retract, thus becoming displaced and unable to strike the button to depress the piston valve. When Baca played the trumpet prior to his condition, his fingers typified what is commonly described as the "correct" playing position: curved with the tip of the finger serving as the point of contact with the valve button. When his symptoms began, Baca was no longer able to play in this position without his finger involuntarily retracting toward his palm and sliding or falling off the valve button. According to him, the

[42] Libby Schneider, "Instructors: Robert Baca," Shell Lake Arts Center, March 12, 2023, https://shelllakeartscenter.org/2023/03/12/robert-baca/.
[43] "Robert James Baca," University of Wisconsin Eau Claire, accessed April 8, 2025, https://www.uwec.edu/profiles/bacarj.

symptoms of this involuntary retraction of the first finger did not initially include pain or serious discomfort. Instead, Baca likened the sensation to a twitch of the eye, stating that there was, “No pain – [it was] totally electric.”

Understandably, this frustrating situation caused him to inexplicably miss notes seemingly at random throughout his playing. In an attempt to diminish the impact of the symptoms he was experiencing, Baca briefly experimented with an alteration to his standard playing position in which the point of contact between the valve button and his first finger was changed. Unfortunately, Baca’s results were nearly identical regardless of the altered location of the point of contact between his finger and the valve button. In other words, it did not matter which phalange or interphalangeal joint interfaced with instrument with regard to the negative symptoms he was experiencing.

Eventually, Baca experienced further complications when his right bicep began hurting as a secondary consequence of his condition. According to him, this new pain in his arm was a direct result of overcompensating to address the deficiencies of his finger. Regardless of the origin of his pain, it was this development that prompted him to seek medical attention. Baca was initially evaluated by his local primary care physician who was unable to assist him in definitively diagnosing his condition. However, his physician was able to assist him with a referral to a hand specialist at the Mayo Clinic Hand Rehabilitation Clinic in Rochester, Minnesota.

After some time, Baca was eventually able to be evaluated by a hand specialist at the Mayo Clinic. Among other things, this evaluation consisted of a variety of exercises involving Baca’s afflicted finger. Some of these exercises required him to perform specific, repetitive cognitive motions like picking up buttons, pennies, and other small objects with only his thumb

and first finger. It was during this evaluation by the hand specialist at the Mayo Clinic that Baca was diagnosed with focal hand dystonia (FhD), an idiopathic neurological disorder that has become increasingly well documented in the field of disability studies. While there are many musicians who have been impacted by the disorder, it is considered to be quite rare.[44] Additionally, the disorder holds a reputation for being quite devastating within many circles of musicians.

In terms of treatment, many of the most commonly prescribed solutions or methods for treating focal hand dystonia focus on the alteration of habits to avoid certain triggers, utilizing occupational and physical therapies, or other interventions such as medicines or injections.[45] Many of these generalized adaptive solutions were examined and evaluated previously in the chapter.

In Bob Baca's case, the first recommended course of action involved working with an occupational therapist. However, his case was also unique; according to Baca, the aforementioned hand specialist was able to obtain a grant to fund the therapy. In this way, Baca was able to work with an occupational therapist who implemented experimental exercises while the entire process was being overseen by the hand specialist and used as research. Once a week for approximately nine months, Baca traveled to the Mayo Clinic in Rochester, Minnesota to conduct these exercises. Over that period of time, he worked through a wide variety of exercises; some of these involved retrieving small objects, such as pencils and coins, from a bowl of rice painstakingly slowly without disturbing the grains of rice through involuntary flicking of the impacted finger.

[44] "Focal Dystonia," Cleveland Clinic, accessed April 8, 2025, https://my.clevelandclinic.org/health/diseases/22796-focal-dystonia.
[45] "Hand Dystonia," Dystonia Foundation, accessed April 8, 2025, https://dystonia-foundation.org/what-is-dystonia/types-dystonia/hand-dystonia/.

Eventually, the nature of these exercises was extrapolated to cognitive movements involving the trumpet, which were subsequently filmed on a high-speed camera as part of the hand specialist's research. In an interview, Baca explicitly referred to an exercise he devised in which he was to take several minutes to depress a single stroke of the piston valve with his first finger as being quite helpful. While performing this movement, Baca was also to imagine nothing else other than an electronic signal traveling from his brain to his finger, eliciting only the desired motion. This extremely slow, deliberate motion and high level of mental focus was an essential component of many of the exercises throughout his therapy. Baca credited his success to the training he received and philosophies he learned from William "Bill" Adam, renowned trumpet pedagogue and longtime professor at Indiana University. In particular, he cited the commitment to a vivid and disciplined imagination, a core tenet of the philosophies of Bill Adam, as being extremely beneficial throughout his journey.

By the conclusion of his therapy, Baca stated that he reached, "an area where I felt that I could do this," and began performing again. While the therapy hadn't erased or undone the neurological disorder that affected him, it did assist him in managing his symptoms. Through a copious amount of work, both physical and mental in nature, he was able to perform again at a level he felt was respectable. Unsurprisingly, these results are congruent with the outcomes of physical and occupational therapy examined more thoroughly earlier in this chapter.

Despite seeing some measure of positive outcomes as a result of the therapy, Baca eventually sought other adaptive solutions such as left-handed playing. Not long after completing therapy and resuming his public performances, Baca recalled performing the Alexander Arutunian's Trumpet Concerto as a soloist with an orchestra. As most trumpeters will know, the work is a demanding piece containing many virtuosic, flashy passages and typically lasting

anywhere between fourteen and seventeen minutes in length depending upon several factors. Needless to say, the piece requires great faculty in many areas, including finger dexterity. For Baca, the performance generally went well, but he did mention that he had a few spots of difficulty with his retracting finger during the final cadenza of the work. However, the performance also exerted a toll on Baca, requiring a monumental effort in terms of both physical preparation and mental focus during the performance to maintain functionality with his finger. In fact, the entire experience left him questioning the intrinsic worth of the monumental work required to perform things that used to be second nature. Of his feelings after the performance, Baca said, "I just remember thinking to myself, 'this took so much incredible effort to do this. I don't know if I want to keep doing this.'"

As a result of his feelings after performing Arutunian's Trumpet Concerto, Baca began to experiment with playing the trumpet left-handed during what he described as, "a really down moment," full of self-doubt. Though the experience was very awkward at first, he approached the challenge just as he had approached the physical therapy exercises and his preparation upon returning to performing: extremely slowly and methodically. For Baca, switching to left-handed playing provided a completely new set of challenges and obstacles to overcome.

First and foremost, Baca had to slowly reteach and reinternalize his knowledge of the finger positions for each note on the instrument for his left hand to operate the piston valves successfully. While not incredibly difficult, this challenge does require great dedication and patience as it is largely a function of time. In addition to familiarizing his left hand with the duties of manipulating the piston valves, Baca also said switching to left-handed playing elicited a shift in his embouchure, stating, "It was kind of like starting trumpet all over again." Figure 3 demonstrates the left-handed playing position adopted by Baca.

Figure 3 Robert "Bob" Baca Left-Handed Playing Position[46]

After a tremendous amount of dedicated time and effort, Baca overcame the unfamiliarity that came from interfacing with his trumpet in new ways. In fact, he was eventually able to return to his gigs, performing Broadway shows at an extremely high level. Just like Arutunian's Trumpet Concerto, the trumpet books for a Broadway show can be quite demanding. It was during a particularly intense run of a show that Baca began noticing intense pain in his right hand. Part of this pain was from his first finger involuntarily retracting and clamping down, likely as a stress response to playing difficult material for long periods of time. Baca described the pain as dramatic, forcing him to change how he positioned his right hand multiple times during the run of shows.

He also experienced considerable pain and discomfort in his right palm as a result of holding the instrument in a way in which it was not designed. To be more specific, the second

[46] Robert Baca, "Listen Closely," Band Director Media Group, February 6, 2018, https://banddirector.com/jazz-band/listen-closely/.

valve slide on a modern ‘B-flat’ trumpet exits the second valve and sticks out on the right side of the valve block. By contrast, the left side of the valve block, which typically encounters more surface area contact with the hand in the standard playing position, is relatively flat. Additionally, many modern trumpets contain a draw knob on the second valve slide to facilitate better grip when removing the slide. However, this knob typically does not come into contact with the hand in a standard playing position. With a left-handed playing position, the knob can press into the palm of the right hand, causing considerable discomfort and pain over time.

Eventually, whether as a direct result of the aforementioned pain and discomfort or not, Baca had to undergo carpal tunnel surgery on his right hand. Both the surgery and the act of flipping the second valve slide over so as to avoid contact with the draw knob helped reduce Baca’s pain and discomfort when he played, allowing him to continue performing at a high level as he was accustomed to.

In terms of evaluation, this solution is effective because it allowed Baca to return to the high level of playing that he was accustomed to prior to the development of his disorder. Although it took considerable time and included a few negative side effects that required attention along the way, Baca is now able to do all the same things as prior to his condition. Of the negative side effects Baca encountered, the most impactful is undoubtedly the shifting of the embouchure due to changing hand positions. The idea of any change to a trumpeter’s embouchure, much less one as dramatic as Baca described, is typically a daunting prospect. However, this negative side effect can be mitigated with an abundance of time and effort on the part of the trumpeter.

In addition to being effective, this solution is also highly accessible. Employing this solution requires no additional financial burden and no additional acquiring or implementing

technology. Instead, this solution is completely contained to the individual in question, meaning it is available to every trumpeter who has time and is dedicated to self-improvement. The subtle differences between one-handed playing and left-handed playing should be again noted as they sometimes exhibit slightly different characteristics regarding effectiveness and accessibility.

Because this solution is effective and highly accessible, it is also highly efficient. In short, the risks for negative side effects pale in magnitude and scope to the potential for positive outcomes associated with this adaptive solution. The primary potential negative side effects, which may or may not happen on a consistent basis to individuals who employ this solution, can typically be mitigated. In Baca's case, the pain and discomfort he experienced when he reversed the roles of his hands was eventually mitigated by shifting his grip and inverting one of the slides on the trumpet. As previously mentioned, his shifting embouchure was also mitigated with countless hours of methodical practice, though amateur musicians may not have the same results in that area.

In addition to being highly accessible, this solution is also highly adaptable for many of the same reasons. This solution would primarily be helpful for trumpeters experiencing injury or disability to one or more of the upper extremities on the right-hand side of the body. In other words, it is not limited in being beneficial for hand injuries and disabilities. Instead, it could reasonably be utilized by trumpeters with injuries or disabilities of the shoulder, wrist, forearm, or elbow on the right side of the body.

Surprisingly, when reflecting upon his experiences, Baca claimed that his shift in mouthpiece placement was, "for the better," indicating that he felt his trumpet playing was better now than it was prior to his diagnosis. Additionally, Baca also mentioned that he had difficulty imagining what it felt like to play right-handed prior to the development of his condition. While

Baca did not express how long it took him to reach this frame of mind, it is likely fair to assume the timeframe was in excess of one year given the experiences of other trumpeters.

While it is true that the left-handed playing solution assisted Baca in the restoration of his trumpeting abilities, his mental approach and attitude toward the situation should not be discounted. Baca's demeanor was incredibly positive throughout the interview. Of his thoughts on the adversity he encountered, Baca said he believed, "good things always come out of really bad things." In addition, Baca said that he never cared what others thought regarding his temporarily diminished trumpeting. Instead, he claimed that trumpet playing was therapeutic for him, stating, "it's pure, absolute enjoyment that I live for." While difficult to measure, the assertion that his positive outlook and approach aided him in this process may stand to reason and is further explored in chapter five.

To conclude, Robert "Bob" Baca is a professional trumpeter and long-time collegiate professor who was diagnosed with focal hand dystonia. After attempting to remedy the situation through non-invasive procedures and generalized adaptive solutions like occupational therapy, Baca resolved to teach his left hand to operate the piston valves of the trumpet and switch the role of the right hand to the primary support for the weight of the horn. This transition consisted of a considerable learning curve in which Baca's mouthpiece placement and embouchure were shifted and changed. In addition, Baca also had to have surgery as a result of problems that arose while he was employing this solution. Throughout the process, Baca relied heavily on the lessons of his former teacher, William Adam, for guidance and support. In particular, Baca discussed the importance of focusing on creating a mental image of what he wanted rather than focusing on the reality of what his hand was able to do. This mental approach, paired with the left-handed playing solution, a healthy dose of optimism, and a high work ethic, allowed him to re-establish

a high level of trumpet playing and continue his distinguished career. Though Baca's injury is somewhat rare, his story and subsequent solution are far more common than most of the musical world realizes.

Steffanie Skiles – The Swiffer Device & One-Handed Playing

A more recent attempt to remedy an injury than those seen by Wingy Manone and Jimmy Burke, the Swiffer Device was an accessibility technology used by a Kentucky schoolteacher named Steffanie Skiles. The following information regarding Skiles' injury, recovery, the effects on her ability to play trumpet, and her experience with accessibility technology was obtained in an interview via Zoom on Monday, September 16th, 2024, at 5:30 PM EDT. A full transcript of this interview can be located in Appendix C.

On the morning of February 23, 2021, Skiles slipped and fell in an icy parking lot, resulting in a shattered olecranon, fractured ulna, several torn tendons and muscles, and a tremendous amount of pain throughout her left arm and elbow. Further, Skiles' range of motion was severely impacted, causing extreme limitations to both fine motor control as well as gross motor control. Despite her injury, Skiles attempted to proceed with her day, attending work and attempting to play the trumpet as usual. According to Skiles, it very quickly became apparent that her injury was serious and would require a trip to the hospital where surgery was recommended by the medical staff. Unlike the typical progression of remediation approaches outlined earlier in this chapter, the nature of Skiles' injury necessitated surgical intervention to achieve the best predicted outcomes.

On March 2, 2021, Skiles underwent a surgical procedure known as an open reduction and internal fixation of olecranon fracture via posterior reconstruction plate and long-tension band wire. The nature of this surgery also necessitated several weeks of rest and recuperation, as

is common for this type of generalized adaptive solution. The severity of Skiles' injury and the scope of the recovery time required for the surgical intervention may be further illuminated by Figure 4 and Figure 5 below.

Figure 4 Skiles' Injury X-ray Before

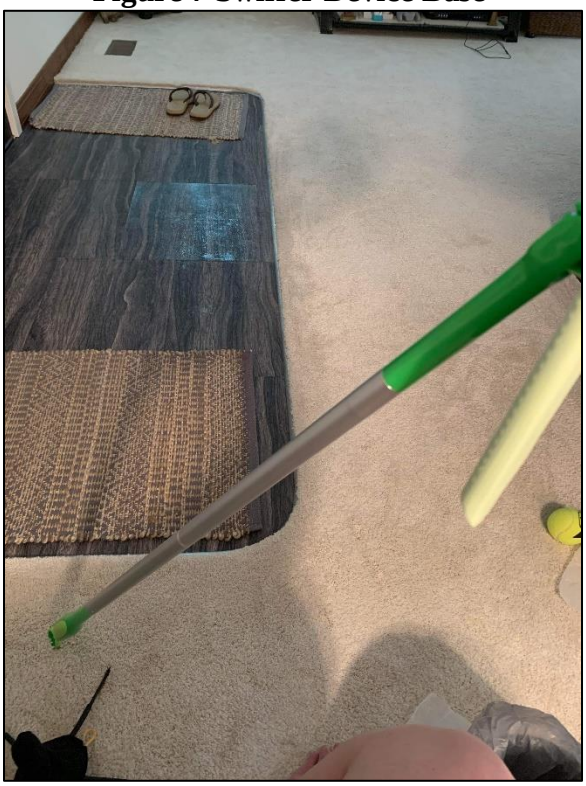
Figure 5 Skiles' Injury X-ray After

The magnitude and severity of her injury and initial surgery notwithstanding, Skiles returned to playing the trumpet on March 16, 2021, though she readily admitted that she may have returned to playing the trumpet too quickly, stating, “I probably should have taken more time off than I did, but between trying to keep normalcy and gigs and all that, I kind of just forced myself to get over it and deal with it.” When she resumed playing the trumpet, she could not raise her left elbow as her arm was placed in a cast that restricted her available range of motion. Her left arm, which typically bears the bulk of the weight of the instrument, was of no assistance to her. To play the instrument without placing significant strain on her right hand, wrist, arm, and shoulder, Skiles used everyday materials and ingenuity to fashion a device capable of functioning as temporary left arm.

According to Skiles, the device could be fashioned by anyone with access to a nearby Walmart, consisting primarily of an unaltered Swiffer Sweeper. When in use, the device was flipped vertically so that the padded portion of the sweeper rested in between the valve block and bell of the trumpet. Meanwhile, Skiles placed the handle of the sweeper in a tennis shoe to serve as a sturdy base, free from unintended movement or sliding when in contact with the floor. The layout of the device can be seen in Figure 6 and Figure 7 on the following page.

Figure 6 Swiffer Device Pad

Figure 7 Swiffer Device Base



As previously mentioned, this device acted as a stabilizing anchor, allowing Skiles' right hand to continue to operate the piston valves of the instrument while her left arm was immobilized. Skiles used this device for quite some time, beginning with her return to playing in late March and concluding with her restored range of motion in August of 2021.

In terms of evaluation, the Swiffer Device is highly effective as it allowed Skiles to resume playing trumpet with minimal negative side effects or consequences. Skiles' ability to play the trumpet, both technically and musically, was not diminished in any fundamental or profound way. Her facility to produce tone and operate the piston valves of the instrument remained largely unchanged. However, it is important to note that utilizing this device did elicit a shift in the horizontal placement of the mouthpiece on Skiles' lips. In her case, the shift was slight, though noticeable; it is also worth mentioning that musicians are typically extremely

sensitive to deviations or changes in their embouchure or mouthpiece placement. Additionally, this side effect would be negated or irrelevant if the device were to be used to assist a person with a disability in learning to play the instrument rather than as a tool to mitigate injury for an already established musician. In other words, the possibility of negative side effects associated with the use of this device stems largely from the potential deviation from a musician's perception of their normal playing position rather than any issue with the device itself. Regardless, the prospect of an adjustment period for an established musician can be daunting and should be considered with great care.

In addition to being highly effective, this device is also highly accessible. As mentioned earlier, the bulk of materials necessary for fashioning this device can be purchased many places across the United States for little cost. In fact, at the time of this publication, the Swiffer Sweeper can be purchased for approximately fifteen to twenty USD. Further, the device is not difficult to use; there are no lengthy processes required to modify the instrument and there are no fundamental changes to the way in which the instrument is played. Additionally, the device is somewhat customizable and adjustable, providing the user with a degree of flexibility with respect to the desired angle, position, and height of the stand to meet the needs of musicians of a variety of shapes, sizes, and ages.

Because this device is both highly effective as well as highly accessible, it is also highly efficient. When compared to the potential for positive outcomes, the drawbacks to using this device are quite limited in scope and magnitude. Aside from the potential deviation from a musician's established system and performance procedure, the most significant potential negative side effect of using this device is likely the time investment associated with undertaking a trial-and-error process to refine this device for the individual's needs. However, it should be

mentioned that the trial-and-error process associated with this device is easily overshadowed by the same process associated with other assistive technologies, such as those covered in chapter four.

As this device acts as a stand-in for the entire left arm, it is highly adaptable and could function as a solution for a wide variety of injuries or disabilities impacting the shoulder, arm, elbow, wrist, or any of the joints, muscles, and tendons in between. Although it was originally used specifically for an injury to the left elbow, the device could likely be modified to assist a musician with an injury or disability to the upper extremity on the right side of the body as well. However, this may also induce more unintended consequences or provide diminished effectiveness as the right hand is responsible for the more complex and fine-tuned motions of playing the trumpet.

Despite the generally positive outcomes Skiles experienced with the Swiffer Device, it is important to note that it was not the only trumpet-specific adaptive solution being employed to remediate her injury. When asked about using the Swiffer Device while performing on gigs, Skiles indicated that she was extremely apprehensive to use the device around others, stating, “I was scared out of my skull.” To alleviate her apprehension and anxiety stemming from the prospect of using the Swiffer Device in public, Skiles elected to play the trumpet using only her right hand on gigs and in her daily teaching. Additionally, Skiles also mentioned the following: “I would force it even when I couldn’t have the range of motion. I would tuck in my left elbow to where my hand would be more keen to what we normally do.” Skiles’ sentiment regarding the use of accessibility technology in the public view is interesting as it mimics some of the behaviors seen in some of the other studies examined in chapter two. Further, Skiles’ responses

are perhaps evidence supporting several of those authors' assertions that musicians exhibit a proclivity to under-report, ignore, and downplay their injuries and disabilities.

It is important to differentiate Skiles' use of only her right hand to play the trumpet from several other examples examined in this chapter, such as the one-handed playing solution used by Jimmy Burke. While both trumpeters used only one hand to play the horn while simultaneously supporting its weight, it is important to note that Burke's instrument was a uniquely designed left-handed cornet. As such, Burke's instrument likely possessed a weight distribution that was more compact and potentially had fewer negative side effects with respect to the forces exerted on the muscles, joints, and tendons of the hand. In other words, though trumpeters can and frequently do play the instrument one-handed, it is usually a practice reserved for situations that are brief in nature, such as a mute change or while conducting or providing cues to an ensemble in which they are playing.

In terms of evaluation, the one-handed playing solution is effective as it allowed Skiles to resume playing the trumpet, though with a few negative side effects or consequences. Skiles' ability to play the trumpet, both technically and musically, was not diminished in any fundamental or profound way outside of her ability to play the instrument for extended periods of time. Her facility to produce tone and operate the piston valves of the instrument remained largely unchanged in short intervals. With that being said, the solution did inherently create some negative outcomes for Skiles. In particular, the use of the right hand to both hold and support the weight of the instrument as well as operate the piston valves created a significant increase in the forces exerted and tension placed upon the muscles, joints, and tendons of her right hand. While playing in this manner for an extended period can lead to stress and soreness of the muscles, joints, and tendons, the larger cause for concern is the possibility or increased risk of developing

further injuries if other precautions are not taken. Some of these precautions include limiting total playing time, employing frequent breaks during practice sessions, incorporating the solution gradually over time, and other practices examined earlier in the chapter.

As with the Swiffer Device, it should also be noted that this adaptive solution also elicited a shift in the horizontal placement of the mouthpiece on Skiles' lips. As discussed in more detail earlier, this shift in mouthpiece placement would likely be negated or irrelevant for a person requiring this adaptive solution prior to learning the instrument as opposed to an already established trumpeter needing to employ this solution to mitigate the impacts of an injury or disability. Further, it could be argued that Skiles' shift in mouthpiece placement was likely compounded by the frequent switches between playing one-handed and playing while using the Swiffer Device, thus complicating the evaluation of both adaptive solutions.

In addition to being effective, this solution is also highly accessible. With no associated financial burden or equipment needed, this solution is incredibly easy to obtain and utilize aside from the potential side effects noted in the previous paragraphs. Many people can implement this solution, so long as they have the function of the upper extremities on one side of the body. However, it should be mentioned that playing one-handed with the left hand would introduce a different set of variables, some of which can be seen in the earlier examination of Robert Baca's experience.

Because this solution is effective and highly accessible, it is highly efficient. There are many potential positive outcomes associated with using this solution. However, the possibility for a significant negative outcome exists, though it can be mitigated by several factors and scenarios as mentioned previously. When compared against one another, the potential for

negative outcomes associated with using this solution are outweighed by the potential for drastically positive outcomes, such as a completely restored ability to play the instrument.

As this solution only requires the upper extremities of one side of the body, it is highly adaptable and could function as a solution for a wide variety of injuries or disabilities impacting the shoulder, arm, elbow, wrist, or any of the joints, muscles, and tendons in between. Although the solution originally utilized the upper extremities of the right side of the body, the solution would still be viable if the situation were mirrored and the impacted individual only had functional capacity of the left-side upper extremities, albeit with a slightly varied set of potential variables due to standard instrument design.

While Skiles was recovering and alternating back and forth between the two aforementioned adaptive solutions, she was also continuing to utilize generalized adaptive solutions such as physical therapy, which is examined as a general adaptive solution in more detail earlier in the chapter. Beginning on April 8, 2021, Skiles began routinely attending physical therapy to restore the range of motion and strength in her left arm. While physical therapy did improve the range of motion of her left arm and elbow over time, the improvement to the range of motion in her left wrist left much to be desired. Through collaboration with her physical therapist and surgeon, it was discovered that some of the hardware installed during surgery was prohibiting Skiles from rotating her hand from a supinated to pronated position and vice versa. In her own words, Skiles said, “one of the screws we [the surgeon] installed was too long and was pressing on the top bone and muscle in my forearm to where I couldn’t turn my hand over. The solution was to either have the surgery and fix it or just deal with it.”

As a result of this revelation, Skiles underwent a second surgical procedure on July 6, 2021. The purpose of this surgery was to remove and alter some of the hardware, namely screws,

installed during Skiles' initial surgery. After her second surgery, Skiles continued physical therapy and continued to utilize the Swiffer Device. The process of multiple surgeries and many visits to physical therapy over the better part of a year highlight both the positive and negative effects of these types of general adaptive solutions, which are discussed earlier in the chapter. While the surgical intervention and therapeutic approach did restore much of the function of Skiles' left arm, elbow, and wrist, it was a lengthy, painful, and expensive process, to say nothing of the mental toll exerted on the individual.

According to her interview, Skiles continued to use the Swiffer Device periodically all the way through the month of August 2021, essentially half a year from her injury. It is important to note that Skiles indicated that, while things were back to "normal," there was a notable adjustment period before the act of playing the trumpet returned to a place of comfort.

With regard to the notion of comfort, Skiles said, "I probably didn't feel comfortable with my playing again until late that Fall, like October or November." Skiles alluded to the fact that this sense of comfort was multi-faceted, involving both physical senses as well as mental thought processes. In particular, Skiles referenced being "pretty self-conscious" throughout the process of getting back into shape while holding the trumpet in the standard position she was accustomed to before her injury. Interestingly, these comments seem to mirror some of her thoughts and feelings toward the use of the Swiffer Device earlier in her recovery process.

When asked about lasting changes or impacts, Skiles mentioned that she is still convinced that her lateral mouthpiece position is different than it was prior to her injury. She did not indicate whether this difference was a net positive or negative, just that it was different. She also mentioned that she eventually felt like she made it "back to where I was before all of this, chop-wise and endurance and just being able to do it." Perhaps unsurprisingly, Skiles' perceived return

to her accustomed level of playing from prior to her injury also coincided with the timeline of her return to a sense of comfort when playing the instrument: around October or November of 2021.

To conclude, Skiles' specific injury required multiple surgeries and physical therapy, which are examples of some generalized adaptive solutions outlined earlier in the chapter. Used in conjunction with one another, those solutions effectively assisted her in achieving a sense of normalcy after many months. However, they did little to facilitate her playing the trumpet immediately after her injury. For that, Skiles, who cited a lack of commercially available assistive technology for trumpeters and financial concerns in an interview, decided to use her ingenuity and creativity to create a low-cost, "low-tech" solution to enable her to play the trumpet despite her devastating injury. Like the device Jimmy Burke used at a young age, Skiles used regularly available supplies in an innovative way to fashion a device to support the weight of the trumpet, effectively acting as a left arm. In addition to the accessibility device she fashioned, Skiles also periodically utilized the one-handed playing solution due to a fear of how she would be perceived by her colleagues and audience members while performing with the accessibility technology.

ERGObrass Support System

One of the only commercially available accessibility technologies for trumpeters, the ERGObrass Support System is a group of ergonomic supports made for virtually every instrument of the standard concert band. Originally created in Finland, this accessibility technology began with the development of the ERGObone in 1999.[47] Since then, unique devices

[47] "How We Started," The Story, ERGOBrass, accessed March 28, 2025, https://www.ergobrass.com/story/.

have been created for all the instruments of the concert band, focusing on providing practical ways in which to facilitate comfortable playing environments devoid of stress and tension. In short, the goal of this accessibility technology is to alleviate the burden of holding the weight of the instrument while playing.

With regard to trumpeters, the ERGObrass System is designed to shift the weight of the instrument from the hands to either a chair or the waist of the player depending upon whether they are seated or standing. The ERGObrass System for trumpeters consists of only a few parts, including a support rod that contains a spring mechanism to adjust with the player, a chair support tube that attaches to the support rod via a rubber band and makes contact with the chair, a plate fastened to the valve block in which the support tube locks, and a belt pouch for use when standing. In the earlier iterations of this device, the plate, and thus the device as a whole, was fastened to the valve block of the instrument by way of zip ties, though a different system is used in the more current designs. An example of the device in use can be seen in Figure 8.

Figure 8 ERGObrass System for Trumpet[48]

[48] "ERGObrass for Trumpet," Thompson Music Company, accessed March 28, 2025, https://thompsonmusic.com/products/ergobrassfortrumpet.

In terms of evaluation, the ERGObrass Support System for trumpeters is generally effective in remediating the symptoms of some injuries and disabilities. In particular, the device successfully remedies injuries and disabilities that cause the weight of the instrument to become a barrier in which the player's range of motion is not affected. Hypothetically speaking, broken fingers or an overuse syndrome of the left hand, wrist, or forearm would likely cause a player to have difficulty lifting the weight of the instrument and could thus be remedied by this device. It should also be noted that the device is effective in its prevention of injuries, especially with regard to overuse syndromes and other musculoskeletal conditions. Aside from assisting players with injury and disability, the device is also an effective means of assisting younger players support the weight of the horn, creating a more comfortable experience and reducing the risk of injury.[49]

In addition to being effective, this device is generally somewhat inaccessible. Though easy to install and operate, this device can prove to be difficult to obtain due to financial barriers. At the time of publication of this document, this device was listed for anywhere between one-hundred thirty and one-hundred fifty USD at a variety of music companies. Though potentially not an issue for established or professional players, the cost of the device may dissuade some from obtaining it, especially younger players, hobbyists, or students.

As this device is effective and somewhat inaccessible, it is also somewhat efficient. There are very few inherent risks for negative outcomes associated with the use of this product. Further, most reviews accessible online speak only to the positive aspects of the device. If anything, the largest impact to the efficiency of the support system is its cost.

[49] Kevin Price and Alan H.D. Watson, "Effect of Using ERGObrass Ergonomic Supports on Postural Muscles in Trumpet, Trombone, and French Horn Players," *Medical Problems of Performing Artists* vol. 33, no. 3 (September 2018), 183.

As this device aims to assist with holding the weight of the instrument, it is very adaptable. In other words, many of the injuries and disabilities that affect trumpeters either directly impede the ability to operate the piston valves or the ability to hold the instrument due to its weight. As this device nearly completely transfers the weight of the instrument from the hands to the seat, waist, or floor, it could be utilized for a wide variety of injuries and disabilities.

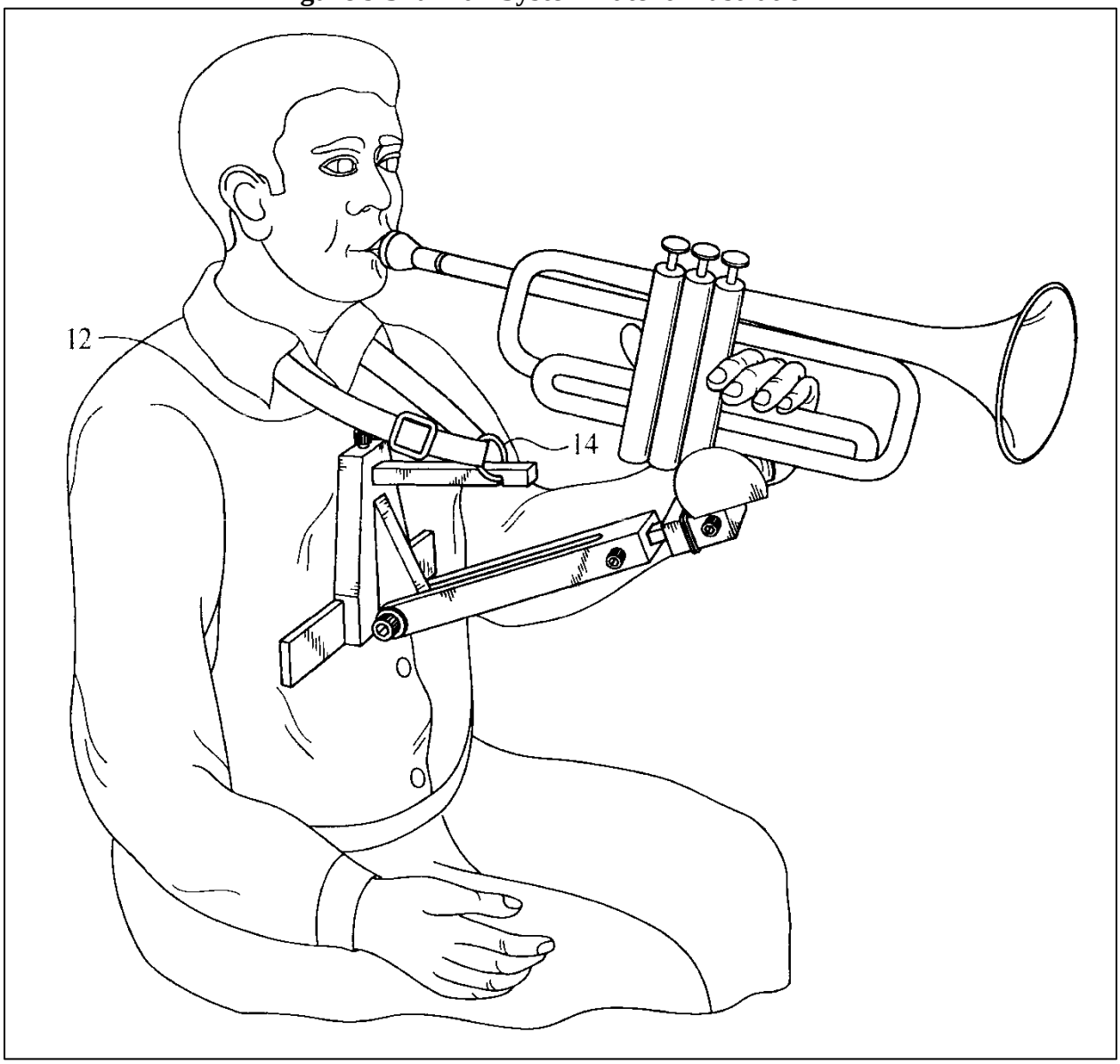
To conclude, the ERGObrass Support System for trumpet is an effective and somewhat inaccessible ergonomic device. It is designed to increase the comfort of the player, reduce instances of injury, and remediate symptoms of injury and disability, especially those that impact the ability of the player to hold the weight of the instrument. Though the device is praised by many trumpeters, especially on online trumpet forums, its significant cost can be a barrier to accessibility for some, especially considering that trumpeters facing injury and disability must often try multiple types of adaptive technologies to find what suits them best.

Shulman System

Somewhat similar to the ERGObrass system discussed previously, the Shulman System is a device that supports, stabilizes, and balances the trumpet. Originally created by trumpeter Matt Von Roderick, formerly known as Matt Shulman, the system received a patent in 2003 and began production shortly thereafter. The device primarily utilizes two elements made from wood; the first element is placed vertically against the chest while the second element extends perpendicularly away from the body and contains a point of contact for the instrument at the end. These two elements, which are connected by a pivot, essentially act as a third arm and can be further stabilized through the addition of a neck strap. In short, the device acts to stabilize the trumpet by shifting some of the burden of holding the weight of the instrument from the hands

and arms to the chest. Figure 9 encompasses a visual representation of the device from its now-expired patent.

Figure 9 Shulman System Patent Illustration[50]



[50] Shulman, Matthew. Stabilizing Device for Small Brass Musical Instruments. US Patent 6,504,087B2, filed February 8, 2001, and issued January 7, 2003.

Though it is no longer commercially available, it can still sometimes be found on certain trumpet-related marketplaces, though it is rare.

In terms of evaluation, the system is generally effective at remediating the effects of injury or disability. Though it was initially designed as a means to reduce physical tensions that naturally occur within trumpeters, the device also has merit with respect to mitigating injury or disability symptoms. As the device dramatically alters the way in which the weight of the instrument is felt by the musician, it is particularly effective with regard to injuries or disabilities in which the repetitive lifting of weight for long periods of time are a contributing factor. Further, the device is generally effective at preventing those same types of injury and disability.

In addition to being effective, the device is generally highly inaccessible. In other words, the device is extremely difficult to obtain, primarily for two reasons. First, the device inherently serves or appeals to a small, niche community. Secondly, and more importantly, the device is no longer being produced and the patent has expired. To put it another way, the number of devices created was relatively limited; because production of this device has ceased, they are only obtainable secondhand. A final consideration regarding the accessibility of this accessibility device is the financial barrier created by the lack of supply of the product. In other words, when one of these devices is found to be for sale, it sometimes is inaccessibly expensive because the demand outweighs the supply.

Because the device is effective and highly inaccessible, it is also inefficient. Though there are no documented potential negative outcomes associated with this device, the inaccessibility of it removes it as an option for most trumpeters who encounter injury or disability. Further, other accessibility options are much easier to obtain and have generally

similar results with regard to effectiveness. In short, this device should probably be considered a last resort in its current state.

As the device is similar to ERGObrass in terms of its stability and weight-bearing potential, it is adaptable. There are a variety of injuries and disabilities that could potentially benefit from the implementation of this device. In particular, it is possible that overuse syndromes could greatly benefit from this system, given that overuse syndromes are often improved with rest, altered practice habits, and altered playing positions.

To conclude, the Shulman System is a niche device that was once commercially available to trumpeters to assist in the stabilization and weight bearing of the instrument in order to reduce the occurrence of tension while playing. While perhaps not originally designed with the idea of aiding musicians experiencing injury or disability, it is an adaptable solution that can be potentially beneficial with regard to the alleviation of symptoms for some trumpeters.

Chapter 4: Case Study

This chapter reports on the findings of a case study of the WingMaster device, one of the most recent examples of accessibility technology for trumpeters in the twenty-first century. The chapter begins by briefly detailing the lives and careers of two individuals, Gregory "Greg" Wing and Peter Pickett. Both men are considered leaders and experts within their respective fields of trumpeting and engineering. This, along with their proximity to one another by chance, made it possible for their partnership and collaboration in creating the WingMaster device, a novel technology used to facilitate the operation of the piston trumpet despite significant injury or disability to the trumpeter's right hand. Next, the chapter chronicles Wing's journey with his condition, including the onset and progression of symptoms, the initial attempts made to remediate the condition, and the impacts observed on his ability to play the trumpet at a professional and world-class level. Subsequently, the chapter details the creative processes and collaboration that yielded the WingMaster device. The outcomes associated with both the working partnership of the two men, as well as the WingMaster technology, is evaluated in a manner consistent with the other adaptive solutions and technologies examined in earlier chapters. The experiences of both men as outlined in this chapter are further utilized to extrapolate hypotheses regarding future usage and development of this technology and those like it in chapter five. The information in this chapter was gathered through individual interviews via Zoom with Wing and Pickett on September 2, 2024, at 4:30 PM EDT, and August 16, 2024, at 10:00 AM EDT, respectively. Complete transcripts of those interviews can be located in Appendix D (Wing) and Appendix E (Pickett).

Greg Wing, Trumpeter

Originally from Covington, Kentucky, Greg Wing is a professional trumpeter and retired collegiate professor of music and trumpet currently residing in Evansville, Indiana. He boasts an illustrious career as both a performer and teacher, having played with virtually all the biggest acts of his time. While Greg was an undergraduate student at Morehead State University, he began making trips every other week to Bloomington, Indiana to study with William "Bill" Adam, longtime Professor of Trumpet at Indiana University. After graduating with a degree in music education from Morehead State University in 1976, Greg began graduate study at Indiana University, again studying with Bill Adam and serving as his Associate Instructor of Trumpet from 1977 to 1981. After graduating from Indiana University with his Master of Music degree in 1981, Wing relocated to Las Vegas, Nevada.

That same year, Wing joined the Buddy Rich Big Band and toured across the United States, playing lead trumpet in the band for over a year. At the conclusion of his time touring with the Buddy Rich Big Band, Wing began an impressive performing career in Las Vegas that spanned multiple decades. During his time in Las Vegas, Wing played lead trumpet in the house bands at the Las Vegas Hilton, Caesars Palace, Flamingo Hilton, Stardust Hotel, and Frontier Hotel, performing with names such as Frank Sinatra, Sammy Davis, Jr., Johnny Mathis Tony Bennett, and Natalie Cole.[51]

Outside of his position as a trumpeter in the house bands, he also went on further tours with the likes of Paul Anka and Tom Jones, with whom he spent four years on tour. His longest-

[51] Greg Wing, "About Greg Wing," Greg Wing Trumpet, accessed March 19, 2025, https://www.gregwingtrumpet.com/about-greg-wing.html.

tenured position in Las Vegas came at the Stardust Hotel where he played lead trumpet at the Lido de Paris show for ten years, logging over six thousand, six hundred performances.

In 2002, Wing moved from Las Vegas to Morehead, Kentucky, to become Professor of Music and Trumpet at Morehead State University, his alma mater. Teaching collegiately and finding joy in his students' success was something he always wanted to do and brough him great fulfillment.[52] He retired from his position at Morehead State University in December of 2023.

Needless to say, Wing has long been considered a proverbial giant in the field, playing with many of the largest names in music and inspiring countless students to find success of their own. The magnitude and scope of his career are extremely important to consider with respect to the debilitating impact of his condition. His role in this document began with a condition with his right second finger that developed toward the end of his teaching career at Morehead State University and is explored in-depth beginning on page sixty-six.

Peter Pickett, Engineer and Trumpeter

An accomplished engineer, trumpeter, and entrepreneur, Peter Pickett is the founder and owner of Pickett Brass and Blackburn Trumpets, a company specializing in the production of trumpets, trim kits, and mouthpieces for all brass instruments. Located in Lexington, Kentucky, Pickett attended Virginia Polytechnic Institute and State University, earning a Bachelor of Science in Mechanical Engineering and a Bachelor of Arts in Music Performance in 1995 and 1996, respectively.[53] It was there that Pickett was able to combine his love for engineering and

[52] Zoe Hall and Hunter Boggs, "Professional Trumpeter Finds New Passion in Teaching," *The Trail Blazer Online*, September 19, 2019, https://www.thetrailblazeronline.net/life_and_arts/article_89ea7236-daef-11e9-9145-b3c3a0ae6fdf.html.
[53] Leslie King, "Hokie Tracks: Peter Pickett," Virginia Tech, accessed March 19, 2025, https://liberalarts.vt.edu/magazine/2019/hokie-tracks/peter-pickett.html.

creating with his love for the trumpet and making music. After completing his undergraduate degrees, Pickett continued his studies at Virginia Tech, earning a master's degree in mechanical engineering in 1998, writing his thesis on active noise control technology and trumpet acoustics.[54]

After graduating, Pickett relocated to Lexington, Kentucky and began working for Lexmark, a company that manufactures printers and other imaging products. He also joined a local community band to continue his musical pursuits. Shortly thereafter, Pickett purchased a lathe and began making heavy bottom valve caps and other miscellaneous trim pieces in 1999.[55] According to Pickett, his trim parts, which he began making for purely aesthetic reasons, began to catch the eyes of his friends. This led to the acquisition of CNC machines and the expansion of his operation, now encompassing buttons, valve stems, and top caps. This also coincided with the official creation of his business, Pickett Brass, in 2003.

Over the years, Pickett has proven himself to be an innovator unafraid of facing new challenges. In 2007, his company began producing trumpet mouthpieces, which are much more complex than trim kits and situated in a much more competitive market. In 2016, his company acquired Blackburn Trumpets, a well-respected brand of trumpets, and began manufacturing all parts of the instrument from start to finish.

Today, Pickett Brass and Blackburn Trumpets is a well-known, household brand across the United States and abroad, with many distinguished players and teachers opting to use equipment made by Pickett. Pickett's success as an engineer and entrepreneur owes largely to his

[54] Katherine L. Klinefelter, "Modern Innovations in American Trumpet Mouthpiece Design" (DMA Diss., University of Oklahoma, 2014), 70.
[55] "About Us," Pickett Brass & Blackburn Trumpets, accessed March 19, 2025, https://www.pickettblackburn.com/about-us-ezp-3.html?srsltid=AfmBOoqRpTqzwuvNOOx9d8JuBbkKXRgp-Hew3-HZ7ABuLxW_iGv0Qx8b.

propensity for creativity and problem-solving. These attributes also undoubtedly impacted his successful collaboration with Greg Wing and the creation of the WingMaster device.

Injury Occurrence and Initial Remediation Attempts

According to his interview, Wing stated that he first began noticing changes in the function of his right hand in 2018. In particular, he began noticing diminished technical facility, owing to decreased responsiveness in the second finger of his right hand. To be more specific, his second finger was slow to rise or lift up back to its original resting position after depressing the second piston valve and would involuntarily retract. The initial occurrence of his symptoms was subtle and became gradually more dramatic and obstructive. Eventually, it was nearly impossible for him to elicit a response from his finger during the upstroke portion of movement associated with manipulating the piston valves on a trumpet. Understandably, this symptom proved to be incredibly burdensome and detrimental to his ability to play the trumpet. For example, any technically demanding or quick passages that required him to interface with the second valve quickly became a smear of sound; his ability to play with pristine accuracy and precision was severely hampered.

In addition to the impact on his ability to create music, the symptoms he experienced also affected his daily life. For example, Wing mentioned that he can no longer type on a keyboard with both hands because of his condition. Because of the involuntary retraction and inability to control the second finger on his right hand, it is faster and more accurate for him to type one-handed or by just using the index fingers of both hands. In addition, Wing claimed that his finger would frequently curl up into a tensed position without him even being aware, such as when he was driving, resulting in pain and soreness in both the affected and surrounding muscles.

At the time these symptoms first began appearing, Wing maintained an incredibly active schedule, frequently performing all across Kentucky, Indiana, West Virginia, Ohio, and the broader region. In addition, he was also responsible for the instruction of a large studio of collegiate trumpet majors. As such, this condition undoubtedly placed tremendous strain and pressure on him, as is common with many professional musicians who encounter injury or disability. In order to continue performing at a high level as well as model for his students during lessons, Wing experimented with several modifications to his right-hand position on the instrument.

According to Wing, there were two primary hand position alterations he explored, both of which completely disregarded his second finger, almost as if it were no longer there. In one of the altered playing positions, his third finger assumed the responsibilities normally held by the second finger and his fourth finger subsequently assumed the responsibilities of his third finger. In other words, he completely refrained from using his afflicted finger, instead opting to shift the rest of the fingers into a new role. In this modification, the third finger was now responsible for operating the second valve, instead of its normal third valve responsibility, while the fourth finger was now responsible for operating the third valve instead of occupying its normal position in the ring on top of the lead pipe. This modification saw no changes to the first finger position or responsibilities. The second altered hand position Wing explored was very similar to the first, with the primary difference being that the third finger was sometimes responsible for operating both the second valve as well as assisting the third finger with operating the third valve.

Needless to say, both of these altered positions left much to be desired in terms of positive outcomes. Because the fourth finger has no moving role in a typical playing position on the trumpet, it was too weak to move at the speed needed by Wing. Likewise, using the third

finger (ring) to go back and forth, being responsible for operating two piston valves, was similarly cumbersome. As such, neither served as a viable solution and both yielded similar results as his normal playing position where fast, technical passages were concerned. On his situation at that time, Wing said, "[it] can create a lot of frustration within your own aura as an artist, not mentioning trying to keep your mind out of you and to be able to serve your students by making sure that your attention is on them and not on your little ailment," clearly indicating that the impacts of his predicament were severe and extremely difficult or impossible to ignore.

As neither of the two aforementioned solutions were viable, Wing did not spend much time trying to force them to work. Instead, in 2019, he sought the help of a physical therapist, a general adaptive solution explored more in-depth in chapter three. For two to three days a week for several months, Wing worked with a physical therapist in Morehead, Kentucky. He reported that their sessions frequently consisted of a variety of arm stretches in an attempt to rule out something catching in the arm and shoulder that would prohibit his finger from working correctly. Unfortunately, Wing reported that he did not find any benefits from these sessions and only experienced a sore arm as a result. However, the physical therapist hypothesized that Wing could have been suffering from focal dystonia, a relatively rare neurological disorder. Wing said that this hypothesis, "opened pandora's box," and led him down a proverbial rabbit hole of research regarding potential adaptive solutions and experimental treatments.

Throughout 2020, as the COVID-19 virus shut down much of the world and work for musicians generally screeched a halt, Wing spent considerable time pouring over medical periodicals and experimenting with different adaptive solutions to alleviate his condition. It is during this time that he began experimenting with playing left-handed, a general adaptive

solution examined more in-depth in chapter three. While this solution yields positive results for some, it is typically not without side effects or drawbacks.

In Wing's case, the change to left-handed playing effectuated a significant shift with regard to both the lateral and vertical placement of the mouthpiece on his lips. In other words, his embouchure was significantly altered due to the change in the way he held the instrument. The shifting of the mouthpiece placement coupled with the act of learning a new muscle memory with the left hand was considerably debilitating for Wing's playing. He likened the situation to being a beginner all over again, indicating that there was a six-month period of time where his embouchure was, "almost unusable" and he, "couldn't even play well enough to play taps." Interestingly, some of Wing's symptoms and experiences with left-handed playing distinctly mirror those of Robert Baca, whose adaptive solution was examined in chapter three.

To mitigate some of the challenges of relearning how to play the trumpet with the left hand, Wing took a recommendation from a close colleague and used a video camera to watch himself play the trumpet with a reversed image. The theory behind this suggestion was that his brain could be convinced that everything was normal when simultaneously playing and watching a reversed image of himself. After a brief period of time, Wing opted to abandon this train of thought and instead sought further opinions from medical professionals.

In late 2020 or early 2021, Wing reluctantly visited his primary care physician and was referred to a hand surgeon at the University of Kentucky Medical Center in Lexington, Kentucky. According to him, the purpose of seeing the hand surgeon was to rule out any potential mechanical issues that could be plaguing him. Essentially, Wing sought to find a diagnosis for himself through process of elimination. After an MRI, it was discovered that he had

a cyst in the carpal tunnel area. As a result, Wing agreed to undergo what he described as an exploratory surgical operation in 2021.

The surgical procedure involved incisions in both the hand and the wrist in order to shave down the aforementioned cyst and release his trigger finger. It should be noted that Wing was skeptical of the potential for positive outcomes of the surgery, going so far as to imply that the trigger finger release was unnecessary as he could move his hand and finger kinesthetically; according to him, problems did not arise until his finger had to perform repeated motions. Perhaps unsurprisingly, the surgical intervention did not yield any discernable positive outcomes for him or his trumpet playing.

In fact, during the interview, Wing read from a copy of his surgeon's report from seven weeks after his surgery. Among other things, the report said, "patient reports right-long finger gets stuck in a flexed position and he has trouble or a delay in being able to extend the finger straight." It should also be noted that the report indicated that his symptoms were still reproduceable every day. Interestingly, these results closely mirror those discussed in the examination of general surgical interventions in chapter three. It was this string of disappointing outcomes with a variety of adaptive solutions that led Wing to contact Peter Pickett to ask for his help.

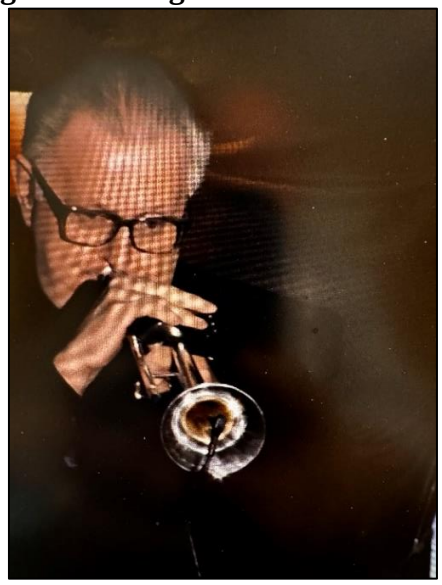
The WingMaster Device

Following Greg Wing's series of attempts to remediate his disorder that yielded few positive results, he decided to reach out to Peter Pickett, engineer, trumpeter, entrepreneur, and founder and owner of Pickett Brass and Blackburn Trumpets based in Lexington, Kentucky.

Together, the two collaborated to create the WingMaster, a novel accessibility device designed to assist those who may be unable operate the piston valves of the trumpet.

After Greg Wing's surgery, he discovered that his right second finger seemed to be less affected by his condition if it was placed in the extended state as opposed to the curled or clawed state. In other words, the mobility of his impacted finger was much improved when it was not curled as it commonly was in his standard playing position. Instead, if his finger was extended straight, some of his involuntary contractions and lack of control were alleviated. In short, his finger appeared to operate with fewer restrictions if it were in a position more akin to the playing position seen for a rotary trumpet than a standard piston trumpet. He therefore hypothesized that he could regain much of his playing ability if there were a way in which his fingers could manipulate the piston valves from an elongated or extended position with minimal movement. Then, he scribbled down a few design ideas on a napkin and sent it to Pickett, thus beginning the collaborative process between the two. Figure 10 is a photograph of Wing performing with the completed WingMaster device and illustrates the aforementioned concept regarding the alleviation of his symptoms through a finger position that is in the extended state.

Figure 10 WingMaster Device in Use



Over the course of approximately the next two years, the men worked together through a variety of prototypes and iterations of the device. It is important to note that both men were separated by approximately sixty miles and had incredibly busy schedules, making it somewhat difficult to find time to work together on a consistent basis. Nonetheless, Wing was able to periodically make visits to Pickett's workshop in Lexington, Kentucky, where the two would brainstorm ideas and test out the newest prototype design. In between visits, Pickett worked diligently to take the feedback gathered through their meetings and incorporate it into the next iteration of the device.

At its most basic level, the concept of the WingMaster is quite simple. By making contact with a series of buttons, electrical signals are sent to a series of servo motors that are in turn responsible for manipulating the position of each of the piston valves. Thus, the instrument can be played with less mechanical motion and input from the trumpeter. In simpler terms, the device transfers the responsibility of fine motor motion from the player to a series of battery-operated motors. However, in practice, the device required a great deal of adjustments, tuning, and troubleshooting to address numerous complex issues and challenges regarding its design and implementation.

As previously mentioned, the primary objective of the device was to remove the specific challenges and barriers Wing experienced when making music by altering the way in which his afflicted finger interfaced with the instrument. In his standard playing position, the fingers of his right hand exhibited a curled or clawed position. Additionally, his right second finger had a limited range of motion and experienced involuntary contractions when subjected to repetitive motion. Because of his condition, he hypothesized that a playing position in which his fingers could be extended flat would be beneficial. It was additionally hypothesized by Wing and Pickett

that a system that required a smaller range of motion in general for all fingers would be potentially beneficial.

As a result of these considerations, the earliest versions of the device featured three modules: one module that housed the buttons needed to interface with the instrument as well as the custom-printed electronic circuit board, one module that housed the actuators needed to manipulate the piston valves of the instrument, and one module to house the battery needed to power the device. Each module was made from 3D-printed plastic and designed on a Computer-Aided Design System (CAD).

The first module was originally secured to the top of the instrument by being clamped onto the outside of the bell and the outside of the lead pipe. An early example or prototype of this module can be seen in Figure 11. This first module housed both the electronic circuit board responsible for connecting all the electrical components of the device as well as the buttons in which the individual interfaced with to provide direction to the device. Further, this first module was connected to both the second and third modules through electronic wiring. In simplest terms, this first module, powered by an external battery, was where Wing used his fingers to press the buttons on the device, sending an electronic signal to the motors of the device to engage the piston valves of the instrument.

Figure 11 WingMaster First Module Early Prototype

Throughout the process of creating the WingMaster, this first module posed several significant challenges to overcome and saw much change with respect to design. One of the earliest challenges concerned the way in which the module was connected to the instrument. In short, the original method of clamping the module onto a large section of both the bell and leadpipe yielded unfavorable acoustic results; the instrument, as a vibrating piece of metal, was dampened and sounded much differently. Of this specific challenge, Pickett said the following:

> And the initial thought was just to clip it on and it basically squeezes your horn on the outside of the bell and the outside of the leadpipe. And mechanical engineering-wise, it was a great solution. It just snapped on, it was very secure, easy to take on and off, and it looked kind of cool. Unfortunately, it completely changed how the horn played. And in hindsight, I probably should've known that in that we were clamping down on a significant part of the bell – three or four inches – and on the leadpipe. And we all know that when we put a leather handguard on or heavy bottom caps – when you do things to the mechanics of the horn it changes how it plays.

To remedy this unintended consequence, Pickett decided to modify the way in which the first module was secured to the horn. Because the design of this device called for the pistons to be pulled downward by a motor instead of being pushed down from above by human hand, the top portion of the piston valve, including the valve buttons, valve stem, and top valve caps were no longer needed. By removing these items from the trumpet, Pickett was able to then fasten the first module to the top of the valve casing, near where the top valve caps are typically screwed in. This reduced the overall surface area that made contact between the first module and the instrument, mitigating the aforementioned acoustic changes.

A second challenge Wing and Pickett faced with the design of this module came from the positioning and selection of the buttons to be used. In terms of design, Pickett went through several iterations of the device before he found a satisfying size and shape for the module to fit

Wing's hands. Likewise, several attempts were made to find a suitable location for the buttons to be placed.

Once those issues were addressed, great care had to be taken in finding the button to be used for the device. It is important to note that there is a dramatic difference between this device and the standard piston valve on a trumpet with regard to the necessary travel time and range of motion the fingers need to travel to result in a completely depressed piston, a sentiment which can be better expressed in Figure 12 and Figure 13.

Figure 12 WingMaster First Module Buttons Prototype

Figure 13 WingMaster First Module Prototype in Use

In short, the mechanical motion from the fingers for this device was dramatically reduced when compared to a standard piston trumpet. As such, it was very easy to accidentally depress the valves without the intent to do so and a learning curve existed for the player when switching between notes that required different valve combinations. To remedy this, Pickett and Wing

experimented with several different buttons until one was found that contained the desired amount of tactility and haptic feedback combined with the appropriate amount of force or resistance for Wing's fingers.

The second module on this device was connected to the instrument at the bottom of the valve casings, just above the threads where the bottom valve caps are typically screwed in. It was also connected to the first module through electrical wiring. As previously mentioned, the second module of this device housed the actuators responsible for manipulating the piston valves of the instrument. To be more specific, the second module contains three servo motors that work to pull the pistons in a downward motion. To do this, each servo motor was attached to the piston by way of a piece of nylon string. When the servo motor was activated, it would enact force upon the piston. Through the use of a bellcrank to convert the servo's rotational motion to a linear motion, the pistons were able to be pulled into position, aligned just as they would be on a standard trumpet. This design is illustrated in Figure 14 and Figure 15.

Figure 14 WingMaster Second Module CAD File #1

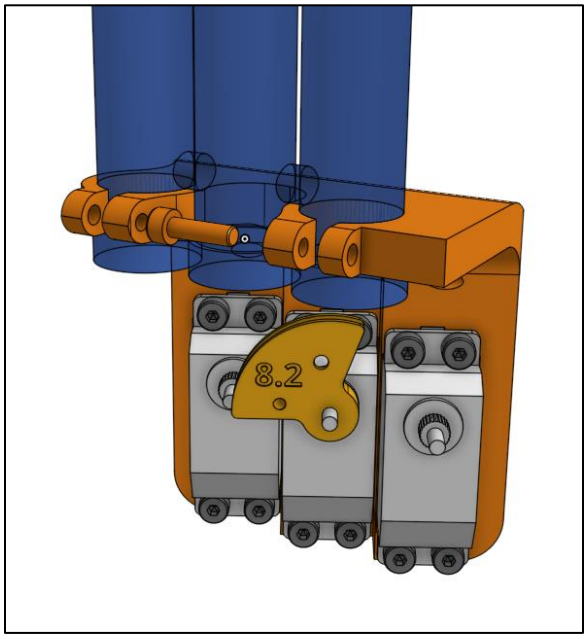
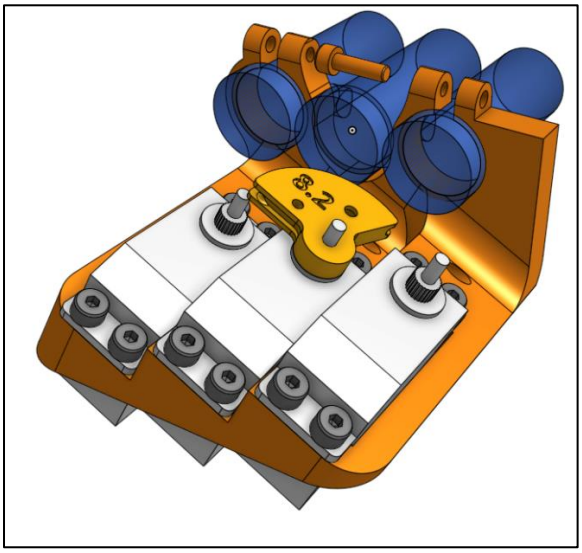


Figure 15 WingMaster Second Module CAD File #2

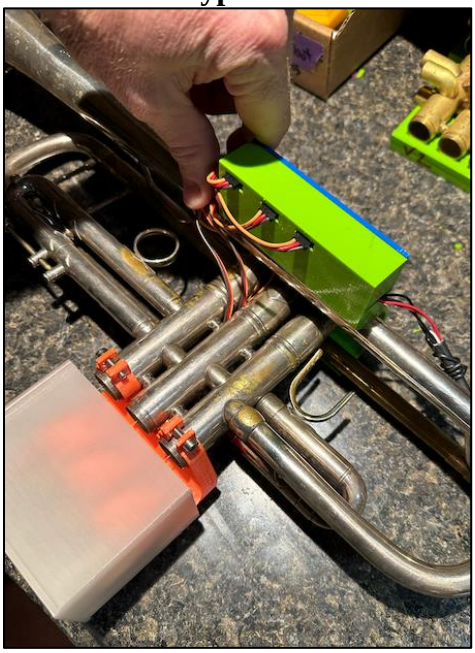


The primary design challenge with the second module was essentially a complex balancing act. The servo motors had to be powerful enough to move the pistons at an appropriate speed for the player, but they could not be so large as to add too much weight to the horn. Wing and Pickett both cited this as a particular concern that took a substantial amount of time through trial and error before an acceptable solution was found.

Additionally, servo motors produce noise that scales with their size; according to Pickett, larger servo motors intrinsically produce more noise. An attempt was made to enclose the servo motors on the second module as seen in Figure 16 and Figure 17.

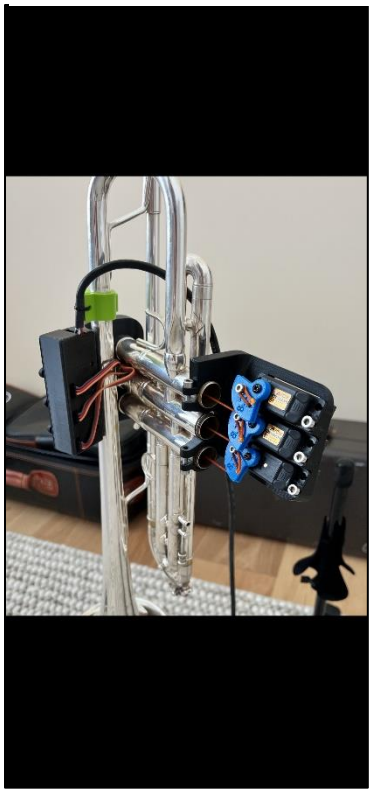
Figure 16 WingMaster Device Second Module Prototype #1

Figure 17 WingMaster Device Second Module Prototype #2



However, Pickett eventually moved away from this design, citing added weight to the instrument and extreme difficulty in making an airtight housing that would noticeably mitigate the level to which the motors were audible. In the final design of the WingMaster, the second module is not enclosed; the servo motors and string are both visible as illustrated by Figure 18. However, the servo motors are of a size that do not produce enough noise to be audible to an audience during a performance.

Figure 18 Completed WingMaster Device



The third module of the device, which houses the battery powering the device, is not connected to the instrument at all. Instead, the third module connects to the first module by way of electrical wiring. The third module itself is designed to fit in the pocket of the performer. According to Pickett, the primary challenge for this device owed to striking a balance between power and size, much like the servo motors themselves. In essence, larger batteries are typically more powerful but are typically larger as well. For this device, the goal was to provide enough power to make it through a recital or concert several times over without adding additional weight to the horn itself or being unwieldy. To solve this problem, Pickett was able to construct a battery large enough to power the device for hours on end and decided to house the battery in a location that added no weight to the instrument.

The WingMaster Device Evaluation

In terms of evaluation, the WingMaster was effective as it completely restored Wing's ability to operate the piston valves of the instrument with his right hand, albeit with a few extra

steps and considerations. In other words, the WingMaster device allowed Wing to play in an unrestricted manner similar to before the development of his condition. When evaluating this device, it is important to consider the status of Wing's playing from several time periods. Before his condition, Wing was a world-class trumpeter and teacher as evidenced both by his success as well as that of his students. Throughout his condition, Wing's playing ability deteriorated for several reasons that included some of the negative side effects of other adaptive solutions that may not have presented themselves had this solution been implemented first. For example, the shift in vertical and lateral mouthpiece placement that Wing noticed and cited as a contributing factor in his "unusable embouchure" was a direct result from shifting his playing position from right-handed to left-handed. Had he never shifted his playing position so dramatically and utilized this device first, he may not have experienced such a marked decline in his playing.

However, it should be noted that this accessibility technology is not free from negative side effects or considerations. It could easily be described as cumbersome or awkward, especially given that it so heavily relies on modification of the instrument. In fact, both Wing and Pickett estimated that it would take approximately thirty to forty-five minutes to install the device, with most of that time spent adjusting the settings on the servo motors to move the piston valves the appropriate distance and speed in relation to the performer's preferences. Further, the instrument could not be stored in most traditional trumpet cases in its modified state. In Wing's example, a double trumpet case had to be used anytime the device was to be stored with the device installed. While most trumpeters likely couldn't physically play the instrument longer than the life of the battery powering the device due to face and lip considerations, it should also be mentioned that the device had to be routinely charged in order to be used. While not necessarily a drawback of the device, it could certainly be considered inconvenient.

In addition to being effective, this device is somewhat inaccessible. As this device is a novel technology, it is unique but contains no components that are not at least somewhat readily available on their own. In other words, the accessibility of this technology is limited less by the hardware it is built from than the knowledge it would require to be duplicated by another person. For example, any number of the electrical parts or servo motors used in this device can be purchased at a reasonably low cost at a variety of locations. However, the act of reproducing the exact configuration of the components, such as the custom-printed circuit board, would likely require an individual to have considerable training and experience.

In addition to the electrical components of the device, much of the rest of the device is also made from inexpensive parts. Pickett explained that approximately ninety percent of the device consisted of 3D-printed plastic parts. While it is true that the device is mostly made from plastic and that plastic is usually quite cheap, it should be considered that a 3D-printer can still be extremely cost prohibitive. Given that information, the device would likely contain a financial barrier to accessibility if it were to be replicated by an individual without extensive knowledge and a 3D-printer but may not contain that same financial barrier if it were available in a mass-produced commercial setting.

With regard to accessibility, the most important aspect of this device is the time it would take to fit the device to each unique individual. To put it another way, the largest barrier to accessibility for this device according to Pickett is the amount of time it would take to tailor the device to each individual given that everyone has different sized hands and unique preferences. It is unlikely that any two players would have the same sized hands and prefer the same button placement, button tactility, servo motor speed, button resistance, and more. It is also worth mentioning that, in Wing's case, several of the 3D-printed components had to be changed several

times, either due to redesigns or breaking. This may have been a result of Wing's larger hands and strength or simply due to the nature of this being a novel technology in the process of being developed. However, it does pose further questions regarding the accessibility of the device that are currently unanswerable due to its limited sample size.

Because this device is effective and somewhat inaccessible, it is also somewhat efficient. The potential benefits for someone with an injury or disability are certainly undeniable. The device has proven to be able to assist in the regaining of abilities in those with incredibly complex cases with no current definitive diagnosis. With that being said, the device in its current state would require a sizable amount of time, energy, and possibly money to reproduce and implement on another individual, especially if their symptoms and needs differed from Wing's.

As this device was designed to assist someone with limited mobility in the digits of the right hand, this device is adaptable. There are several injuries or disabilities that affect the hands, wrists, and fingers of trumpeters that could be mitigated through the use of this device. Further, this device has already shown a propensity for being flexible, passing through several design iterations and changes. It is plausible that this device could be easily modified to assist an even wider range of injuries and disabilities. For example, during the design process of this device, the location of the buttons was altered several times, thus leading to the conclusion that this device is potentially malleable in other ways as well.

Regarding the effects of this experience on his mental health, Wing was adamant that his experiences and the lessons he learned from Bill Adam were, "very instrumental in me being able to keep my head on even though I knew the things around me were just falling apart." Interestingly, this same sentiment was echoed by Robert Baca, another student of Bill Adam whose situation can be read about in chapter three. Aside from being known for his phenomenal

trumpet playing, Wing is also well-known for his commitment to positivity and kindness. His positive approach to life and steadfast resolve to never quit despite the odds were both readily apparent in his interview. Further, those traits undoubtedly assisted him in persevering through the stress, chaos, and uncertainty created by his condition.

Post-WingMaster Device

In December of 2023, Wing retired from his position as Professor of Music and Trumpet at Morehead State University and moved to Evansville, Indiana, where he currently resides at the time of publication of this document. This move impacted several things, including his ability to visit Pickett's shop when a part broke or when he required assistance with the device. This change, coupled with several other factors, influenced him to stop using the WingMaster device and commit to playing left-handed full time.

As mentioned earlier in the chapter, the WingMaster device could be described as cumbersome depending on whether it was stored on the instrument all the time or constantly installed and uninstalled. Additionally, Wing had been through several stressful years in which his identity, livelihood, and source of joy had been negatively altered in a profound way. Because he had previously experimented with left-handed playing and the shifted embouchure that it entailed, he concluded that it would be easier and less frustrating to dedicate himself entirely to one singular approach or adaptive solution: left-handed playing.

At the time of this publication, Wing has not yet received a definitive medical diagnosis for his condition, though it may be a moot point at this stage. According to him, he is enjoying his retirement, spending lots of time practicing, teaching, and trying to be the best person he can be. Since retirement and transitioning back to left-handed playing, Wing has released a CD titled

Reflections on a Grateful Journey in celebration of his fifty years as a professional trumpeter. Further thoughts and considerations regarding the WingMaster device can be found in chapter five.

Chapter 5: Discussion and Conclusion

Discussion

As this document engaged with a wide range of information and a variety of works by authors within the community of disability studies for musicians, there are several outside arguments to address and consider in addition to those original to this document.

In relation to some other authors' hypotheses presented in chapter two, this document produced some interesting results, though they may be inconclusive. One of the more commonly espoused beliefs within the community of disability studies for musicians is the notion that musicians frequently underreport or hide their encounters with injury or disability. Although not quantitative in nature, the data collected in this document appeared to parallel this premise. Of the musicians interviewed for this document, several indicated that they were wary or even afraid of the perceptions that their colleagues might hold regarding their condition and its impact on their ability to produce their art.

In particular, Steffanie Skiles conveyed that she felt terrified of what others would think if they saw her using the accessibility technology she fashioned. This feeling was intense enough to cause Skiles to utilize a completely separate accessibility solution when she was around others, moving from the Swiffer Device to a one-handed playing solution. This further compounded her situation and complicated her efforts to successfully play the trumpet as she did prior to her injury.

In a similar situation, Greg Wing also implied that he knew what others were likely thinking about his situation and diminished facility on the trumpet. Regarding his situation in

higher education, he said, “tenure is a blessing,” implying that he was well aware of the implications of his situation as they relate to a performance-based industry. In other words, Wing was well aware that his condition would have severely impacted his ability to make a living in many other scenarios in the field, further lending credence to the notion that musicians may withhold the reporting of their injuries for fear of lost work.

In his interview, Robert Baca also mentioned that he rarely discusses his experience with focal dystonia, which is in line with the aforementioned hypothesis presented by several authors. However, Baca’s responses differ in reasoning from Wing, Skiles, and others. In other words, Baca explicitly stated that he did not like to discuss his injury for concern that others might hear of his condition and extrapolate his diagnosis onto themselves through a placebo effect. Interestingly, his premise stands to reason as focal dystonia is quite rare.

It is quite interesting that all participants seemed to exhibit a sense of awareness or even anxiety stemming from their perception of what their colleagues and others might think of their injury or condition and use of accessibility technology. It could be hypothesized that this phenomenon rivals all other reasons or causes for the lack of accessibility technologies available to musicians. For example, the use of a rotary trumpet could be beneficial to some individuals in situations such as Greg Wing’s. However, the viability of this solution would likely be greatly impacted by the individual’s perception of their colleagues’ opinions, to say nothing of the inherent timbral or tone production differences between a piston and rotary trumpet. Trumpeters in certain situations, such as an orchestral setting where perfection is expected and measured against a standard, would likely be averse to any such deviation from the norm.

As presented in chapter two, several authors also posited that injury and disability reporting rates for musicians differed between men and women. The consensus among these

authors seemed to be split. This document did not uncover any new evidence to support either argument, likely due to the small sample size necessitated by the nature of this document.

While the temptation to rank the accessibility technologies and solutions examined in this document may exist, that endeavor would likely prove to be less than fruitful. Although each solution or device was evaluated in terms of its effectiveness, accessibility, efficiency, and adaptability, those evaluations were sometimes based on anecdotal information and a limited sample size. In other words, this document's evaluation of various accessibility technologies and solutions does not prove or disprove that any are better or worse than the rest. On the contrary, this document's findings more readily indicate that there is no solution that is perfect or free from risks and negative outcomes. Further, the responses collected and literature surveyed strongly indicate that the evaluation of each type of accessibility technology or solution is subject to a wide variety of variables. In short, the outcomes associated with each adaptive solution and technology are highly dependent upon the circumstances of each unique individual's situation.

More importantly, the document's findings illuminate the reality that many musicians face when encountering injury or disability. This reality is that when facing injuries or disabilities, many musicians must endure a lengthy and exhaustive process of trial and error to find a solution that reasonably remediates their symptoms and allows them to return to their craft. Further, for many musicians, a clear path forward is often non-existent when they encounter injury or disability due to a lack of established or commercialized accessibility technologies, a sentiment echoed by the data collected in this document.

Conclusion

Though the field of accessibility studies for musicians is quite young as an academic discipline, much work has been done in cataloguing the etiology, diagnoses, and general remedies for a variety of injuries and disabilities experienced by musicians. However, the available literature on accessibility technology for musicians contains gaps in the collective knowledge, particularly with regard to the chronicling and cataloguing of specific and unique types of adaptive technologies utilized by trumpeters to remediate the symptoms of their injury or disability. Instead, much of the extant literature focuses on the collection and categorization of data regarding condition occurrences and results of generalized adaptive solutions such as physical therapy, medication, and surgical intervention.

While it is true that trumpeters do have access to a few types of accessibility technologies and solutions, the onus is frequently placed upon the individual to find a solution to remediate the symptoms of their injury or disability. This is due, in part, to the aforementioned gap in the collective knowledge of the field. In other words, very few well-known, commercially available accessibility technologies exist for trumpeters. As such, trumpeters frequently must build or design their own accessibility technologies, either from scratch or by emulating others. This premise is well exemplified by the case study involving the creation of the WingMaster by Greg Wing and Peter Pickett in chapter four as well as the accessibility solutions devised by Robert Baca and Steffanie Skiles, which are discussed in detail in chapter three.

This document chronicled the creation, development, and progression of several accessibility technologies and adaptive solutions, both for the general musician as well as trumpet-specific approaches. Some of the general solutions examined included non-invasive

approaches such as physical and occupational therapies, medicinal approaches such as the management of pain and inflammation through NSAIDs, and surgical interventions such as carpal tunnel surgery. In broad terms, the general solutions examined displayed a range of results regarding effectiveness, accessibility, and adaptability. In practice, these results are more heavily influenced by the condition of the individual and vary widely.

Regarding trumpet-specific accessibility technologies, this document examined several solutions, both commercial and non-commercial in nature. Some of these included "Wingy" Manone's use of prosthesis, "Jimmy" Burke's use of a Tripod Device and left-handed cornet, Robert Baca's left-handed solution, Steffanie Skiles' Swiffer Device, the ERGObrass Support System, the Shulman System, and the WingMaster as created by Greg Wing and Peter Pickett. In general, positive outcomes were commonly associated with the effectiveness of each of these devices and solutions. However, variability was observed when the accessibility and efficiency of these solutions was examined. Perhaps surprisingly, the non-commercially available devices and solutions were typically more accessible than those that were mass produced on a commercial level. This may be further rationalized or explained by understanding that since the individual trumpeter often finds themselves creating their own accessibility technology to best meet their needs, their solutions are sometimes more primitive in nature, thus eliminating some of the accessibility barriers relating to financial means or complexity of construction.

In terms of accessibility technology, there is no perfect solution devoid of negative associations regarding overall outcomes, effectiveness, accessibility, efficiency, and adaptability. Each adaptive solution contains intrinsic benefits and associated risks. Further, each type of injury, disability, or condition presents unique needs to be addressed. Similarly, the needs of each individual are also unique, even amongst individuals who have encountered similar injuries,

disabilities, or conditions. Therefore, the number of extant accessibility technologies will likely never be enough.

Because of the state of accessibility technology for trumpeters, coupled with the possibility that trumpeters exhibit a proclivity for underreporting or understating the severity of injuries and disabilities encountered, more work is required with regard to the study and creation of accessibility devices and solutions. In short, trumpeters need greater access to a wider variety of technological solutions to assist them when they encounter injury or disability. The solution to this problem is multi-faceted, requiring both more work in the creation of accessibility technologies for trumpeters as well as more work in the chronicling and cataloging of technologies that have been created. The ultimate objective of this document is to provide a unique intersection of musicians, engineers, and teachers with a repository of information. Ideally, this study will serve as a springboard or source of inspiration for future research, development, and study of accessibility technology, both for trumpeters and other musicians as well.

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Appendix A: Institutional Review Board Approval

The UNIVERSITY of OKLAHOMA

Institutional Review Board for the Protection of Human Subjects

Approval of Initial Submission – Exempt from IRB Review – AP01

Date: July 17, 2024 **IRB#:** 17443

Principal Investigator: Drew M O'Dell

Approval Date: 07/16/2024

Exempt Category: 2

Study Title: The Development of 21st Century Accessibility Technology for Trumpeters with Right-Hand Injuries and Disabilities: A Case Study

On behalf of the Institutional Review Board (IRB), I have reviewed the above-referenced research study and determined that it meets the criteria for exemption from IRB review. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:

- Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Request approval from the IRB prior to implementing any/all modifications as changes could affect the exempt status determination.
- Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.
- Notify the IRB at the completion of the project.

If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,

Ioana Cionea, Ph.D.
Vice Chair, Institutional Review Board

Appendix B: Transcript of Interview with Robert Baca

Interviewee: Robert Baca (Labeled as "RB")

Interviewer: Drew O'Dell (Labeled as "DO")

Date of Interview: 9/30/2024

Time of Interview: 4:15 PM EDT

Location of Interview: Zoom

[Begin Transcript 00:00:22]

[00:00:22] RB: Hello, Drew!

[00:00:23] DO: Hi Professor Baca, can you hear me alright?

[00:00:25] RB: I can hear you very well.

[00:00:27] DO: Fantastic! I can hear you as well. Sorry for the connection issues with Zoom; I'm not quite sure what happened.

[00:00:33] RB: I'm not either. I actually am on Zoom calls quite a bit but don't initiate them.

[00:01:02] DO: Well, I'm glad we were able to make it work and apologize again for the trouble.

[00:01:15] RB: No worries at all. Can you give me just one paragraph of a background of what you're doing and what you want to accomplish and what you want to get out of me today?

[00:01:26] DO: Yeah, absolutely. First, if it's okay with you, I've got a document to read to you about getting your consent to participate in the research. So, if it's okay with you, I've got a lengthy blurb to read to you quickly and then ask you some questions about your consent to participate and then I can give you all kinds of background about the study if that doesn't answer all your questions. Is that okay with you?

[00:01:47] RB: Sounds good.

[00:01:49] DO: Okay. You are invited to participate in research about the creation and development of twenty-first century accessibility technologies for trumpeters with hand injuries and disabilities. The purpose of this research is to chronicle the advancements made in the field of adaptive technology for trumpeters to be used as a repository of information for future musicians, students, teachers, engineers, et cetera. If you agree to participate, you will be interviewed via Zoom and will be audio and video recorded. Your audio, video, or photographic images may be used in university research reports with your permission. There are no benefits and minimal risks to participating in this research. The interview will be

conducted online via Zoom. The organization hosting the data collection platform has its own privacy and security policies for keeping your information confidential. There is a risk that the external organization, which is not part of the research team, may gain access to or retain your data or your IP address which could be used to re-identify you. No assurance can be made about their use of the data you provide for purposes other than this research. There is also a risk of accidental data release if we collect your data using audio and video recordings. If this occurred, your identity and the statements you made could become known to people who are not on the research team. To minimize this risk, the researchers will transfer data to, and store your data on, a secure platform approved by the university's Information Technology Office. Finally, you will be asked to transfer documents, images, or other personal records to the researchers in this research. There is a risk that someone who is not part of the research team may gain access to this data during the transfer process. We will give you information about transferring data to the researchers to minimize this risk. When we receive your data, we will transfer the data to, and store your data on, a secure platform approved by the university's Information Technology Office. Your participation is voluntary and your responses will be shared with all readers in the form of direct quotes and a complete transcript published in the dissertation. Your consent to the publishing of your identifiable responses is a requirement for participation in this research. We might share your interview responses

with other researchers or use it in future research without obtaining additional permission from you. Now, I will be asking some questions to find out how you want me to report your ideas. You can refuse any that you do not like without penalty. Do you agree for data records to include identifiable information?

[00:04:16] RB: Yes.

[00:04:17] DO: Do you agree to have your name reported with quoted material?

[00:04:21] RB: Yes.

[00:04:23] DO: Do you agree for your data to be archived for scholarly and public access in the form of a complete transcript included in the published dissertation?

[00:04:30] RB: Sure.

[00:04:33] DO: Do you consent to audio recording?

[00:04:36] RB: Sure.

[00:04:39] DO: Okay. I may want to take photos of you to include in my research. That would just be like a simple picture of you playing left-handed. If that were to come up, would you agree to that?

[00:04:53] RB: Oh, sure!

[00:04:54] DO: Okay. Your photographs and audio or video records may be used in university research reports unless you tell me not to do this. May I contact you to gather additional data or recruit you for new research?

[00:05:06] RB: Absolutely.

[00:05:07] DO: Okay. Even if you choose to participate now, you may stop participating at any time and for any reason. If you have any questions about this research, please contact me at Drew.M.ODell-1@ou.edu or the faculty advisor, Dr. Matt Stock at mstock@ou.edu. You can also contact the University of Oklahoma Norman Campus Institutional Review Board at (405) 325-8110 or at irb@ou.edu with questions, concerns, or complaints about your rights as a research participant or if you do not want to talk to the researcher. Do you agree to participate in this research?

[00:05:46] RB: Yes.

[00:05:47] DO: Finally, would you like a printed or electronic copy of the information we have just reviewed?

[00:05:52] RB: No.

[00:05:53] DO: Okay, great. And today is September 30th, 2024, and I am interviewing Professor Robert Baca and it is approximately 3:15 Central Time. I'll start by giving you a quick little blurb about the research project. I studied and did my undergraduate degree with Greg Wing and was there from 2014 to 2018. So, I've seen what has been going on with his playing and the injuries he has had with his right hand. And now, I'm finishing up my DMA at the University of Oklahoma where I studied with Dr. Karl Sievers. And so, I chose to do my research project on accessibility technologies for trumpeters because I realized, when I was looking through all the different journals like *Medical Problems of Performing Artists*, that there wasn't really much out there in terms of technology for people who had hand injuries or disabilities. And what I realized is that most of what was out there was a product of a *do-it-yourself* ingenuity. People had just built their own accessibility technology – there was really nothing commercially available outside of the Shulman System and the ERGObrass System. I saw Greg's story where he was working with Peter Pickett to create the WingMaster, which I'm not sure if you have seen or not.

[00:07:27] RB: Yeah. And I think that's fine then, Drew. I think I have enough of a background to help you. And you studied with such excellent players and teachers that I think everything that you are going to ask with my journey is just going to be crystal clear, whereas others that might have come from a different point of view might have a little more difficulty understanding. So, I'm really glad that you are asking these questions.

[00:07:54] DO: Yeah, and I'm very thankful for the teachers I've had and I'm thankful for you for taking some time to help me with my project for sure. Do you have any other questions about the research before I jump in with the questions?

[00:08:06] RB: I don't.

[00:08:07] DO: Okay. Would you be willing to start by giving a little bit of biographical information? You know, where did you go to school? Who did you study with? What kind of path did your career take? Just so I can include it so the readers know.

[00:08:25] RB: Sure. Well, I'm from Lockport, Illinois, which is about forty miles South of downtown Chicago. I was part of a wonderful grade-school program at the time in 1968 called Kelvin Grove Grade School. This was a little bit

closer to the military style of concert bands. We actually made a record in sixth grade.

[00:09:01] DO: Oh, wow!

[00:09:02] RB: And another in eighth grade. And we participated in the Midwest Band Director's Association conference in my seventh grade and my eighth-grade years. And I mention those things to show just how intense and wonderful this band program was. And things were such that we had to study with, from the beginning of playing, the teacher that was recommended through the band director. We mostly worked on the concert band music that we were playing in our concerts. But the Arban's book, playing it thoroughly all the way through – I think I had gotten through most of it by the time I was in eighth grade. And then there was a junior college nearby, Joliet Junior College, where one of Mr. Adam's students taught. His name was Jerry Lewis and he went to Indiana University in the early to mid-1960's. So, I studied with him from my freshman year in high school through attending the community college for two years. It was one of the best decisions I have made in my life because he was a solid Bill Adam student. So, I've been doing routine since probably the end of eighth grade and did it all throughout high school. And he was so wonderful in directing me to listen to the Chicago Symphony Orchestra and we were just forty miles South. So, by the time I

was a sophomore, I was going regularly to listen to them and meeting and getting to know Adolph Herseth and what that sound was all about.

[00:11:10] DO: Oh, wow!

[00:11:12] RB: And so, by the time I was probably a freshman in college, I was dead set sold on joining the *(laughs)* Chicago Symphony after college and every part of that. And Jerry Lewis had such a personality that he had pretty much decided where I was going to go next and that was Indiana University. So, he talked to Mr. [Bill] Adam and I was very, very lucky be able to get into his studio and then you could go into the same story that you've heard from Karl [Sievers] and Greg [Wing] and that's my story.

[00:11:58] DO: Uh-huh.

[00:11:59] RB: Everything that they've said was my experience as well. I studied with him for the rest of my undergraduate degree and then I was his graduate assistant for my master's degree. I think it was three years that I did that for, so maybe my master's degree and the beginning of my doctoral degree. I really wanted to pursue the orchestra so for the undergraduate degree, I was involved with the bands very heavily as a music education major and then got heavily involved with the orchestras during my master's degree. And there was an opening in a jazz band after Greg had

opened up the window for everyone to play on Buddy Rich's band. Several Adam students played on that band, making everyone aware of what that sound was about.

[00:13:03] DO: Sure.

[00:13:05] RB: And so, I was one of those, with probably ten to twelve others. And after getting off of that band and several other bands that Buddy Rich's band backed up, I got married. I was supposed to get married before getting in the ensemble but my wonderful wife, who I'm still married to, said, "let's put our marriage off because this is important for you to do." And so, I did and then she graduated and got a job in Indianapolis. And so, I moved to Indianapolis and just began playing there and there were many Adam students that were there and were just the way Karl and Greg would be – just so open-armed and gracious.

[00:13:58] DO: Uh-huh.

[00:13:59] RB: They pretty much supported my living through their scraps. And then I worked on my doctorate while traveling down from Indianapolis at that time. I was there for, I think a couple of years, and then in 1986 a job opening came open at the University of Wisconsin at Eau Claire and Dominic Spera had taught here –

[00:14:27] DO: Okay *(nods).*

[00:14:29] RB: –so I talked to him about and, yeah, I came up here and I've been up here, I think this is my thirty-eighth year here. It's just so wonderful in every way. Of course it's drop-dead gorgeous here, but we're also right next to a very large musical city – the Twin Cities, which has an incredible amount and several different veins of players that pretty much stay in that one area. It's got two great orchestras and a very large Broadway scene. There's just lots of different things going on and we're about seventy miles straight East of that.

[00:15:16] DO: Okay

[00:15:17] RB: Is that good for a start?

[00:15:19] DO: Yeah, that's fantastic! So, you said you started at Eau Claire in 1986?

[00:15:26] RB: Correct, the fall of '86.

[00:15:28] DO: Okay, the fall of '86. Would you mind giving me some dates as far as when you toured with Buddy Rich and the dates you were in school, both at the community college with Jerry Lewis and with Mr. Adam at IU?

[00:15:39] RB: Sure. I graduated from high school in 1976.

[00:15:43] DO: Okay.

[00:15:45] RB: I'm partly figuring this out mathematically at the moment.

[00:15:47] DO: *(Laughs)* Okay.

[00:15:49] RB: *(Laughs)* I hope I'm accurate here. And then, so that would've been at the community college, would've been two years, so that would've been 1978. So probably the Fall of 1978 going to Indiana University. Let's see, I think I went on Buddy Rich's band, I am going to say, in the Fall of 1983.

[00:16:15] DO: Okay.

[00:16:16] RB: And I got married on July 14th, 1984.

[00:16:24] DO: Okay.

[00:16:25] RB: So, that would've been in Indianapolis, approximately two years before the job opening at Eau Claire.

[00:16:33] DO: Right. Okay. Yeah. Well, *(laughs)* the wedding date is the important one to remember so I'm glad that one came easily.

[00:16:39] RB: *(Laughs)* Yeah, that one I don't forget.

[00:16:41] DO: Okay, so jumping into some questions – so, I saw a video of you on YouTube that kind of explained your situation, and obviously I reached out to you on the recommendation of Greg and Karl and Matt Stock. But for the sake of the paper, could you describe the nature and occurrences of events that led to your playing of the trumpet with your left hand and what kind of timelines are involved with that as well?

[00:17:08] RB: Certainly. So, I think it was around 2010 or 2011, depending upon earlier or later in that year it was somewhere around that time.

[00:17:24] DO: Okay.

[00:17:25] RB: I started having difficulty with my first finger for the 'F' and the 'B-flat', so my first finger closest to me. It started going over the valve and off of the valve as opposed to being able to hit it directly.

[00:18:02] DO: Okay.

[00:18:03] RB: So, I play pretty close to the edge of my fingers. But even the pad [of the finger], the first pad and the second pad, changing to that [playing position] was not good enough because the finger was actually retracting.

[00:18:24] DO: I see.

[00:18:26] RB: As we know, muscles can only contract, and so a little electronic signal was going there [to the finger], and it was quick. I would say it felt like a twitch in your eye. So, there was no pain, it was totally electric. But after a while, trying to perform with that – where I first saw a doctor was when I started having bicep problems on my right arm because of trying to compensate for it so much.

[00:19:09] DO: I see.

[00:19:10] RB: So, I talked to my local physician, and he said, "I don't have a clue what it is." And I put to him that this was what I did for a living, so if I need to go to Switzerland *(laughs)* to find the best person in the world, that's what I'm going to do.

[00:19:29] DO: Right.

[00:19:30] RB: So, it was about a month later, and he said, remarkably so, *(laughs)* "It's Sweden actually that supposedly knows something about this." He said, "there was another one in Mobile, Alabama that we could send you to, but the Mayo Clinic is forty-five minutes from here. I don't have a clue what it is but they have a very well-known hand specialist area there and I can get you in with the head person." So, I thought, *Great! Let's go do that!* So, I think it was a week or two weeks later, I traveled there. I would have to look up what that fella's name was because I can't remember right now. But he looked fairly young and he came into my room, asked what was wrong, and then had me take my index finger and thumb and put it on a device and squeeze on the device. And that device had a digital meter on it.

[00:20:44] DO: Okay, interesting.

[00:20:45] RB: And then he said, "Just do this about three or four times." A couple of other things he did was to have me pick up a penny and then he had me pick up a button. And at that time, those things were pretty impossible to do.

[00:21:08] DO: I see.

[00:21:10] RB: My point is that I think it was about two to three minutes, tops, and he said, "Oh yeah, you've got focal dystonia."

[00:21:20] DO: Okay, so it was a quick diagnosis.

[00:21:24] RB: So, I said, "Well, that's wonderful, we can categorize it and so now I can do something about it." And he said, "Well, unfortunately you can't –"

[00:21:34] DO: *(Laughs)* Right.

[00:21:35] RB: –because there's no cure for it." And then he described exactly what it was, said it was categorized in the year 2000 so it was fairly new, probably ten years at that time. Basically, he said, "this is just a short circuit in your engine. Basically, you have an area that we don't have enough research yet to know what causes it, but you have area that when something needs to go to your index finger on your right hand, that area is just gone. So, a synapse goes from your brain and tells it what it wants to do and it goes so far and then it just crashes. And that's why you feel that twitch on your finger." And so, my reply was, "That's great! Everything about the way I've been taught to play the trumpet is gestalt. So, I'll just create those passageways again. I really think it's about as simple as that." *(Laughs)* He said, "Well, it's actually not as simple as that with how fast your synapses travel in your brain." I don't remember the exact figure that he

used, but it was something like a millionth or a billionth of a second. This is so interesting with you being a Bill Adam student, you'll understand this.

[00:23:23] DO: Right.

[00:23:24] RB: He said, "If you think 'woe is me,' or any thought other than that electronic signal going to your finger and doing exactly what you're imagining it to do, in a billionth of a second, that synapse is going to go where you're thinking of rather than where you're imagining." Isn't that interesting?

[00:23:49] DO: That is very interesting.

[00:23:51] RB: He didn't know anything about Bill Adam, and yet it was exactly all the things that he had told us about playing what you imagine rather than identifying what reality is.

[00:24:03] DO: Right.

[00:24:04] RB: So, he said, "If you even acknowledge that this exists and what could possibly happen, the synapse will go to that area and will crash. The possibilities of building that again are, quite frankly, just next to

impossible." My response to that was, "If I understand what it is, then we've just got to do this." I guess that was convincing enough. I said, "How much would I need to come in?" His response was, "Quite frankly, you would need to see me for about eight hours a day, seven days a week for months, if not years."

[00:24:50] DO: *(Laughs)* Oh, wow.

[00:24:51] RB: *(Laughs)* I think he also said, "Since I don't have the time for that and you don't have the money for that, perhaps we could try some other experiments." He said he thought he could get a grant to get me a therapist he could watch over that I could do certain exercises with and use it as research since these things had never been done before. So, I went once a week for about eight months to the Mayo Clinic. And we did exercises like this *(demonstrates using first finger and thumb)* where my finger would go to pick up a pencil and the entire finger would flick and so the pencil would just flick on my body. It was quite a dramatic twitch. So, through these exercises, I had to hold my finger straight and then I had to bring it down to my thumb which was extended horizontally. And I was to do that, to take a distance of about an inch, and to take five minutes to make that happen.

[00:26:25] DO: Okay.

[00:26:27] RB: So, if you can imagine that –

[00:26:30] DO: Yeah.

[00:26:32] RB: Trying to just do something that slowly, my finger at first was twitching everywhere, but I actually did start to get some success with that. He saw the success so he said, "I'm not going to charge you for any of these visits." And we then went to, he had a bowl of rice, and I had to go into the bowl of rice and pick up a dime or a penny or a quarter that was buried in there without flicking rice. So, exercises just like that and then I started to come up with some on my own with my trumpet. And so, as things got better, I would take my first valve and I would depress the valve over like two or three minutes.

[00:27:32] DO: Okay.

[00:27:33] RB: And I would try to have it where if it was on a speed camera it wouldn't look disjunct, that it would actually look smooth. And doing that and then doing different valve combinations – that's how I was able to get my therapy paid for because he used it as a research project. I'm not sure if he published it or not. But we did that for about nine months. And that got me enough of an area where I felt that I could do this. So, I went back to playing – I guess I was playing the entire time – but I went back to

performing again. And it was going pretty well, I mean I was actually starting to do some solo playing. And I remember, at that time I played the Arutunian Trumpet Concerto with an orchestra during that time with my right hand. Today, Drew, I can not even imagine that happening.

[00:28:38] DO: Yeah.

[00:28:39] RB: I don't even know how I did that. But I did miss a couple of notes in the cadenza due to that finger retracting. If you can just imagine doing four sixteenth notes with the possibility of that finger going to the left or the right or pulling back –

[00:28:57] DO: Yeah.

[00:28:59] RB: –and, you know, on the second sixteenth note or something. And so, I had really gotten into a wonderful state of imagination that has helped my trumpet playing to this day. So, good things always come out of really bad things and that's definitely – I was able to get to a focus level that I had never gotten to in my life up to that point. So, I did this Arutunian Concerto and I just remember thinking to myself, *this took so much incredible effort to do this. I don't know if I want to keep doing this.*

[00:29:57] DO: Yeah, I can understand that.

[00:29:59] RB: It was just so much. And so, it was during just a really down moment in August, just thinking, *maybe he's right. Maybe this is like never going to come back again.* And I remember taking my left hand and playing a 'D' and an 'E', which can be an odd fingering, and it was so awkward, but that springy feeling was not there. And so, I just said, "I'm going to learn left-hand." And I just did it exactly like I had done the exercises with the pennies and the quarters, just super slowly and working on having it all be smooth and what my imagination was as opposed to trying to drive a car too fast, I guess.

[00:30:57] DO: Right.

[00:30:58] RB: But I remember I got to the point where I could play Broadway shows again, and I had my right hand now holding the trumpet. And I had to go through several, several changes in position because, as the Broadway show got more intense or anything got more intense, the index finger could cramp down.

[00:31:26] DO: I see.

[00:31:28] RB: And so, it started to just really – it would be like taking your hand that you hold the trumpet with and unconsciously squeezing it as hard as you could.

[00:31:40] DO: *(Nods)* Yeah.

[00:31:41] RB: So, I started to get some pretty dramatic pain. It was all during one like, two-week show. And I tried it [the right index finger] in different positions like putting it in the third finger ring, putting it at the bottom, and then finally, I put it in the ring on top on the right where your pinky finger would go.

[00:32:05] DO: Okay, interesting.

[00:32:06] RB: And then I almost pulled that off.

[00:32:09] DO: *(Laughs)* Oh my goodness.

[00:32:10] RB: So, then I went without it and kept my index finger straight and was able to play with my left hand and that worked. Unfortunately, in the midst of that, there was so much isometric tension that was going on I actually had to have carpal tunnel surgery.

[00:32:34] DO: Oh goodness!

[00:32:35] RB: I had gotten bad carpal tunnel. That's exactly how you acquire carpal tunnel; it's when those muscles are squeezing. So, I got that and then I played with my left hand. I think one of your questions was about it [the

injury] doing anything with your embouchure and your position. Yes, it did. And it actually – it was kind of like starting trumpet all over again.

[00:32:59] DO: Yeah.

[00:33:01] RB: It did change the position for the better. Basically, ten or twelve years later after that, I've been still working with it and I have no recollection now of, whether it's right hand or left hand, it feels as good or better – I can do technical things as good or better than I ever could with my right hand. And so, it's actually not even part of the thought process now.

[00:33:38] DO: Well, I'm glad to hear that the outcome has been so positive. Did you ever consider, either during that Broadway stint or at any other time, actually pursuing a left-handed trumpet?

[00:33:54] RB: I did.

[00:33:55] DO: You did? Okay.

[00:33:56] RB: Yeah. Yeah, I did. And I called Bach [Vincent Bach Corporation] about it to see if it was possible and they said absolutely. We started to go down that route but it was right at the same time that I was experimenting with seeing if this would work with a regular, right-handed trumpet because I really liked my trumpet. And I wasn't really sure if I wanted to get

something else. I also had great difficulty with the part on the second valve slide that is the little knob that's there.

[00:34:33] DO: Yeah.

[00:34:34] RB: *(Laughs)* That really dug into my hand!

[00:34:37] DO: *(Laughs)* I can imagine, yeah!

[00:34:39] RB: And that was part of, I think, the problem of the carpal tunnel syndrome so I actually turned that backwards to this day. So, it's just round there now and it works just fine.

[00:34:53] DO: I see, interesting. That's fascinating!

[00:35:52] DO: In a lot of the literature I've read about injuries and disabilities in musicians, there seems to be a chronic persistence of under-reporting for fear of lost work or just the general perception around it. Did you find that those thoughts crossed your mind as you were either dealing with the dystonia, or dealing with learning to play left-handed, or dealing with the embouchure transitions or anything like that?

[00:36:19] RB: Never. I've never cared about any of those things.

[00:36:23] DO: Okay.

[00:36:26] RB: I just really enjoy pursuing – I don't know, I think it's just because I have a job so I'm not worried about paying right *(laughs)*.

[00:36:36] DO: *(Laughs)* Yeah.

[00:36:37] RB: So, it's pure, absolute enjoyment that I live for. I'm glad my wife puts up with it. And it's like, whatever happens, happens. I've never thought that [the feelings of lost work, etc.].

[00:36:52] DO: Mm-hmm. I remember when I was interviewing Greg, one of the memorable quotes from the interview was that he told his colleagues *(laughs)*, "tenure was a wonderful thing" when he was going through his process of re-learning everything. Speaking of colleagues, did any of your fellow musicians, colleagues, or contractors seem to notice that you were playing left-handed or did they just think it was business as usual?

[00:37:19] RB: Well, of course. I think everybody around was very aware of it. And I think like you say, I actually did not talk about it very much and obviously it makes perfect sense, right? I've had several invitations where people have said, "More people need to know about this. You need to come to

this conference and talk about it." And Drew, I'm not interested in that because of what the placebo effect can be.

[00:37:52] DO: I see.

[00:37:53] RB: In other words, this is such a rare thing. But there could be any person that has any one of the symptoms that I've talked about and they could certainly look at this as an option and then of course, all of a sudden, it creates a placebo and this person has extra problems –

[00:38:12] DO: Sure.

[00:38:13] RB: –as a result. So, I actually will not talk about it at any type of forum. I think what you're doing here, putting it in the context of several different types of things and how they remedy those – I think that that can be an important story, I guess your own conference would be all about this one thing. Of course, with mine, I did not go for any other type of technological help, just the stuff that Mr. Adam told us.

[00:38:49] DO: Well, in light of that, I'd like to say thank you again for taking the time to chat with me. I hope my paper is more solutions-based and presents a history of what different people have done with a variety of injuries so that

when someone has an injury or something they have somewhere to go to as a next step kind of thing.

[00:39:17] RB: Well, unfortunately, not every person has studied with Mr. Adam.

[00:39:22] DO: That's true.

[00:39:24] RB: He would basically, once with you were with him, and I don't know, I was with him for ten or twelve years – everything about the foundation of what he did, without ever saying it, just gave us all an attitude of there's nothing we can't fix if we just think about the sound.

[00:39:50] DO: Yeah, I think that's a wonderful perspective that I explored a little bit with Greg, talking about the idea of re-learning the trumpet when it's so engrained as part of your identity and how that can take a mental toll on a musician.

[00:40:05] RB: Yes.

[00:40:07] DO: Okay, I think that covers everything that I was hoping to ask in the span of time that we've got. Thank you again, Professor Baca, I really, really appreciate it.

[End Transcript 00:40:17]

Appendix C: Transcript of Interview with Steffanie Skiles

Interviewee: Steffanie Skiles (labeled as "SS")

Interviewer: Drew O'Dell (labeled as "DO")

Date of Interview: 9/16/2024

Time of Interview: 5:30 PM EDT

Location of Interview: Zoom

[Begin Transcript 00:00:03]

[00:00:03] DO: Alright, hey Steffanie, how's it going?

[00:00:05] SS: Hey, it's going well, how are you?

[00:00:07] DO: I'm doing well, thanks. I appreciate you agreeing to help with this research. Before we get started, I've got a verbal consent form to read to you and some questions to ask you about how you'd like me to share your ideas. So, let's jump in with that; I'll read you a lengthy blurb and ask you some questions at the end.

[00:00:27] SS: Ok.

[00:00:28] DO: You are invited to participate in research about the creation and development of twenty-first century accessibility technologies for

trumpeters with hand injuries and disabilities. The purpose of this research is to chronicle the advancements made in the field of adaptive technology for trumpeters to be used as a repository of information for future musicians, students, teachers, engineers, et cetera. If you agree to participate, you will be interviewed via Zoom for approximately 90 minutes in length and will be audio and video recorded. Your audio, video, or photographic images may be used in university research reports with your permission. There are no benefits and minimal risks to participating in this research. The interview will be conducted online via Zoom. The organization hosting the data collection platform has its own privacy and security policies for keeping your information confidential. There is a risk that the external organization, which is not part of the research team, may gain access to or retain your data or IP address which could be used to re-identify you. No assurance can be made about their use of the data you provide for purposes other than this research. There is also a risk of accidental data release if we collect your data using audio and video recordings. If this occurred, your identity and the statements you made could become known to people who are not on the research team. To minimize this risk, the researchers will transfer data to, and store your data on, a secure platform approved by the university's Information Technology Office. Finally, you will be asked to transfer documents, images, or other personal records to the researchers in this research. There is a risk that someone who is not part of the research team may gain access

to this data during the transfer process. We will give you information about transferring data to the researchers to minimize this risk. When we receive your data, we will transfer the data to, and store your data on, a secure platform approved by the university's Information Technology Office. Your participation is voluntary and your responses will be shared with all readers in the form of direct quotes and a complete transcript published in the dissertation. Your consent to the publishing of your identifiable responses is a requirement for participation in this research. We might share your interview responses with other researchers or use it in future research without obtaining additional permission from you. Now, I will be asking some questions to find out how you want me to report your ideas. You can refuse any that you do not like without penalty. Do you agree for data records to include identifiable information?

[00:02:55] SS: Yes.

[00:02:56] DO: Do you agree to have your name reported with quoted material?

[00:03:00] SS: Yes.

[00:03:01] DO: Do you agree for your data to be archived for scholarly and public access in the form of a compete transcript included in the published dissertation.

[00:03:10] SS: Yes.

[00:03:11] DO: I would like to access some of your records for my research. They may include schematics, drawings, and photographs. Do you agree for me to do this?

[00:03:18] SS: Yes, I do.

[00:03:20] DO: Do you consent to audio recording?

[00:03:22] SS: Yes.

[00:03:23] DO: Do you consent to video recording?

[00:03:25] SS: Yes.

[00:03:26] DO: I may want to take photos of you to include in my research. Do you agree?

[00:03:30] SS: I do.

[00:03:32] DO: Your photographs and audio or video records may be used in university research reports unless you tell me not to do this. May I contact you to gather additional data or recruit you for new research?

[00:03:42] SS: Yes.

[00:03:43] DO: Even if you choose to participate now, you may stop participating at any time and for any reason. If you have questions about this research, please contact me at Drew.M.ODell-1@ou.edu or the faculty advisor, Dr. Matt Stock, at mstock@ou.edu. You can also contact the University of Oklahoma Norman Campus Institutional Review Board at (405) 325-8110 or at irb@ou.edu with questions, concerns, or complaints about your rights as a research participant or if you do not want to talk to the researcher. Do you agree to participate in this research?

[00:04:22] SS: I do.

[00:04:23] DO: Finally, would you like either a printed or electronic copy of the information we have just reviewed?

[00:04:28] SS: No.

[00:04:29] DO: Okay, great. Today is Monday, September 16th, at approximately 5:37 PM Eastern Time and I'm here with Steffanie Skiles. Steff, I was hoping we could start with you telling me a little bit about your background and what you're doing now and maybe that could be a springboard into what happened with your injury.

[00:04:53] SS: Sure. So, I'm a public-school teacher and I teach in Kentucky. I'm currently the band director at Ashland Middle School and the assistant at Paul Blazer High School in Ashland, Kentucky. This is my second year there. Before then, I spent my first six years of teaching over in Greenup County, Kentucky, and I was the band, choir, and general music teacher at McKell Middle School. And to get to the whole accident, this was in 2021, so right after or during the pandemic, Greenup County had been on an A-day/B-day rotation. While some schools stayed completely virtual, ours wanted to slowly integrate kids back into the building, and their solution was to cut the alphabet of every grade into separate categories and split the students that way. They were beginning to put that into place when my accident happened. Regardless of where the kids were, whether it be virtual, A-day/B-day in-person, or whatever, staff members still had to report to school. We were expected to work in our classrooms, not to really interact with our colleagues and to keep the spacing and masking and all that, you know.

[00:06:19] DO: Right.

[00:06:20] SS: There were a couple of other folks in the other schools in the district who could not be trusted to work from home so we had to still report.

[00:06:30] DO: *(Laughs)* I understand.

[00:06:32] SS: So, to kind of get into it – is this where you want me to give specifics?

[00:06:38] DO: Yeah, if you wouldn't mind just telling me exactly what happened and when.

[00:06:44] SS: Well, it was February 23rd and I'll never forget it. I was living in my apartment and I couldn't practice in my apartment so I would get to school early to play through my routine. On that day, I was supposed to trade off with a good friend of mine named Arias Fischer, now Arias Flory. And I had to go to school since teachers had to be there anyway.

[00:07:11] DO: Sure.

[00:07:12] SS: So, I was getting ready to do that, however, if you're familiar with Kentucky at that time, that was when the really bad ice storm came through and was bad for a whole week or so. Luckily, I still had electricity and water because a lot of people in my district did not. But regardless, teachers still had to report to school. And so, the day before, I had gone down and cleared the entire parking lot at my apartment. It took me all afternoon to clear the snow and ice. The sun was out and everything was melting so it wasn't so bad, or so I thought. Well, on the 23rd, I got up and got my stuff ready and was scraping the ice off my windshield while the car was warming up. I had finished scraping the ice off my windshield,

and as I was walking back, doing the weird penguin shuffle we do, my left foot shifted, and I fell straight down. I tried to grab the hood of my car, but I drove a small SUV so the nose was slanted and that didn't work. I fell straight down on my left elbow and had an *oh crap* moment and just laid there for a minute before trying to get to work. I couldn't raise my arm or turn my hand over. Raising my arm above midway of my body caused ridiculous pain that made me want to pass out or throw up.

[00:08:52] DO: Wow.

[00:08:53] SS: But, my brain, being what it was, told me to get to school, go to work, and play through my routine with Arias. And so, I drove to work, got inside, and had one arm doing everything. I got set up and was holding back tears; I had gone to the teachers' lounge and got some ice and had it on my elbow. To make a long story short, Arias was like, "you idiot, go to the hospital!" My principal and some other teachers had also come in and one of them asked what had happened to me. I told them what happened, and they said, "You blank-blank-blank, go to the hospital!" *(laughs)* I had very supportive colleagues!

[00:09:35] DO: And you went to the hospital immediately after that?

[00:09:38] SS: Yeah, I called my father and he drove down from Grayson, which is about a 45-minute drive. And then we drove from Southshore to Kings' Daughters Hospital in Ashland. So, it was about an hour or a little less. We went to the ER, waited about 10 minutes, they took me back for an X-ray, waited another 15 minutes, and then they got me into a room and put my arm in a splint. Two days later, on the 25th, I had a follow-up with a specialist and the orthopedic surgeon, Dr. George Aitken, who is still with King's Daughters. As far as the splint goes, they put me in one of those really thick braces and told me not to move it – I was stuck at 90 degrees. You know, they were like, "go home, good luck, and we'll see you again in 2 days to talk about surgery." I had not seen the X-ray and they didn't really describe what happened, but they said I broke it, it was bad and that I would definitely need surgery, but that the earliest the surgeon could see me was in 2 days.

[00:10:52] DO: So, the diagnosis was a shattered elbow, then?

[00:10:55] SS: Oh, yeah, I'd have to pull out the thing for the proper name for it. But basically, *(points at elbow)* this triangular part of your elbow, like the really pointed part – I broke that entire piece off.

[00:11:09] DO: Oh wow!

[00:11:10] SS: *(Laughs)* I have the X-ray if anyone wants it!

[00:11:12] DO: I'm sure I could incorporate that into my paper on your injury.

[00:11:18] SS: Yeah, it's called the olecranon. And when the olecranon broke, it pulled several muscles and tendons and there were minor fractures on – I'm trying to remember what the other bone is called. You'd think I would remember this since I broke it! Other than a big chunk of my elbow missing, there wasn't any splintering or anything. It was all internal, meaning it didn't pop out of my skin or anything, it was just shifted up my arm.

[00:11:56] DO: Ok.

[00:11:58] SS: But the surgeon on February 25th basically said the exact same thing. And that's when I first saw the X-ray, it was on the 25th. He told me I had two options. I could choose not to do the surgery and see how it regrows because the bone would re-attach at some point with no promise of how it would heal. Or, I could go through the surgery and have hardware. He didn't really describe specifically what hardware, or if he did, I was in shock and my father might remember. Either way, my options were to have the surgery and have physical therapy and have better range of motion promised than if I didn't have the surgery. And so, that was the

first meeting with the surgeon. On the 27th, I had to have a COVID test before surgery because that's just the pre-screening they had because of the pandemic.

[00:12:52] DO: Right.

[00:12:53] SS: That was negative, and so the first surgery for my elbow when the majority of the hardware was installed, *(points to elbow)* and you can see the scar here.

[00:13:01] DO: Yeah.

[00:13:04] SS: That was on March 2nd, 2021. The procedure was called an open reduction and internal fixation of olecranon fracture via posterior reconstruction plate and long-tension band wire. And I just remembered, the other bone that had a fraction was the ulna.

[00:13:37] DO: Okay, so you had several plates and wires installed in that first surgery.

[00:13:40] SS: Oh yeah.

[00:13:41] DO: And you said there was a follow-up surgery?

[00:13:45] SS: Yeah, so the first surgery, and again it's hard to tell – I can get my X-rays if needed. *(Points to elbow on camera)* You can kind of see the point here or could if I had a better camera.

[00:13:56] DO: *(Laughs)* Yeah, it's pretty noticeable.

[00:14:01] SS: *(Laughs)* Yeah, the kids are like, "you've got a 90-degree angle!" It is quite different. But there's a part of the plate itself that goes up here [points to forearm].

[00:14:11] DO: Halfway up your forearm or so?

[00:14:13] SS: Yeah, and it goes all the way around and curves up, because again, I had messed up above my elbow too. So, there's a little hook just above my elbow that allows me to move my arm in and out. But the thing is, I can't straighten my arms all the way straight. As for the follow-up surgery, there are several different screws involved in several spots, one of which I got to keep as a souvenir. I got to keep it because the screw was too long, which wasn't realized until I was going through physical therapy. The original surgery happened at the beginning of March and I was off work for 2 weeks. The earliest I was cleared to go back was March 16 because I had my surgery follow-up on March 15. After the original surgery, a hard cast or case was put on my arm.

[00:15:19] DO: I see.

[00:15:21] SS: So, I was in that for 2 weeks, and I wasn't put into an actual brace until the staples were removed. And it was adjustable based on the degrees or angle my doctors wanted me at. My arm was stuck at 90 degrees for about a month or month and a half. I wasn't cleared for physical therapy until around April 8th.

[00:16:01] DO: Okay, so a pretty lengthy process that included – was it just two surgeries?

[00:16:07] SS: Yeah, and the second one happened because I did physical therapy for all of April, May, but when I got to June, when my range of motion was around 100 degrees, I couldn't get my hand to turn over. We already knew my arm would never be perfectly straight again unless I get this removed, but I couldn't get my hand to turn over like I just did [gestures to rotating hand].

[00:16:45] DO: So essentially, your hand could not be rotated from palm down to palm up position?

[00:16:51] SS: Right. I forget what they call that, but there is a certain term for face down and another for face up. But anyway, at physical therapy in June, they told me something was wrong with my hardware and that I needed to follow

up with my surgeon because I should have more range of motion. So, this is where the second surgery happened, *(laughs)* it was actually on my birthday. So, on June 29th I had a follow up with the surgeon, who looked at the X-rays and talked to my physical therapist, who was at a different hospital in Ohio because that was closer to where I lived.

[00:17:29] DO: Sure.

[00:17:31] SS: Anyway, he said one of the screws we installed was too long and was pressing on the top bone and muscle in my forearm to where I couldn't turn my hand over. The solution was to either have the surgery and fix it or just deal with it. So, I opted for the surgery and that was on July 6th.

[00:17:57] DO: Okay, wow. So, for the better part of a year, you were going through surgeries and recovering. Obviously, this impacted your trumpet playing. Would you explain a little bit, going back to the date of the injury? What did you do in the meantime? Before and after surgery? While going through physical therapy? What different things did you try to remediate the injury?

[00:18:20] SS: So, the day I fell, I actually did get through lead pipe and long tones.

[00:18:26] DO: Wait, so you played a little bit still using your left arm to hold the weight of the instrument?

[00:18:30] SS: *(Laughs)* Yeah, but it hurt really badly!

[00:18:34] DO: *(Laughs)* I can imagine!

[00:18:36] SS: So, it was more of the right hand holding most of the weight. That was the day I fell, where I played a little bit of my routine. Then, after that, between the pain meds they put you on and just how you feel, and I was also staying at my parents' house where I stayed until I went back to work on the 16th, I didn't play any during that time. Before the surgery I was in pain and in shock and after the surgery my parents of course told me to rest and chill.

[00:19:14] DO: Well, I don't think anybody could fault you for not playing during that time. So, when did you pick the horn up again?

[00:19:24] SS: *(Sighs)* I think the first time I picked it up proper, I was at my apartment, so I think it would have been the week of March 16th. I got cleared on the 15th to go back to work, went back to work on the 16th looking like garbage, but I'm a middle school band and choir teacher, so I had to be able to play piano.

[00:19:48] DO: Mm-hmm.

[00:19:49] SS: So, I had to do something because you can't suck in front of the kids. So, sometime during that week is when I would have picked it up. But I couldn't use my left-hand at all because I was stuck at 90 degrees against me with my left arm.

[00:20:01] DO: So, you were just playing one-handed and holding the horn with your right hand?

[00:20:04] SS: Yeah, but your right hand makes it to where this position is weird *(points to mouth and lips)* and that sucks. So, for me, I looked into the ErgoBrass but they didn't have anything; I don't know if it was a shipping thing because of the pandemic or something else.

[00:20:23] DO: Ok.

[00:20:25] SS: But also, regarding money, I was a single teacher in one of the poorer districts in the state, so I wasn't making a whole bunch of extra money. And so, I wanted something a little more stable that was an external thing. I had an extra Swiffer stick, like you know, your normal cleaning dry-erase Swiffer.

[00:20:46] DO: Mm-hmm. Mm-hmm.

[00:20:48] SS: And I turned it upside down, put the handle in a shoe so it would stay put and wouldn't roll around on my floor because my apartment had wood floor at the time.

[00:20:58] DO: Mm-hmm.

[00:21:00] SS: And so, I shoved the pad, the thick part of it, in between the valve casing and the bell, and again, I still couldn't turn my hand over either, so the angle for that was kind of wonky. But I did do that for like 30-minute sessions the week I came back to work.

[00:21:21] DO: Okay. What were some of the drawbacks or challenges you had with using the Swiffer? You mentioned the position, still kind of holding it up in some way that felt normal to you. Did you have any lateral or vertical mouthpiece changes or anything like that? I know that can happen a lot when you change the pressure of the horn and how you're holding it.

[00:21:42] SS: Yeah, you know there are plenty of people who play one-handed, like we do as band directors all the time during class. But, with the left-hand shift like that, and you know, my teeth aren't perfectly straight, so I'm playing pretty much dead center but there's a little bit of fluctuation with it on

angle. But yeah, I won't say it was anything crazy, but to me, I could tell a difference. It was a marginal shift to the left, just because I was at the mercy of it on that stick.

[00:22:11:] DO: Mm-hmm.

[00:22:12] SS: And then at school I had to do just right-handed only, so my position got all kinds of warped. Eventually, when I started physical therapy, I slowly tried to move to the old way of holding it when I got the range of motion back. It was difficult because, although my range of motion in my left arm was better, I still had trouble rotating that wrist and hand. I remember taking a picture in May of me holding the trumpet with both of my hands instead of using the Swiffer stick for the first time.

[00:22:47] DO: Wow, that's a long time.

[00:22:49] SS: Yeah. Yeah.

[00:22:51] DO: So, in using the device, did you ever get to a point where it felt comfortable? Or did it feel foreign the whole time as far as position goes?

[00:23:00] SS: *(Sighs)* I mean, I got used to it because I was stubborn and had gigs coming up that I didn't want to give up. Plus, I was teaching and it was

concert season with band assessment. You can't suck in front of the kids and you have to be able to model and do stuff. Oh yeah, between taking two weeks completely off the horn, because of the time off, and position shift, oh yeah – it's one of those things where you get used to it because you just kind of do.

[00:23:32] DO: Right.

[00:23:33] SS: It's like an embouchure change.

[00:23:35] DO: It takes time. I've listened to you talk about it and I've seen some photographs of your Swiffer device. Were there any modifications you made or could I go to Walmart and re-create the same thing with no external input?

[00:23:47] SS: Yeah, you could go to Walmart. Like I said, I was cheap and broke as all get-out. But I know some people might make another wedge just to kind of hold it differently. I wanted a thick wedge because again, most people could turn their hand over, but I couldn't, so if my trumpet was going to fall, all I had was my right hand to catch it. But yeah, anyone can do it.

[00:24:10] DO: So, you wanted a thicker pad in between the valve casing and bell, I see.

[00:24:14] SS: Yeah.

[00:24:16] DO: So, you mentioned that you still had gigs coming up. How far away were those gigs or how far out from your injury occurrence would you estimate?

[00:24:25] SS: So, my surgery was in March. I had a church gig at the beginning of April and I subbed that out to a local friend to cover. And it's one of those church gigs where I'm still getting calls from them and they understood.

[00:24:40] DO: Right.

[00:24:41] SS: They were like, "you know, take care of yourself." But in the beginning of June, I had Sacred Winds in Pikeville and Somerset, Kentucky.

[00:24:50] DO: Okay.

[00:24:51] SS: And then, in the middle and end of June and I had two different gigs in Ashland. One was a wind ensemble, the Bluegrass Wind Ensemble, with my high school band director, Mr. John Johnson. Just that kind of stuff. June was mainly heavy hitting and then July would have started band camps and all of that.

[00:25:13] DO: In reading a lot of literature on instrumentalists who have injuries and disabilities, there are a lot of hypotheses and data correlation that imply that occurrences of injuries may be under-reported for fear of musicians losing work or losing gigs. Did you feel any of that when turning gigs down to recover? Was there any apprehension to bringing your Swiffer device with you to the gigs and using it?

[00:25:46] SS: *(Sighs)* Well, with the Swiffer device, I didn't take it to work and I didn't take it to any gig. I did it at home just so I wasn't stressing my right side too much, and so that also kind of wrecked the position *(points to mouth)* because my right-hand playing was doing something different than my Swiffer device playing.

[00:26:02] DO: So, you just played completely one-handed on your gigs?

[00:26:04] SS: Yeah. Well, sometimes, I would force it even when I couldn't have the range of motion, I would tuck in my left elbow to where my hand would be more keen to what we normally do.

[00:26:17] DO: Right.

[00:26:18] SS: Because, whether we know it or not, this *(points to left wrist)* tilts in some, but I couldn't do that. So, I would adapt and shove my left elbow in to

make that look more natural. Granted, this looks ridiculous, but I knew at work I had to teach woodwinds and I couldn't hold a flute otherwise. So, I tried to make as minimal changes as possible to make it seem like I was my normal, happy, hunky-dory self and make it seem like everything was fine. That Swiffer device saved me at home, but out in public, oh yeah, I didn't use it. I didn't really seek any more gigs than I had to play and I definitely played it a little bit safer. But the good news is that it was still during the pandemic, so a lot of the gigs I would have had in May, like the Ashland Ballet and the Portsmouth High School musical, got cancelled. Not good for them, but like –

[00:27:09] DO: Right, yeah, I understand.

[00:27:11] SS: Oh yeah, the apprehension – I was scared out of my skull.

[00:27:13] DO: Yeah, I can understand that. So, how long then would you say before you had both hands back on the horn again? May of 2022?

[00:27:24] SS: 2021. But that was without me being able to turn my hand over. I couldn't do that until the beginning of August 2021.

[00:27:32] DO: Oh, okay. So, how long would you say that you used the device? When was the last day that you used it before throwing it to the side?

[00:27:41] SS: *(Sighs)* Probably in July of 2021. Even after I had the second surgery to where I could turn my hand over, to get the full range of motion back, there was still a little bit of physical therapy to go through. It makes sense because my hand had been basically immobilized for like 5 months.

[00:28:00] DO: Sure. So, from basically February to July was the timeline of injury and using the device.

[00:28:08] SS: Yeah.

[00:28:09] DO: And then you were back to the way you were or pretty close to it?

[00:28:13] SS: Yeah.

[00:28:14] DO: Did you notice any lasting changes in your playing as far as the position is concerned? Or anything that, even after you went back to playing without using the device, was still there from when you were jumping around to different positions?

[00:28:28] SS: I'm still convinced that my position is still a little more to the left now from the process. Granted, everything is all figured out now and it's all happy, hunky-dory. After I stopped using the Swiffer device, I had to watch myself because I was so used to having to compensate and bringing

my arm in more than I should. That took a minute to re-arrange. Playing position-wise, I don't think it ever went back to my old embouchure, but it definitely got closer to what I was used to.

[00:29:10] DO: I see. I see. So, definitely some mental recalibration going on throughout the process.

[00:29:17] SS: *(Laughs)* Yeah.

[00:29:18] DO: If you had, God forbid, another significant injury in the future that impacted your ability to play trumpet, would you do anything differently than you did with this injury? Perhaps a different process to find some sort of relief, or more time off the horn, or any other alterations?

[00:29:37] SS: *(Sighs)* Well, it depends on the injury and where it happens. After going through this, like if I fell on my wrist, I'd do something totally different. If it was my elbow, I'd probably do something similar again. So, it really just depends on how I would have injured myself. But time off the horn *(sighs)* – I should have done it with work too. I was cleared for work, but I should not have gone to work when I did.

[00:30:07] DO: Ah, I understand.

[00:30:09] SS: Kind of like playing, I probably should have taken more time off than I did, but between trying to keep normalcy and gigs and all that, I kind of just forced myself to get over it and deal with it. So, I would probably take a little bit more time off. But again, it depends on how bad the injury was. If I could turn my hand over *(scoffs)*, I don't know, I would probably do something similar to what I did. It just depends on the injury. And technology-wise, other than like the ErgoBrass, you're kind of left figuring it out on your own.

[00:30:39] DO: Yeah. That's part of the narrative of this document, is that outside of the Shulman system and the ERGObrass, there's really not much commercially available. And so, there's a decent list of trumpet players who have done what you have done and DIY'd a solution, whether it be Greg Wing, Peter Bond – a lot of older examples as well. Would you say this process negatively impacted your mental health as well as your physical health, knowing what you know about musicians and identity?

[00:31:14] SS: Well, the short version is that I was so stubborn and I knew that I wanted it to get better. I wanted to get back to playing and I knew I could do it, so I pushed myself through physical therapy and all that. So, I wouldn't say it bothered me too much, but the trauma of having fallen - we have snow and ice every season – that still freaks me out and I'm more cautious on that. Playing-wise, I was pretty self-conscious. I probably didn't feel

comfortable with my playing again until late that Fall, like October or November. And I say "comfortable" *(does air quotes)* as like, I could kind of tell I was back to where I was before all of this, chop-wise and endurance and just being able to do it.

[00:32:07] DO: Yeah. Yeah, I understand. It's a lengthy process.

[00:32:11] SS: Yeah.

[00:32:12] DO: If you did feel like you encountered adverse impacts to your mental health, were there any previous experiences or teachings you drew upon to assist your frame of mind throughout this process and getting back to where you were?

[00:32:28] SS: Well, the good news was that I had a lot of friends and trumpet players from college. And my undergraduate professor, Mr. Greg Wing, was going through the thing with his right hand and with his fingers. So, we kind of bonded a little bit over that. And my old trumpet teacher, Ricky Spears. He got me through a lot. There were a lot of role models and cheerleaders egging me on and telling me it was going to be okay. And Arias had actually broken her left elbow, although not as bad – *(laughs)* the doctor's said I devastated mine. So, I kind of went back to her and asked her what she did and how she got over it because that happened to

her when we were in undergrad, like during class at school and everything. So, we got through it and had a really good support system and I was so stubborn, *(laughs)* or stupid, either one, and made the best of it.

[00:33:31] DO: Yeah, having a support system is really important and that sense of community as well to get you through it.

[00:33:37] SS: Yeah.

[00:33:38] DO: Do you have any other thoughts or ideas we haven't covered that you think might be pertinent to a study of this nature, of disability technology for trumpeters?

[00:33:49] SS: Not right off, but I will say, I'm really interested to see how this goes and who all says what. Because, in the band directing world, and I'm sure other classes too, the big thing is all about adaptive stuff and accommodations for kids. I've never had a kid do what I did, but for example, today I walked in and a 7th grade trombone player has an arm in a sling but it's just fractured. So, I haven't had the extreme of needing to create a device, but there are Facebook groups for band directors and you'll see people post all the time like, "hey, I have a kid who is missing this part of their pinky and they want to play clarinet. What do we do?"

[00:34:30] DO: Mm-hmm.

[00:34:31] SS: Or "this kid plays French horn and they're missing this or this kid plays trumpet but they broke their wrist. What do I do?" So, I think there's a lot of merit and value to this because I feel like a lot of people kind of like me – they're finding ways to make it work, but if there was a better, well-known system and study out there, I think it would really help.

[00:34:51] DO: For sure. If nothing else, hopefully it brings awareness and you never know who might stumble upon it in 20 years and see this repository of information and have some jumping point if they have to build their own technology or something, then they'll have some ideas to bounce off.

[00:35:05] SS: Yeah.

[00:35:06] DO: Well, I think that about does it for my questions for the interview, Steffanie. I really appreciate your time and meeting with me and sharing all your personal stories. I hope it isn't too traumatic to re-live. I'm sure that was not a fun time for you.

[00:35:21] SS: *(Laughs)* Yeah.

[00:35:22] DO: And I do appreciate your sharing, again, all the stuff that may not be easy and I'm hopeful that it will help somebody. It will certainly help me finish this project, and for that I am forever indebted and grateful.

[00:35:34] SS: Yeah, thanks for asking me! I'm glad to help and I hope it does help other people.

[00:35:39] DO: Absolutely. It definitely helped me at the very least. Thank you very much. I hope you have a great rest of your week.

[00:35:46] SS: Thanks, Drew. You too.

[00:35:48] DO: Alright, see you.

[00:35:49] SS: Bye.

[End Transcript 00:35:50]

Appendix D: Transcript of Interview with Greg Wing

Interviewee: Greg Wing (labeled as "GW")

Interviewer: Drew O'Dell (labeled as "DO")

Date of Interview: 9/2/2024

Time of Interview: 4:30 PM EDT

Location of Interview: Zoom

[Begin Transcript 00:00:03]

[00:00:09] DO: Hey! Thanks again for doing this interview. I really appreciate you taking a minute to talk about your experiences. I think it could be really important for the future of our field and future for people with disabilities and injuries to be able to still play the trumpet and do something they enjoy. Before we get started, I'm going to read you a consent form and there will be some questions at the end.

[00:00:31] GW: Okay.

[00:00:32] DO: Let me just navigate to that. Okay. You are invited to participate in research about the creation and development of twenty-first century accessibility technologies for trumpeters with hand injuries and disabilities. The purpose of this research is to chronicle the advancements made in the field of adaptive technology for trumpeters to be used as a

repository of information for future musicians, students, teachers, engineers, et cetera. If you agree to participate, you will be interviewed via Zoom and will be audio and video recorded. Your audio, video, or photographic images may be used in university research reports with your permission. There are no benefits and minimal risks to participating in this research. The interview will be conducted online via Zoom. The organization hosting the data collection platform has its own privacy and security policies for keeping your information confidential. There is a risk that the external organization, which is not part of the research team, may gain access to or retain your data or your IP address which could be used to re-identify you. No assurance can be made about their use of the data you provide for purposes other than this research. There is also a risk of accidental data release if we collect your data using audio and video recordings. If this occurred, your identity and the statements you made could become known to people who are not on the research team. To minimize this risk, the researchers will transfer data to, and store your data on, a secure platform approved by the university's Information Technology Office. Finally, you will be asked to transfer documents, images, or other personal records to the researchers in this research. There is a risk that someone who is not part of the research team may gain access to this data during the transfer process. We will give you information about transferring data to the researchers to minimize this risk. When we receive your data, we will transfer the data to, and store your data on, a

secure platform approved by the university's Information Technology Office. Your participation is voluntary and your responses will be shared with all readers in the form of direct quotes and a complete transcript published in the dissertation. Your consent to the publishing of your identifiable responses is a requirement for participation in this research. We might share your interview responses with other researchers or use it in future research without obtaining additional permission from you. Now, I will be asking some questions to find out how you want me to report your ideas. You can refuse any that you do not like without any penalty. Do you agree for data records to include identifiable information?

[00:03:05] GW: Yes.

[00:03:07] DO: Do you agree to have your name reported with quoted material?

[00:03:10] GW: Yes.

[00:03:11] DO: Do you agree for your data to be archived for scholarly and public access in the form of a complete transcript included in the published dissertation?

[00:03:19] GW: Yes.

[00:03:20] DO: I would like access to some of your records for my research. They include schematics, drawings, photographs, et cetera of the WingMaster technology. Do you agree for me to do this?

[00:03:30] GW: Yes.

[00:03:31] DO: Do you consent to audio recording?

[00:03:34] GW: Yes.

[00:03:35] DO: Do you consent to video recording?

[00:03:37] GW: Yes.

[00:03:38] DO: I may want to take photos of you to include in my research. Do you agree?

[00:03:42] GW: Yes.

[00:03:43] DO: Your photographs and audio or video records may be used in university research reports unless you tell me not to do this. May I contact you to gather additional data or recruit you for new research?

[00:03:54] GW: Yes.

[00:03:55] DO: Okay, thank you. Even if you choose to participate now, you may stop participating at any time and for any reason. If you have questions about this research, you can contact me at Drew.M.ODell-1@ou.edu or the faculty advisor, Dr. Matt Stock at mstock@ou.edu. You can also contact the University of Oklahoma Norman Campus Institutional Review Board at (405) 325-8110 or irb@ou.edu with questions, concerns, or complaints about your rights as a research participant or if you don't want to talk to the researcher. Do you agree to participate in this research?

[00:04:34] GW: Yes.

[00:04:36] DO: Finally, would you like a printed or electronic copy of the information we have just reviewed?

[00:04:41] GW: No.

[00:04:42] DO: Okay, great. And it is Monday, September 2nd at 3:36 Central Time. Awesome! Well, I hope you're doing well and thanks again for sitting through that and agreeing to do this interview with me.

[00:04:58] GW: No problem! Doing very well.

[00:05:01] DO: I'm glad to hear that. So, we'll just jump in and remember, if at any point you feel uncomfortable or there is a question you don't want to answer, feel free to just say pass. Would you be willing to describe the timeline of your injury including dates, when onset of symptoms occurred that you noticed, attempts you made at remediation, progression of the injury over the years, and outcomes you've had with different attempts at remediation?

[00:05:24] GW: *(Laughs)* Oh, boy. You can hear me okay, right?

[00:05:28] DO: Yes, I can hear you just fine!

[00:05:30] GW: *(Laughs)* Okay, that was a mouthful of a question!

[00:05:32] DO: *(Laughs)* It is, indeed.

[00:05:34] GW: You know, when you play a musical instrument, it's hard enough to pick it up one day at a time without something going on or your mind diverting attention to something it shouldn't. But I started noticing that my technical facility on the right hand, only the middle finger, was not being as responsive as it once was probably around 2018. And so, during the lessons – I was the full professor at Morehead State [University] – I started modifying my hand position or my fingering position. Now on

trumpet, we've got first valve, second valve, and third valve. I started modifying my approach in lessons, still playing with the right hand, where I would go *(demonstrates with hand)* first valve *(depresses first finger on imaginary valve)*, second valve with the third finger *(depresses third finger on imaginary valve)*, and then do the second and third valve both with the second digit. Once in a while I would use the pinky so it would be one *(depresses first finger)*, two with the third finger *(depresses third finger)*, and three with the pinky *(depresses pinky finger)*. Well, that only lasted a while. You know, obviously, the more progressive the technical passage, the more difficult that became to do. So, as an artist, you know that can create a lot of frustration within your own aura as an artist, not mentioning trying to keep your mind out of you and to be able to serve your students –

[00:07:02] DO: Sure.

[00:07:03] GW: –by making sure that your attention is on them and not on your little ailment. So that lasted a couple of years. I decided to seek a physical therapist around 2019 in Morehead [Kentucky]. And that's when he first said, "You know what? I think that you may have focal hand dystonia," which opened up pandora's box for me. So, all of a sudden, he is giving me all these periodicals and all these articles to read to be able to educate myself with what in the heck focal hand dystonia is to begin with. So,

that's kind of where my journey begins in 2018 and 2019. In 2020, I would go back to playing right-handed and then I would switch to the left hand and I figured, *oh my God, this is horrible*. It's like starting over with a beginner. Not only do you have the challenges with learning a new muscle memory with the left hand, but from a trumpet or embouchure perspective, the vertical balance is different when you switch hands because you're holding the horn differently now than with the right hand. And the lateral movement from left to right is slightly different. So, all of a sudden, I was a beginner starting all over again. So, Humpty Dumpty fell off the wall and made a big boom *(laughs)*. I'm going to go see a neurologist next week here in Evansville [Indiana] and I just happened to pull up my case study from my hand surgeon.

[00:08:37] DO: Oh, okay!

[00:08:38] GW: And this is his report dated May 20th, 2021 *(displays packet)*. So up to that, I would modify my hand positions by going back and forth and alternating between the second and third digits on the right hand and then I would do left hand and then I would do right hand and then I would do left hand. So that went on for a year or two, then I went to a hand surgeon. And the whole purpose of seeing the hand surgeon was not to have hand surgery, but to see if there was something mechanically wrong with the finger and the ligaments going all the way up to the carpal tunnel – to see

if maybe it was a physical ailment. Well, the surgeon said, “Listen, I can’t guarantee anything, but I do believe that if we can release your trigger finger—”, which I did not have trigger finger and my finger never once caught. So, he said, “Let’s see if maybe that might help it.” And then after an MRI, they noticed I had a cyst in the carpal tunnel area. So, with my permission, I agreed to have some type of exploratory hand surgery where he went and released the trigger finger. Again, I didn’t have trigger finger but he released that section anyway. He made an incision in the hand and made an incision in the wrist area and shaved part of a cyst that he thought might be interfering with this movement *(demonstrates middle finger moving up and down as if depressing a valve)* all the way up and down. Now, to this day, I feel a clicking in there, but it still catches. As I’ve explained so many times to so many people, I can move my hand without any limitations or disability. It’s a kinesthetic movement; in other words, I’m not thinking about doing it, it just does it. But the longer I do that, the slower this second finger becomes to the point where it’s unusable.

[00:10:38] DO: I see.

[00:10:39] GW: A lot of times I’ll be in the car and I’ll have my hand down and my wife will notice that this right hand and the finger *(second finger)* starts to curl under to the point that I’m not even aware that it’s doing it. So, it’s involuntary. So, to make a long story short, here I am in 2024 playing

entirely left-handed and I just finished my solo CD left-handed. We'll see how it turns out.

[00:11:05] DO: I'm excited to hear it.

[00:11:07] GW: Well, it's come along. You know, it's nothing really technical. It's all lyrical and warm and fuzzy type of tunes as I like to call it.

[00:11:14] DO: I'm sure it's beautiful! If you wouldn't mind talking a little about the journey with the physical therapist – did any of the remedies that you did in terms of physical therapy help improve the situation? Was he or she the one who suggested going to the surgeon next?

[00:11:30] GW: Well, the physical therapist had me start doing all these arm stretches *(demonstrates by rotating arm and shoulder)* and he thought that maybe there was something catching up in the arm and shoulder that was preventing the fingers from working the way they should. And when I'm talking about physical therapy, I'm talking about two or three days a week for three or four months at a time and nothing ever came from it.

[00:11:52] DO: Okay.

[00:11:53] GW: Other than a sore arm *(laughs)*. So, that didn't prove to be worthwhile. So, I just kept plugging along. Then I got that wild hair up my butt and thought that maybe I should go see a physician. I'm not too in favor of seeing a physician for any reason. But there I went to Lexington at the University of Kentucky Medical Center where I found a hand surgeon who was recommended by my primary care physician. So, at the advice of my primary care physician, I went to see the hand surgeon and that's when he said we could explore and see what happens. After his result – I'll just read the report. This is after seven weeks of post-op following the surgery. After seven weeks, it says, "patient reports, however, that when he plays the trumpet, which he does professionally, his right-long finger gets stuck in the flexed position and he has trouble or has a delay in being able to extend that right finger straight." Even to this day, I can not type any longer. My left hand is fine, but my right hand – this finger will not extend or give me individual control to be able to type with the right hand. So, that's another issue.

[00:13:17] DO: I see.

[00:13:18] GW: *(Reading again from the surgeon's report)* **"**He reports that this occurs several times a day while playing and is reproducible every day." So, here we are. To back it up a little bit, from 2018 through surgery in 2021, I'm still playing right-handed and left-handed to the best of my ability. The

embouchure – over COVID, I had noticed that the [embouchure] position had changed, because of the manipulation of the right hand and left hand, so much that the embouchure was almost unusable. There was a six-month period of time that I couldn't even play well enough to play taps.

[00:14:00] DO: Oh.

[00:14:01] GW: And so, my range was limited. Everything was limited. I had to start over basically. I drew a schematic on a piece of paper and I sent it to Peter Pickett. I don't know if Peter shared it but I've lost it and long-since deleted it. But it was a little schematic that I drew of a little motor being connected to the pistons and me having some little button, like contact buttons on the side of the bell. I originally drew it and thought that there's got to be some way that if I can fully extend my hands and have a contact pad, contact pad, contact pad *(pointing to three locations on the trumpet bell and adjacent to the valve block)* somehow connect to the positions, that I might be able to have better technical facility with my fingers in this position, not this *position (demonstrates holding the trumpet in a standard playing position)*. See, even now I can't even lift that *(referring to his second finger)*. It's uncontrollable when my fingers get in there.

[00:14:53] DO: Mm-hmm. I see. Yeah.

[00:14:54] GW: But I'm thinking, *if I can extend my fingers, maybe I can have better facility*. I find it interesting that I experimented playing sideways like a rotary valve. I haven't played in a long time, so *(demonstrates by playing an ascending and descending chromatic scale with the trumpet in an altered playing position akin to holding a rotary valved trumpet)*. That's right-handed. And since my fingers are fully extended, I have better facility and control fully extended than I do in the normal playing position.

[00:15:25] DO: Oh, okay.

[00:15:27] GW: *(Demonstrates by playing the same chromatic scale, this time in what would be considered the standard playing position for the instrument, with, this time with a delayed response any time the second finger is used to depress a valve)* If you watch that slowly, that second finger doesn't release whatsoever.

[00:15:36] DO: Yeah.

[00:15:38] GW: *(Demonstrates by playing the same exercise again)* I'm getting most of the notes but the second finger doesn't come up at all.

[00:15:45] DO: Yeah. I see.

[00:15:46] GW: But again, if I hold the trumpet sideways *(demonstrates the exercise again in the altered playing position with improved results)*, you can see how the second finger is more responsive from an elongated valve position versus your traditional valve position where they're [the fingers] more curved.

[00:16:03] DO: Yeah, I do see that.

[00:16:05] GW: So, I was thinking, *surely someone might be able to invent a device where my fingers are fully extended to give me as much freedom on these fingers as I can*. And you even saw today, September 2nd, 2024, I was playing a pretty good chromatic scale, so to speak, that wasn't as inhibited as in the traditional way to play trumpet.

[00:16:31] DO: Mm-hmm.

[00:16:32] GW: So, the only person that I knew that might be able to pull this off was Peter Pickett. Now, Peter has his own mouthpieces – he's one heck of a trumpet player himself – but he got into engineering with a large corporation and he's a genius.

[00:16:46] DO: He is.

[00:16:48] GW: He invents mouthpieces and he has several patents from when he worked for the corporation that he's responsible for. But he decided to venture off on his own and make mouthpieces. And he was the closest person that I knew that might be able to help me in Lexington, Kentucky. I believe with all my heart that Vince DiMartino, when he found out that I was exploring this with Peter, may have given Peter a phone call to encourage him to help me *(laughs)*. I don't know that for one hundred percent certainty, but Vince has a wonderfully gentle and kind persuasive way *(laughs)*.

[00:17:24] DO: That sounds like something he would do *(laughs)*.

[00:17:27] GW: Yeah. So, I think Vince may have contacted Peter and Peter agreed to help me. And Peter has been so gracious. The WingMaster – it took about a year and a half for it to be developed. But it was a mechanical device. I think I shared those pictures with you of the WingMaster.

[00:17:43] DO: Mm-hmm. Yes. Yeah.

[00:17:45] GW: But the WingMaster was an invention that he came up with which is the world's first electronic valve apparatus connected to a trumpet that would allow, by me touching a finger pad connected to a servo motor, the valves to go down. All I have to do is this *(demonstrates a movement similar to depressing a valve on the back of the hand)* and you'd hear *(demonstrates*

a soft or feint mechanical whirring or clicking sound). And it added a little weight to the trumpet. Well, for whatever reason we could never get the finger pad control to be as responsive as I needed it to work and my second finger refused to work that as well. So, that's when – I believe it was at the Adam Festival [William Adam International Trumpet Festival] at Marshall [University], 2023 perhaps?

[00:18:33] DO: I believe so, yeah.

[00:18:35] GW: So, in 2023 at Marshall after my presentation, I showed everybody the WingMaster. I decided to take it off because it was not doing me any good. I was going to retire that following semester but I was living in Evansville, Indiana. So, logistically it made it more difficult to make it over to Peter's in Lexington for him to modify it and tweak it. It's amazing that he built the WingMaster on his 3D printer.

[00:19:02] DO: Yeah.

[00:19:03] GW: Technology has come a long way.

[00:19:05] DO: Absolutely.

[00:19:07] GW: I even watched him make a modification on the finger buttons by watching that little 3D printer go to town. But like I said, Peter is a genius and I thank him publicly for all the effort and all the time that he spent doing this for me. It just didn't work the way I needed it to work. So, my journey continues. That said, I play all left-handed and the fingers are coming along. I'm just having to work the new position and the embouchure to get it the way I know I need it to be able to play at a high level. So, that's my journey. So, all my time in retirement is spent practicing and trying to be the best teacher and person I can. And you've got to keep yourself going.

[00:19:55] DO: Oh, absolutely. Well, I hope you're enjoying it. It's well deserved; that's for sure.

[00:20:00] GW: Yeah. Once a trumpet player, always a trumpet player. Just because you retire – you don't stop playing!

[00:20:06] DO: Oh, absolutely. And I give my thanks to Peter too for helping you and helping me with this project as well. So, you mentioned that the WingMaster process took about a year and a half. Would you say that you started seeing Peter after the surgery? Is that about –

[00:20:25] GW: Oh, yeah. The surgery was 2021 and so this was probably in the middle of Fall of ’21 going into ’22.

[00:20:39] DO: Okay.

[00:20:41] GW: That’s probably fair because it was after the hand surgery that I realized or thought, *well, let’s try this*. And so, it took Peter a while to get back to me because he’s busy.

[00:20:49] DO: Sure.

[00:20:50] GW: And then I just kept on, you know, sent him a text now and then asking him if he’d consider helping me. And so, he said, “Okay, let me see what I can do.” He came up with several different mockups. One was a regular, plastic C-shaped extender. He would take off the valve cap and the valve stem like it never existed. And then there was a piece of plastic that my hand rested on. And here were the actuator buttons *(points to a place on the bell of the trumpet that is adjacent to the valve block)*. But we didn’t realize at the time that when you put a piece of plastic on resonating, vibrating brass, it deadens the sound and it didn’t sound like a trumpet at all *(laughs)*.

[00:21:35] DO: Oh, okay. I can imagine. Yeah.

[00:21:37] GW: So, I had to bring that to Peter's attention and he had one of his employees or associates come up with a new way. And then Peter said, "Why don't we hook it right here *(points to the top of the valve casings where the top valve caps and buttons are screwed in)* and that way it's not touching the lead pipe or the bell?" And so, we found a way to hook it right on the valve itself and that's kind of the way it evolved.

[00:22:07] DO: I see. Would you be willing to talk a little bit about the effect this has had emotionally and mentally during this process? And then further, how studying with Mr. [Bill] Adam impacted how you dealt with that?

[00:22:24] GW: Well, as we know, as artists on an instrument for so many decades now, you are what that is. You know, the trumpet becomes, I think, a part of you that you can't ever imagine not playing.

[00:22:38] DO: Absolutely.

[00:22:40] GW: So, when this started affecting my ability to perform – it takes a piece out of you. Now, I remember going through the process, and Drew, I don't know if you were there [studying at Morehead State University] when I went through this process. But there were a lot of students when I was teaching those three or four years when I couldn't even play. And I would just shake my head, put my head down and say, "Oh, you know what I

mean." As a teacher, when you want to perform, it's very difficult to go through. I would be in my office trying to get a sound out of the trumpet and teach at the same time. This is where I always tease my colleagues and say *(laughs)*, "Boy, in higher education, tenure is a blessing."

[00:23:23] DO: *(Laughs)* That's funny.

[00:23:25] GW: But I would stay in the office and my wife, Mrs. Wing – she was in the music office working – and so, at 4:30 when we got off work, she would ask, "How was your day?" And I just kind of shook my head and she knew it was one of those days. Well, one of those days turned into one of those weeks. And one of those weeks turned into one of those months. And several months later, it's still very, very difficult. So, emotionally, yeah, you're on an emotional rollercoaster. As I used the cliché, you know, Humpty Dumpty fell off the wall. Now I'm just trying to figure out how in the world I'm going to put Humpty Dumpty back together again *(laughs)*. And so, this has taken months, if not years, to understand that this is a process. So, Mr. Adam. Obviously, you know, all students think the world of their teachers.

[00:24:19] DO: Indeed.

[00:24:21] GW: So, Mr. Adam was no exception to that. We all held him in high regard, not only because he made all of us feel like we were the most important person on the planet, but pedagogically, I had never met a person who was as knowledgeable as he was about how the thing [the trumpet] worked and how to teach it without getting the students' mind all meddled up into the physical. And so, because of his teaching – and obviously when you begin to teach, you're hoping that the apple doesn't fall far from the tree, that you want Mr. Adam's philosophies and his words to become my words and my words to be able to be transmitted to the student as closely to Mr. Adam's teachings as possible. I believe that was very instrumental in me being able to keep my head on even though I knew the things around me were just falling apart.

[00:25:18] DO: Mm-hmm.

[00:25:19] GW: I believed in myself. I knew the process because I had been teaching the process for decades. I know that this takes time. I know that any physical change takes months and months to get the change around to the point that it's kinesthetic so that I'm not thinking about it anymore. So, I had two whammies going on for me. Not only had I had the change to the left hand and had to teach that muscle memory, but I also had to get the embouchure and everything around it so that the note came out like it was supposed to. So, because of him primarily, I was able to get through the

hump, if you will, and on my road back without losing too much hair *(laughs)*.

[00:26:02] DO: *(Laughs)* As a quick aside, do you think, as far as the changing of the position goes when you're playing left-handed *(points to lips)* – do you think that would be mitigated with playing a left-handed trumpet or do you think that would still occur?

[00:26:17] GW: Nah. You know, Mark Dulin at Bach [Vincent Bach Corporation], since I'm a Bach Artist and he had heard that I was playing left-handed, he said, "You know we make left-handed trumpets." And I was thinking, *Yeah, yeah. I get it*. I think Bob Baca plays a left-handed trumpet.

[00:26:32] DO: Okay.

[00:26:33] GW: If they're going to make me a left-handed trumpet, then I would have had to go up to the factory and pick out the trumpet right-handed that I would want them to convert to left-handed.

[00:26:42] DO: Oh. I see.

[00:26:43] GW: Because not every trumpet blows the same. You could blow ten trumpets and they're all going to have just something else that the other ones don't

have. And so that's why you try out instruments. You don't just pick the first one off the shelf, so to speak. Well, I didn't want someone picking that one off the shelf and making a left-handed trumpet and saying, "Well, here you go."

[00:27:02] DO: Yeah.

[00:27:03] GW: Well, what if I didn't like it? So, I just decided, you know, I'm just going to hold it with the right hand and I just put it up there just like this and I play *(demonstrates by playing the trumpet with the right hand operating the piston valves of the instrument)*. So, it's coming around.

[00:27:20] DO: Mm-hmm.

[00:27:21] GW: It's coming around but I work at it every day.

[00:27:24] DO: Oh, I'm sure.

[00:27:25] GW: I believe that it's what we're meant to do. And obviously, practicing the trumpet and perfecting your craft is therapeutic. So, that's kind of where we are.

[00:27:39] DO: Yeah, I've heard you talk a lot about how playing every day and being a trumpeter is therapeutic and part of your identity.

[00:27:47] GW: Oh, yeah.

[00:27:48] DO: If you had to do this whole process again – if you woke up tomorrow and we were a few years back in the past – would you have done anything differently? Would you have seen any different type of specialist or started this process with Peter earlier?

[00:28:04] GW: Well, the Peter process I think came at the right time but I'm not quite sure if I would've gone to a hand surgeon. I believe that the issue is neurological. Somewhere in my brain, something is not working like it should. Now I don't know if it is age related. I don't know if is that dystonia as is one thought. So, I'm anxious to hear what this neurologist is going to say. I've even told my wife, "Surely they've got to be able to have a probe or something that, while you're awake, they can take a probe and stick it in that section of the brain that triggers the individual movement." And so, I don't know if that would be something. But, you know, it's interesting. In the Adam family, we have an orthopedic surgeon named George [unintelligible]. And George is a very dear friend of mine. I called him up, probably in the middle of this two years ago, and said, "George, I'm having trouble with my right finger. It's not moving as fast

as it did and it's not coming up." He said, "Just go see a doctor and have them give you injections of Botox. It'll last about six months but it will help." And I'm thinking to myself now *(shrugs), I never gave that a thought, nor did I think that it would help*. So, I never explored that possibility. Maybe it was foolish on my part not to at least give it a try.

[00:29:32] DO: I see.

[00:29:33] GW: Wouldn't it be interesting now if I go to the neurologist next week and she says, "Oh, no problem. We're just going to give you a shot of Botox and have you come back and see me in six months."

[00:29:42] DO: *(Laughs)* That would be interesting!

[00:29:45] GW: *(Laughs)* Wouldn't that be something! And then all of a sudden, maybe I can go back playing right-handed. I don't know if I should *(laughs)*.

[00:29:53] DO: Well, I'm definitely hopeful that you get some answers and find some relief on that front. To back up for a minute –

[00:29:59] GW: I tell you –

[00:30:00] DO: Sorry, go ahead.

[00:30:00] GW: You go ahead.

[00:30:02] DO: I was going to kind of change the subject, so you go ahead and say what you were going –

[00:30:05] GW: Oh, no. You go ahead and change it *(motions with hands)*.

[00:30:06] DO: Okay. Okay. When you were reading a lot of those periodicals – one of the primary solutions, if you will, to focal dystonia of any part of the body is changing practice habits. Whether it's changing how long you practice in each session, or how many sessions you do, or how many days on and off. Was there any kind of alteration you tried in your practice to see, *well, maybe if I just take a little time off the finger will get better* or anything like that?

[00:30:34] GW: You know, there are several books about focal hand dystonia and I read several of them. And they all require changing the way the brain thinks. And, I'm thinking, *Oh my God. I can't even imagine*. I did have a good, close associate said that he deals with some type of mental imagery with the right brain and left brain. And he suggested that I take a video camera like the one I'm looking at, and even though I'm playing left-hand, I can change the image so that my brain is looking at the left hand play even though the right hand is playing or vice versa. Even though I'm now

playing with my left hand I can change the image around where, as I'm watching myself play left-handed, my brain thinks that it is right-handed playing.

[00:31:22] DO: Oh, fascinating. Yeah, I see what you're saying.

[00:31:26] GW: And so, I dabbled in that a little bit. But to be honest, I was thinking, *ah, this is just taking me way out in left field*. But I've tried a lot of different things.

[00:31:35] DO: I'm sure.

[00:31:36] GW: And I'm sure there is merit to all of these. But I just couldn't give myself enough time, I guess, to figure it out.

[00:31:46] DO: Well, you're a busy person so I totally understand. Is there any type of case you've seen of another trumpet player, or maybe as a teacher you've seen a student struggling with injury or disability, where you thought this device that Peter has designed may help them in some fashion?

[00:32:05] GW: Oh, absolutely. Peter and I even discussed developing a patent and seeing if we could put it out there at all the conferences that he attends so that if someone else is having an issue, maybe the WingMaster could help them.

The only thing that Peter did say is that it's so individualized that it would have to be modified to each individual.

[00:32:27] DO: I'm sure.

[00:32:28] GW: Whether it be the length of the button, or the tension in the button, or something. He said, "it would probably take more individual consideration and time and modifications to that individual than it would be worth."

[00:32:44] DO: Hmm. Yeah, I see.

[00:32:47] GW: And Bob Baca, I mentioned him. Bob plays left-handed. I'm not exactly sure what happened to him but he is one of the only people that I know that has successfully made the transition from right-handed to left-handed playing. I'm sure there are hundreds out there in the world.

[00:33:04] DO: I'm sure there are quite a few, yeah.

[00:33:06] GW: People with similar either dismemberments or disabilities that have overcome it by switching to the left hand.

[00:33:17] DO: Yeah. That's usually the popular solution that I've seen anyway.

[00:33:19] GW: Yeah.

[00:33:21] DO: Just to finish up here so I don't take any more of your time, is there anything else we haven't discussed that you think would be relevant or helpful to me writing about this study?

[00:33:32] GW: Well, I'm very curious as to what this neurologist is going to say. And I believe that if you play the trumpet, you just have to make up your mind that regardless of what is thrown your way, you don't quit. You know, music gives us so much enjoyment and is so therapeutic. So, I'm trying to continue to perform at a high level where I'm not thinking about how to play the trumpet. And that requires a tremendous amount of practice, for lack of a better word. I mean, you have to practice these things to get it to work the way you want it to. And I don't think people understand, or they underestimate, exactly how much time it takes to perfect our craft. And so, not everybody practices hours a day. But I still practice four to five hours a day. And like I said, I do it because I enjoy it, but I understand that for me to get back to my 'A game' so to speak, it's going to require that type of discipline every day. Now, I don't practice seven days a week. I practice six days a week.

[00:34:43] DO: Mm-hmm.

[00:34:44] GW: And my wife is very glad when I don't practice on the seventh day *(laughs)*.

[00:34:48] DO: *(Laughs)* That's funny. Well, thank you for sharing that perspective. Your discipline is legendary amongst people who know you, so that doesn't surprise me at all that you're still getting after it. Just a couple quick questions for when I'm writing you a little bit for contextual background in my paper. Would you mind sharing a little about what years you were touring with Buddy Rich?

[00:35:16] GW: Oh, sure.

[00:35:17] DO: And your career in Las Vegas and where all you've played and the associated years with that? I know that's an open-ended question.

[00:35:24] GW: I've had an unbelievable career. It's just crazy. You know, as a little boy, all I ever wanted to do was play trumpet. And I share it with everyone, my cycle of success. My cycle of success was learned at an early age. I remember picking up the trumpet when I was seven years old in elementary school in Latonia, Kentucky when they had elementary bands. And I picked up the trumpet and no one taught me how to form an embouchure. I just picked it up and all of a sudden, a note came out and I thought, *Well, okay. That was easy*. And then my dad wrote out "Dear

Heart" and "Hello, Dolly!" for me and gave me a fingering a chart. So, I figured out a couple little dorky tunes. He sang them and I figured out the melody. And all of a sudden, I go to the elementary band the following school year and I'm light years ahead of everybody. So, my practice got me to a point that I was better and that made me feel like a million dollars. So, guess what I wanted to do?

[00:36:27] DO: Practice!

[00:36:28] GW: I wanted to practice more! So, my cycle of success is the more you practice, the better you get. The better you get, the more opportunities you have to perform. The better that makes you feel, makes you feel like a million dollars, you want to practice. And so, that's been my whole life. I'm going to be seventy-two so I've been playing trumpet for sixty-four years. And it's still one day at a time *(laughs)*. So anyway, I go to school and graduate from high school and go to Morehead State [University]. Music education was my degree. I went on the road with a show band in the '70s. I started studying with Mr. [Bill] Adam in 1973 as an undergraduate student at Morehead. I would leave Morehead, it took four and a half hours, pick up Phil May in Winchester, Kentucky, and we would drive every two weeks up to Bloomington [Indiana] and back. We did that for two years. Then I graduated and played with a show band in

Columbus, Ohio. Then in the Fall of ’77 is when I began graduate work at Indiana. Now, Indiana is a pretty tough school.

[00:37:26] DO: Mm-hmm.

[00:37:27] GW: So, it took me a while to get some of the remedial classes out of the way. And I wasn’t in any hurry because I went there to study with Mr. Adam. I was there four years and I was his assistant instructor, they call it ‘AI’. Some graduate schools call them graduate assistants.

[00:37:42] DO: Right.

[00:37:43] GW: But at Indiana, there were so many trumpet majors that you actually taught private applied. And I would have ten to fifteen students every semester because Mr. Adam had so many trumpet majors.

[00:37:54] DO: Sure.

[00:37:55] GW: So, I graduated in 1981. My lifelong dream was to play professionally. There were three areas that I knew I could get to. Number one, New York, which did not appeal to my wife. L.A, which did not appeal to my wife. So, the only logical choice was Las Vegas. It was up and booming. When we moved out there in ’81, there were three hundred sixty or three

hundred seventy-five thousand people. Twenty-one years later when we moved back [to Kentucky], there were a million and a half. So, we were out there during this huge explosion of Las Vegas. It just boomed! I was out there during the time when there was still a house orchestra at every hotel.

[00:38:39] DO: Wow.

[00:38:40] GW: So, I was out there three weeks and got the call to go out and play lead with Buddy Rich. I turned it down and my wife said, "you did what?!" So, I called every hotel back in Elkhart, Indiana, where Buddy Rich's band was staying, and I got lucky. I found the hotel and asked him if the position was still available. True story. And then I flew from Las Vegas to Detroit, landed about five o'clock and the downbeat was seven thirty. I sight-read the lead book. And so, that turned out well. I was with Buddy for about a year or a year and a half. And then I came right back to Las Vegas, went straight to Caesars Palace, then over to the Las Vegas Hilton, then out on the road with Tom Jones for four years with a brief stint in there with Paul Anka. I got off the road from there in 1987 and went to Siegfried & Roy at the Frontier Hotel for about six months. An opening came at the Lido [de Paris] show at the Stardust [Resort and Casino] and I was at the Stardust from 1988 to 1998. Ten years.

[00:39:41] DO: Wow.

[00:39:42] GW: So, for ten years, I played two shows a night, six days a week. I played over six thousand six hundred shows of the Lido de Paris show. That took me to the Gold Coast Hotel where I was in a daytime group called the "Kinda Dixieland Jazz Band." And then, I saw the handwriting on the wall. I realized that we had been through a terrible strike where a lot of the solidarity had been lost with some of these collective bargaining agreements with the big hotels. And so, I realized, *maybe it's time to give back a little bit and begin a teaching career*. So, I started applying. I applied at Wright State and Youngstown and everywhere in between in the Midwest. I was trying to get back closer to my roots in Northern Kentucky. So, the only position that really took hold and offered me the position was at Morehead, which was my alma mater. So, my whole career had come completely full circle. So, here I am back at the same place where I started. And obviously, Drew, that's where we met.

[00:40:47] DO: Right. Well, we're lucky that your career did come full circle and that you decided to pursue a teaching career.

[00:40:53] GW: Yeah. But anyway, I've had a fairytale career. People say, *well, I wonder if I could do it*. Yes, you can. If you think you can, you can. It's just a little

different circle now. There are no house bands in Las Vegas anymore but it's all freelance. But it's freelance in any major city.

[00:41:12] DO: Right.

[00:41:13] GW: And so, whether you do the cruise ship circuit, or whether you do the Broadway circuit, or whether you do the orchestra circuit, there is always room at the top. Or if you decide to make a go for it in L.A. as a studio musician. Well, you don't have to go to L.A. to be a studio musician. There are studio positions in Nashville and there are studios in Cincinnati. You know, there are studios all around the country. You just have to be there and get your name known so that people call you. Anyway, that's a little bit about my career so to speak.

[00:41:46] DO: Well, thanks for sharing! It's extremely impressive and inspiring and fun to listen to for sure.

[00:41:42] GW: Well, you know, Doc Severinsen inspired me. Al Hirt inspired me. Harry Jame inspired me when I was growing up. Today there are so many resources to inspire these kids that want to go for it. You know, thirty years ago no one knew who Arturo Sandoval was, or Chris Botti, or Alison Balsom, or Tine Thing Helseth. Thirty years ago, they weren't

around. So, who is going to be the ones that are going to be doing it thirty years from now? Hopefully it will be a lot of our younger students –

[00:42:24] DO: Hopefully so.

[00:42:24] GW: –who take advantage. Sure. Hopefully it's Drew O'Dell!

[00:42:29] DO: *(Laughs)* Well, thank you. I appreciate it. Well, I think that about concludes every question I've got for you today. I wanted to thank you again and let you know that I really appreciate you and really appreciate you sharing your journey with me and sharing your journey with everybody else. Hopefully it helps somebody down the road in the future.

[00:42:49] GW: That's right, I hope it does help. Somebody has got to know what's going on here *(points to impacted finger)* that they can figure it out to help me or help someone else. But, Drew, we're very proud of you –

[00:42:59] DO: Thank you.

[00:42:59] GW: – and the young man you are becoming. And you're going to make all these kids' dreams come true.

[00:43:08] DO: Oh, well that's very kind of you to say. Thank you.

[00:43:10] GW: Yeah. You've got a good heart and you know what to do. So, thank you again and good luck with finishing your dissertation.

[00:43:17] DO: Well, I appreciate it. Good luck to you as well. I hope you get some answers from the neurologist.

[00:43:21] GW: Yep. Well, either way, straight ahead! *(Laughs)*

[00:43:25] DO: *(Laughs*) Straight ahead! Indeed. Thanks so much again. I appreciate it.

[00:43:29] GW: You bet. Bye, Drew.

[00:43:30] DO: Bye.

[End Transcript 00:43:32]

Appendix E: Transcript of Interview with Peter Pickett

Interviewee: Peter Pickett (labeled as "PP")

Interviewer: Drew O'Dell (labeled as "DO")

Date of Interview: 8/16/2024

Time of Interview: 10:00 AM EDT

Location of Interview: Zoom

[Begin Transcript 00:00:05]

[00:00:05] DO: Okay, I believe we're recording. Awesome. Well, thanks for joining me to talk about this, Peter. As you know, it's really important to Greg [Wing] and I think it's really important to me and the trumpet community at large. Before we begin, I have to talk to you about some consent things and permissions and risks and all that stuff. I'll just read this document to you and then I'll ask you some questions. Okay?

[00:00:31] PP: Super.

[00:00:32] DO: Okay. You are invited to participate in research about the creation and development of twenty-first century accessibility technologies for trumpeters with hand injuries and disabilities. The purpose of this research is to chronicle the advancements made in the field of adaptive technology for trumpeters to be used as a repository of information for future

musicians, students, teachers, engineers, et cetera. If you agree to participate, you will be interviewed via Zoom and will be audio and video recorded. Your audio, video, or photographic images may be used in university research reports with your permission. There are no benefits and minimal risks to participating in this research. The interview will be conducted online via Zoom. The organization hosting the data collection platform has its own privacy and security policies for keeping your information confidential. There is a risk that the external organization, which is not part of the research team, may gain access to or retain your data or your IP address which could be used to re-identify you. No assurance can be made about their use of the data you provide for purposes other than this research. There is also a risk of accidental data release if we collect your data using audio and video recordings. If this occurred, your identity and the statements you made could become known to people who are not on the research team. To minimize this risk, the researchers will transfer data to, and store your data on, a secure platform approved by the university's Information Technology Office. Finally, you will be asked to transfer documents, images, or other personal records to the researchers in this research. There is a risk that someone who is not part of the research team may gain access to this data during the transfer process. We will give you information about transferring data to the researchers to minimize this risk. When we receive your data, we will transfer the data to, and store your data on, a secure platform approved by

the university's Information Technology Office. Your participation is voluntary and your responses will be shared with all readers in the form of direct quotes and a complete transcript published in the dissertation. Your consent to the publishing of your identifiable responses is a requirement for participation in this research. We might share your interview responses with other researchers or use it in future research without obtaining additional permission from you. Now, I will be asking some questions to find out how you want me to report your ideas. You can refuse any that you do not like without any penalty. Do you agree for data records to include identifiable information?

[00:02:52] PP: Yes.

[00:02:53] DO: Do you agree to have your name reported with quoted material?

[00:02:57] PP: Yes.

[00:02:58] DO: Do you agree for your data to be archived for scholarly and public access in the form of a complete transcript included in the published dissertation?

[00:03:06] PP: Yes.

[00:03:07] DO: I would like to access some of your records for my research. They include schematics, drawings, and photographs of the WingMaster technology. Do you agree for me to do this?

[00:03:16] PP: Yes.

[00:03:17] DO: Do you consent to audio recording?

[00:03:19] PP: Yes.

[00:03:20] DO: Do you consent to video recording?

[00:03:23] PP: Yes.

[00:03:24] DO: I may wish to take photographs of you to include in my research. Do you agree?

[00:03:28] PP: Yes.

[00:03:29] DO: Your photographs and audio or video records may be used in university research reports unless you tell me not to do this. May I contact you to gather additional data or recruit you for new research?

[00:03:40] PP: Yes.

[00:03:41] DO: Okay. Even if you choose to participate now, you may choose to stop participating at any time and for any reason. If you have questions about this research, you can contact me at Drew.M.ODell-1@ou.edu or the faculty advisor, Dr. Matt Stock at mstock@ou.edu. You can also contact the University of Oklahoma Norman Campus Institutional Review Board at (405) 325-8110 or irb@ou.edu with questions, concerns, or complaints about your rights as a research participant or if you don't want to talk to the researcher. Do you agree to participate in this research?

[00:04:19] PP: Yes.

[00:04:20] DO: Finally, would you like a printed or electronic copy of the information we have just reviewed?

[00:04:26] PP: No.

[00:04:27] DO: Okay, fantastic. And today is Friday, August 16th at 10:18 AM Eastern Time. So, before we jump in, I'd like to ask you a little about how the WingMaster actually works. And I've got a picture here from Greg [Wing] that we can kind of use as a reference point because, from a layman's

perspective, it looks like a pretty complex piece of technology. So, let me share my screen really quickly. Can you see this?

[00:05:05] PP: I see a black screen. Oh, there we go. Yes, now I see it. Very good.

[00:05:09] DO: Yes. Ignore my many tabs that are open *(both laugh)*. So, I've got this picture here of you working with Greg that I've kind of blown up.

[00:05:15] PP: Mm-hmm.

[00:05:16] DO: And I was hoping I could kind of get a better understanding, to explain this to someone in layman's terminology, how it works, how it connects to the trumpet, what it does, et cetera, et cetera.

[00:05:26] PP: Very good. So, going back to the fundamental purpose here, we needed a mechanism or approach to push the pistons down in replacement of Greg's ability to push the pistons down in a reliable, repeatable manner. So, fundamentally that is what we needed to do. So, you can do that in one of two ways. Either on top like we do with our fingers today by pushing the buttons or you could do it from below. As you can see in this picture, we have some strings hanging out of the bottom of the valve casings and those strings and cords are attached to the bottom of the piston. And so, we're pulling the piston down with those servos that are also there in the

picture at the bottom. Those are high speed electric servos that you might find on a high-performance remote-control airplane or car kind of thing. They are very accurate and very fast. And one of the big challenges is, again, replicating what we take for granted when we're playing: how quickly our fingers move. And that was initially very difficult to figure out. But in the picture here, you can see close to the finished product where we had high speed electric servos pulling on the bottom of the pistons to bring them down to position and then, of course, to return them to their up position.

[00:06:44] DO: Okay. Fantastic. So, there are essentially – from my understanding if it is correct – there are essentially two paddles that connect to the trumpet, one of which in this picture looks like it clamps on to the threads on the bottom valve caps, and then the top? How does the top connect to the trumpet?

[00:07:05] PP: Good. So, the top side's purpose is – and you can see it in that picture with the three green buttons. The purpose of that part of the module is to give Greg an interface. So, some buttons to push that match his mobility. If he's got only a little bit of travel in his finger, we need to be able to capture that in order to translate that into the full travel of a piston. So, the purpose of that top part is to basically put those three buttons in a place where you would expect them to be, which is right over the three pistons.

On the top of this horn, and I don't remember if I sent you a picture, we took the stems off and we took the buttons off because, for this module or for this approach, they are basically irrelevant. We are never going to push down on the top of the pistons. So, there is nothing on the top of the horn. So, in place are those three little green buttons. They are in the place of, not really in the exact same position, but where his fingers are going to be. So, they are off to the side a little bit. But again, the purpose of that part is to locate and hold those buttons and to house the rest of the electronics that drive this.

[00:08:16] DO: Okay. Fantastic. And talking about how the device is powered, is there a battery included within those two paddles?

[00:08:26] PP: Yeah, the answer to that is no. And this is one of the big challenges with any cordless device, for all ages, is just battery. So, you need a decent sized battery in order to have any appreciable life. Nobody wants to get halfway through a recital and their horn just stops working. Thankfully, battery technology has come a long way in the last decade with lithium-ion batteries. So, with that said, batteries also have quite a bit of weight to them. And this mechanism, as we can imagine in that picture, is already adding a significant amount of weight. And so, it's not unbearable, but it's not like what we would expect. And the best accessibility technology is the kind that you don't even know is there. Like for instance, when you

wear glasses. Glasses are lightweight; they don't get in the way. You forget that they're there. And they provide all sorts of accessibility benefits. That's what we would like for this to be. And so, to get there, we put the battery off of the horn. So, there is roughly a three- or four-foot wire that hangs off onto a relatively small battery that Greg can have in his pocket that lasts hours and hours and hours.

[00:09:41] DO: Okay.

[00:09:42] PP: So, it's not so big that it wouldn't fit in your pocket, but it's also not so small that it wouldn't provide any appreciable term in usage.

[00:09:51] DO: Right on. So, the battery is connected to one or both of the paddles and the two paddles are also connected with wiring. Is that true?

[00:10:02] PP: Yes. So, in the picture you can see the multi-colored wires that are coming out between the first and second casing or baluster there. Those go directly up into the module that has the buttons and then the battery connects to the module that has the buttons. So, it's relatively self-contained after it's assembled with just that single wire coming off of the battery.

[00:10:25] DO: Okay. Okay. And just for my understanding, the battery is connected to the top module. And then –

[00:10:36] PP: Correct.

[00:10:36] DO: –the top module is connected with separate wiring to the bottom module to send the signals to the motors. Okay, cool.

[00:10:42] PP: That's exactly right.

[00:10:43] DO: I think that takes care of a couple of questions I had about the functionality of the device to then share in the paper.

[00:10:50] PP: Mm-hmm.

[00:10:51] DO: Could you describe your background as both an engineer and a trumpeter?

[00:10:55] PP: Oh, sure. So, I went to Virginia Tech in Blacksburg, Virginia for engineering school. Initially, I wanted to be a mechanical engineer. My dad was electrical. I liked building with Legos, I liked watching how things worked, and I liked mechanisms and machines and all those typical things. And so, the engineering program at Virginia Tech was well regarded and so that found me there. Now, Virginia Tech, like a lot of state schools, is very large, and as a result, can be very overwhelming in the number of options of things that you can do, never mind people that you see and so forth. But one of the benefits is that the music department

there at Virigina Tech was very welcoming, high level, and offered a whole lot of outlets for my playing. And so, quickly after getting there, I got involved with the music program and enrolled also as a performance major for music. And so, I got to play quite a bit. Engineering certainly took a lot of time. And after finishing both of those undergraduate degrees, I continued into a mechanical engineering graduate degree in terms of active noise control and acoustics. And I was able to bring together the music aspect and the active noise control in the form of applying active noise control to a musical instrument. And there is some good bedtime reading there in my thesis from long ago. But the point is that I got to bring them both together and combine both my loves in terms of music and the engineering aspects. After leaving Virginia Tech, I worked for the Lexmark Corporation here in Lexington, Kentucky, which is not music related. Its printers, laser printers, and inkjet printers. And I did that for quite a few years but without letting go of my trumpet playing. And so, after some time, I really wanted to combine those things together. So, in my garage at home, I was making pieces and parts for my trumpet, whether it was decorative buttons or little replacement parts and that kind of thing. And that, long story short, led to making more and more pieces and parts for the musical community, ultimately leading to mouthpieces. I started that in 2007 or 2008 which ultimately led to acquiring the Blackburn Trumpet Company and producing the entire instrument in 2016. So, the love of music and wanting to combine it with designing and

making things has been a lifelong thread through all of those experiences. This project with Greg, I think, is a natural outlet from that. Again, it's creating, it's designing something that did not exist before, and just like music is a collaboration between the player and the listener and the musicians, this was a collaboration between two musicians in order to create something that didn't exist before that was able to bring artistry and music to life. Greg was very frustrated, as you know –

[00:13:51] DO: Absolutely.

[00:13:52] PP: – in his physiological changes, and that frustration is heartbreaking. And we've seen this in any number of situations, whether it's a sports athlete who breaks a leg – you know it, keeps them from doing what they love. Here is something that Greg has done his entire life that is part of his soul and it can not get out of him. And so, working together and collaborating like all musicians do and bringing that together with creation, design, and problem solving – it was a natural fit and certainly most enjoyable.

[00:14:24] DO: Yeah, absolutely. So, you said Pickett Brass was founded in 2007 or 2008?

[00:14:32] PP: So, it actually started in 2003 with those little pieces and parts.

[00:14:36] DO: Oh, okay.

[00:14:37] PP: And again, it was very much an aesthetic venture. It was not any highfalutin, you know, any acoustic design thing. It was just, I thought it looked cool and that's all it was and I was not bashful about saying that. And part of it was for me in just creating something that didn't exist before, whether or not it's functional per se. It looked nice, it was art, it was expression, and it was creating. That side of things, though, does not make for a solid business. How many sets of trumpet buttons do you own? *(Laughs)* It's probably one, maybe two.

[00:15:09] DO: *(Laughs)* Yeah.

[00:15:11] PP: And how many mouthpieces do you own? Every trumpet player owns a number of mouthpieces. And so, with the machinery and expertise and such that we had generated up through 2007 or 2008, it was a natural jumping off point to creating a different kind of art. These mouthpieces that then of course resulted in much stronger collaborations with players and much more meaningful results for us as well.

[00:15:38] DO: Awesome. Before your experiences with this project with Greg Wing, had you ever worked on any sort of accessibility technology or anything of that nature for musicians?

[00:15:51] PP: No. No, certainly not. And again, the things that we have seen since we've been working with mouthpieces are things we don't know what to do with. So, Bell's Palsy for instance –

[00:16:02] DO: Right.

[00:16:02] PP: –You know, where facial muscles and control change – oh gosh, I have nothing. So, we work with different mouthpiece designs to adapt, but it is certainly just a – it's not even a solution, it's just a crutch in order to make something more comfortable. Or, if someone has a dental structure that causes them pain like a tooth that sticks out, sometimes you might consider a mouthpiece change or rim design change as an accessibility way to make it more comfortable to make things work. But those are certainly longshots in comparison to the external devices we're working on here.

[00:16:39] DO: Sure. Prior to this project with Greg Wing, what did you know of his musical abilities? Could you speak to the progression you saw from his peak to where he was when he came to you for help?

[00:16:56] PP: Yeah, that's an excellent question. Greg has a long history of playing and not only here in Kentucky. I've only known him since he's been at Morehead [State University] from a teaching standpoint. Of course, he

never puts down the horn so he is playing his shows in Louisville [Kentucky] and Cincinnati [Ohio]. And I've heard him play there and of course it's spectacular. And you forget that it's him because you can't see him. When you put those two things together, it's like, *Oh, that's so cool*. So yeah, I've certainly seen him teach and seen him play in those professional settings. And maybe not ever seeing him at his peak like he probably was out West –

[00:17:40] DO: Right.

[00:17:41] PP: –but at the same time, still spectacular, still inspirational, still full of joy, full of energy, full of soul. I think we've all heard players that lack all those things but they sound good. You don't feel something, right? Greg always makes you feel something just like Vince DiMartino. These old souls who have all of that so internalized – it's just how they breathe. And that music comes out and that energy comes out. Greg always has that and that never left him. And I think his frustration came from him thinking that it's not coming out even though it does. So, we've seen and heard him for many years and appreciated it all the while.

[00:18:23] DO: Yeah, they are special people for sure. Speaking of his injury, when I was studying with him during my undergrad degree at Morehead State from 2014-2018, I began to start noticing his finger problems. Would you be

able to speak to what you saw in his playing when he came into your shop and try to play? What was the need for this accessibility technology?

[00:18:49] PP: Sure. Well, first of all, he was just angry. He was frustrated with his inability to get this to go to here *(points from his head to his fingers mimicking the act of playing the trumpet)*. So, you immediately saw that. You didn't even have to listen to him. When he did play, you could almost see him twitch like, *I'm asking my finger to go and it's not moving* or *I'm asking my finger to come up and it's not moving*. And you would then of course hear that. He'd be playing a lick and he'd miss a note and it'd be off in left field. Well, the note was here *(points to his head)*. He knew what note to play but his finger wouldn't move or it would only move a little bit. And when you only move your piston a little bit, it sounds like your piston sticks, right? And so, it would sound like that – like his horn was defective. His horn is not defective. And so, his frustration, which then would probably exacerbate the neurological challenges, would just build and he would just stop. And he would reset and he would do it again. And he could kind of get it. But then he put his left hand on and it was mostly there. Now, it's awkward for any trumpet player to switch to the left hand but his fingers worked on his left hand. And so, you could immediately see *A* versus *B* [right-handed vs. left-handed] – what he was describing, what he was feeling, and then what you were listening to.

[00:20:05] DO: Yeah. Yeah, that's a common first solution to just switch hands. We'll talk a little about the challenges that brings in and of itself in a bit. So, this process of working with him spans multiple years, correct?

[00:20:20] PP: That's right.

[00:20:21] DO: Could you shed some light on what that process was like?

[00:20:23] PP: Sure. You know, with him going back and forth to school and back our schedules didn't often align. And so, just by that virtue, it probably took a little bit longer. Iterations on the mechanical design, of course, took a little bit of time. There were many iterations that he didn't see that were just failures because of something we did or we forgot something. And that's the benefit of this prototyping is that you can do something and quickly fail. You can quickly find your shortcomings and the details that you missed as opposed to a lot of engineers who tend to be perfectionist – you know, *I have to get this just right before I go invest in making the part*. And you're going to get somewhere there, ninety percent or ninety-five percent there if you're a good engineer. But at the end of the day, by just putting it on the horn and experiencing it and observing, you're going to get a lot more data. So, the idea is to quickly do these spin cycles of prototyping, testing, evaluating clearly, and then immediately feeding that back in order to create a new prototype. And thankfully the investment for

creating the prototypes is relatively minimal, almost zero. It's just a little bit of time. And that time was afforded by the fact that, like I said, he was in and out and couldn't always visit. And also, a lot of these parts are 3D-printed so they could be produced overnight. And so, we take advantage of those twelve or sixteen hours that nobody is here. And you come in the next day and you have a part and you spend a couple of hours putting it together and you go, *alright, this is better* or *oh, I didn't remember that* or *I didn't see that* or *this looks weird* or *this doesn't feel right* – things that you can't figure out when you're designing on a CAD [Computer-Aided Design] system.

[00:22:11] DO: Okay. So, just to backtrack, what kind of percentage of the device is 3D-printed? Everything but the motors?

[00:22:23] PP: Right, you're exactly right. Basically, ninety percent of it [is 3D-printed]. In the picture [referencing a photo of Greg and Peter working on the device], you can see the blue plastic, which is basically the frame and the mounting. You see some stainless screws in there. You could print screws out of plastic but there is no reason to. So, there are a few screws in there. The orange bellcrank that you see on one of the servos is 3D-printed. The buttons are 3D-printed and so-on and so forth. The electronics, of course, are not. So, we designed a custom-printed circuit board to hold the electronics to make them as compact and power efficient as possible.

Other than that though, all the mechanical components certainly are 3D-printed.

[00:23:06] DO: That's fascinating.

[00:23:07] PP: Mm-hmm.

[00:23:08] DO: So, how successful were your outcomes with the WingMaster at different points of the process? Would you speak a little bit about that?

[00:23:19] PP: Sure. So, I will not say that it was one hundred percent successful. And a lot of it comes down to physical limits. So, like I started out by saying, the additional weight to a horn is not zero. And so, there is that to contend with that you will always have. I'm pretty pleased with the servos themselves in that they aren't hugely heavy, and yet they provide the speed. The initial prototypes were lousy in that the speed was not there. It's like moving your finger, what you feel like is slow motion. It looks fast when you use the servo, but you forget when you play how quickly your fingers move. And so, there was quite a period of time with a lot of frustration in terms of how fast we could make it go with the given actuator size. You know, bigger is always more powerful. And you could go to these giant contraptions that bang those pistons down faster than you and I could ever dream of. But it's noisy, it's too big, and takes up too

much power. And so, from a success standpoint, I felt like these servos were a good success with that orange bellcrank design that translates that rotary motion into a linear motion that you want with your piston. I thought that went pretty well. They're not dead silent, right? We are all sensitive to the *clankity-clank* of our pistons if our pads are bad or our spring is dragging. This has some noise to it that certainly would not make it appropriate for a very quiet gig because you're going to hear it. That is very difficult to overcome. In the upper middle of the picture, you see a blue box or rectangular thing. That goes over the servos, not only to provide mechanical protection so that your fingers or hand don't interfere with it, but also it was intended to cover up some of that noise and capture it. Unfortunately, that's really, really hard. Noise control and containing noise is super hard. It has to be airtight. Any pinholes or any cracks really reduce the efficiency of an enclosure. And so, it's nearly impossible to seal that thing up on the bottom of the horn such that it would actually provide any silencing. So, the noise is still there and an enclosure only adds more weight, more bulk, and all those things and so that was not as successful as I wanted it to be. On the other side of it, those buttons on the top, under those little green paddles there – we went through a number of different electric buttons or little push buttons to find ones that had very low force and not a whole lot of travel. Because again, remember, Greg couldn't move his middle finger up and down a full stroke. It could only go down a little bit and up a little bit.

[00:26:12] DO: Mm-hmm.

[00:26:13] PP: So, we needed a button that was capable of sensing his movement accurately in order to translate to the pistons. So, the buttons that we found are remarkable. They're very tactile. They've got a little bit of click to them, not that you could hear, but you could feel it. A little bit of haptic feedback, per se. They are extraordinarily lightweight and that ended up being a little bit of a challenge because if you just rested your fingers on it, your pistons would go down *(laughs)*, whereas we're used to resting our fingers on the top of our pistons and they don't go down until you push on it. In this case, they were almost too sensitive. And so, we had to build in a little bit of extra force in order to keep those from accidentally going down. Now, from a success standpoint, it worked out well in that we could tune that so it was not too sensitive. One of the – I wouldn't call it a failure – one of the challenges is that there is a mental leap between what we're used to when we push a piston down roughly five-eighths or three-quarters of an inch. Your brain says go, you start pushing that piston down, and you know that there is going to be some time before that piston gets all the way down. And it's remarkable how we've internalized that and we play very accurately with that delay. In this case, when your brain says push the piston down, your finger goes down literally like twenty-five thousandths or fifty thousandths of an inch and it's done: the piston is already down. And so, it's very, very awkward to play this horn –

[00:27:47] DO: I can imagine, yeah.

[00:27:48] PP: –if you don't practice. And Greg noticed this. And when he played initially, mechanically, it was working fine. And it sounded just weird because his face, his embouchure, and his brain, and his fingers were playing like a traditional trumpet and the machine and the mechanics were playing differently. And it was very out of sync.

[00:28:07] DO: Out of sync, yeah.

[00:28:08] PP: It's like watching a video with the audio and the video out of sync. It's very disconcerting. It's difficult to watch. And so, recognizing this, he spent a lot of time practicing and retraining himself. As a result, he could play this accurately just like a traditional trumpet. So, there are some differences there that require relearning how we play. And I don't think that's so much a failure or a success, it's just a difference. The technical solution at least offered a path to be able to play.

[00:28:40] DO: Yeah. Well, I'm not surprised that Greg Wing practiced a little bit to get everything together *(both laugh)*. So, speaking about other solutions that he may have tried such as playing left-handed or playing using other fingers –

[00:28:57] PP: *(Nodding)* Yes.

[00:28:57] DO: –those also come with challenges to overcome or changes such as the lateral placement of the mouthpiece on the lips. Was there anything like this, such as the weight or anything, that might have made additional changes to his position or things like that?

[00:29:23] PP: Yeah. One hundred percent. So, like you said, the weight, and it just feels different. Next, is just his hands. He's got big hands. If you put a bunch of this stuff on the bottom of the horn, you feel it in the palm of your hand. So, there's a sensory feedback like, *something is weird*. And then your body tries to adapt to it. The goal was to not have a whole lot of that because he's already got neurological or psychological issues that we're having to overcome and train. Why are we adding more stuff to it? So, left-hand placement was tried to make as natural as possible without putting things in place. The right hand was another thing. And so, I had to think about where to put the buttons now that we had the flexibility to move that as an option. So, if he wrapped his hand around because he could move his fingers more comfortably here *(demonstrates a hand position with the fingers extended out instead of curved on the buttons)* than if his hand was floating [as in the normal playing position], we could move the buttons over.

[00:30:17] DO: I see.

[00:30:18] PP: So, in the design of that housing that has the buttons, we had to figure out how to attach that to the horn. And the initial thought was just to clip it on and it basically squeezes your horn on the outside of the bell and the outside of the leadpipe. And mechanical engineering-wise, it was a great solution. It just snapped on, it was very secure, easy to take on and off, and it looked kind of cool. Unfortunately, it completely changed how the horn played. And in hindsight, I probably should've known that in that we were clamping down on a significant part of the bell – three or four inches – and on the leadpipe. And we all know that when we put a leather handguard on or heavy bottom caps – when you do things to the mechanics of the horn it changes how it plays. And this is one of those examples where it's like, *well, yeah duh, in hindsight*. But from an engineering side, it made sense to clamp it on. So, we did that and he played it and he goes, "I don't like it. It doesn't sound like anything." And you could hear it! It wasn't Greg making stuff up, you could hear it. It changed how the horn played and he didn't like it. So, from there we had to back up and say, *okay, let's back up and mount this thing to where the buttons would normally be mounted*, which is of course on top of the [valve] casings. And so, we don't touch the leadpipe and we don't touch the bell. We hold [the module] very securely on just the top of the casing. And the horn instantly returned to what he was used to. And so, that was

challenging from a design standpoint to hold on to where it didn't change the horn but then also to put the buttons where his fingers were. And so, that's where the design ultimately worked out to with those two requirements or constraints in play. Now, I'm thankful that this ginormous thing that we clamped to the bottom of the casings did not change the horn substantially. That could have been a real problem, you know, to have this module that is the crux of the mechanics cause an undesirable effect on how it played. Thankfully that didn't work out to be the case.

[00:32:21] DO: Mm. I see. So, regarding the notion of give and take with the design process, you said the earlier iterations clamped on and off. How long does this device take to transform the trumpet? I know there are a lot of moving parts, if you will.

[00:32:59] PP: *(Laughs)* Yeah. It takes way too much time. And so, one of the challenges was when we took his horn, we put the first prototype on and thought, *this is great!* And then he looked at his case and went, "this won't fit in my case. What am I going to do?" *(Laughs)* And so, it is a problem in that it adds a lot more height to the horn. And it probably takes a good thirty minutes to an hour to put it on. And part of that is tuning the servo position so that the servo only lets the piston go up to right where it needs to go and it only pulls it down to right where it needs to go. That stroke adjustment is all electronic. It's a nice little electronic adjustment. But it

takes time to get those strings tied on and get everything tweaked. So, it's a tuning thing and once it's in tune it's great. But you don't want to take it apart. And so, we ended up giving Greg a double case that it laid in very nicely, much like maybe a flugelhorn. Flugelhorns are very tall.

[00:33:57] DO: Mm-hmm.

[00:33:58] PP: And this is very tall. And it worked out nicely just to lay it in the case. And it was totally okay.

[00:34:02] DO: Okay. Yeah. *(Laughs)* I guess this is not something you would want to tune on stage.

[00:34:09] PP: *(Laughs)* No. No, no, no.

[00:34:11] DO: Okay. Is there anything about the device's current iteration that you would change? Is there anything that you're like, *I wish I could improve upon that* or if you came back, what would you change about it?

[00:34:27] PP: Yeah, certainly. So, all engineers know that things are never done. There are always incremental improvements or substantial improvements. There is always something better; you are never done. That is the curse of perfection, per se. Not looking for perfection here, but there are always

things that could be made better. I think housing the servos on the bottom could be more elegant in that it could be covered up or a little more dampened to reduce the noise issue that I mentioned before.

[00:34:56] DO: Right.

[00:34:57] PP: I think that could be something that is improved. It's pretty compact in terms of real estate. I'm pretty pleased with that. I don't think that I could make it smaller on the bottom. On the top, it could certainly be much more elegant looking. We ended up adding a lot of curves and hand support on the top which I thought looked kind of cool and provided a little bit of comfort. But that's going to be very much player specific in how it feels and what you want. We all know the challenges of hooking our pinky into our pinky hook versus people that play with their right hand only on the pistons with no anchoring. There's lots of preferences, there's lots of philosophies and pedagogy on one way or the other. So, that is never done and that is going to be very personal. In terms of the electronics, I think they all worked out probably as best as they could. It draws very little power; like I said, the battery is relatively small and lasts a very long time. It's very easy to replace. And so, I don't think there was ever any anxiety that it would not last through any performance. And so, that was a big deal in the beginning. I asked Greg to play on it until the battery died. And it was like eight hours or ten hours.

[00:36:08] DO: Oh, that's a lot!

[00:36:10] PP: Yeah. Which is good, right? And the batteries were very nice in that they had a little indicator on them that told you how far along they were and they recharged quickly. Again, the electronics were well done and sufficient and high-performance and electronically adjustable. All of that worked out very well. Going back to your question about how long it takes to put on and off, obviously that would be ideal to be clip-on and take it off and able to be played like a normal trumpet. I think that that is going to be hard in order to meet both a traditional player and one who needs the adaptive technology, you know, A, B, A, B. Presumably, either you need it or you don't; you want it or you don't.

[00:36:52] DO: Yeah, that is understandable.

[00:36:54] PP: And you just leave it, right. It is your instrument.

[00:36:57] DO: Speaking of players and various needs, do you see any application for this device for people with injuries or disabilities other than the one Greg Wing has? And then, follow up to that, have you used this device with anyone else or has anyone else contacted you and said, "Hey, I have this similar problem and I need help."

[00:37:17] PP: So, nobody has contacted us. I did meet one player who had an amputated finger. And so, one and three [first and third fingers] would reach [the valves] and two [the middle finger] could not reach. And so, as a result, you play on the shorts of your fingers, which of course we're all taught not to do.

[00:37:33] DO: Yeah.

[00:37:34] PP: They would have much rather played on their fingertips. And so, a simple prosthetic to extend the finger probably would be a better mechanical solution to that as opposed to trying to make an electronic second piston and a manual first and third piston. That might be trying too hard in order to adapt this to somebody's need.

[00:37:53] DO: I see.

[00:37:55] PP: You know, this is a piston pushing machine. And so, anything that prevents you from pushing a piston down and/or pulling your fingers back up to return it to a position would be a case, whether it's no fingers, whether it's any neurological or physiological issue that causes your fingers not to do what you want them to do. And we've seen here recently hand and arm prosthetics that sense nerve impulses further up as you get closer and closer to the spinal column and to the brain that then can be

trained. You can learn to trigger things that normally would automatically go down to the end of your appendages. So presumably you could take this and, instead of mechanical buttons, you could work that sensor that triggers it further up and then get more, for lack of a better term, direct control of your pistons just by thinking about it. I don't think any of that is impossible. It's basically taking your brain putting your fingers down and trying to figure out where that is further up *(gestures up arm and shoulder)* and plugging it in to this *(gestures to head)*. I think there are probably some outlets to that that's very much akin to current prosthetics on hands and fingers and arms.

[00:39:17] DO: Yeah, that's exciting to think about in terms of future developments and future projects to springboard.

[00:39:24] PP: Mm-hmm.

[00:39:25] DO: If you were to go through this process with Greg again, is there anything you would do differently with regard to either the design, implementation, troubleshooting, or is there anything you wish you had done differently?

[00:39:38] PP: I think figuring out his hand position and what, specifically, his fingers could and could not do would have been smarter to do early on in order to get that button input to be as natural as possible. The rest of this, to me, is

mechanical and electrical *go-do*. You just go do it. But we're talking about human interface here. And I think understanding better and appreciating better his motion and then getting that connection between his fingers and the buttons in a better place faster would have been helpful. I think a lot of his frustration through the progress of this was just not getting used to how his fingers interfaced with the buttons. I didn't spend enough time working on that interface. I think that would have made it for a more successful or more enjoyable experience.

[00:40:32] DO: I see. To kind of extrapolate, if someone else were to use this technology or require the aid of this technology, is the most prohibitive factor in that process the time it takes to get used to it or the time you would spend working with you to get the actual positioning of buttons in the correct spot? Or would you say the largest barrier is something else, whether financial or anything like that?

[00:41:03] PP: That's a good question in any kind of solution. Your last point about financial – there's just not a lot of money in this. And that is benefitting from today's 3D-printing technology and very, very low-cost electronics. All the pieces and parts are there. There's not a whole lot of money in that. The money and the expense, per se, is in the first two things you mentioned. One, just taking the time to play this instrument, right? You understand what key signatures are and tempos and rhythms. Why can't

you play the violin? Well, it's different mechanics, right? It's different mechanics. It's a different approach to generate the same technical notes. This is much akin to that. And then too, like I said, working with Greg, it would have been nice to have taken the time earlier on to understand each finger and what it needs and what it doesn't need so that we're not making it hard, right? So that we're not giving you a violin and saying, "Well, here's your answer." And you go, "Well, I can't do that." We need to make it as easy as possible with as short a path as possible between where you are and where you have been.

[00:42:10] DO: Hmm. That's a good answer. Yeah, I played violin in a strings methods course in college and it was not pretty *(both laugh)*. Would you be willing to talk a little bit about how you think your background as a trumpeter influenced and maybe helped you with this project? Do you think – maybe an engineer who wasn't a trumpeter or musician – do you think that helped you or do you think that this is a problem that engineers not in the field of music would be able to tackle as well?

[00:42:43] PP: Sure. So, good engineers are characterized by their open-mindedness and being very humble and well aware of what they don't know, right? So, I think often engineers are accused of what I call the curse of knowledge. *I'm really good at this, therefore I should be really good at this,* even though they're not related. So, in this case, I think the mechanical

engineering and mechanics of it could be accomplished by any good engineer. I think the advantage that I have in being a trumpet player is at least I spoke the language and I could hear right off the bat things that he was talking about. Again, a good engineer could listen, be open-minded, and try to bridge and try to learn in a very short period of time what he's looking for, but certainly as a trumpet player, we have a connection, we have similar experiences, we have similar vocabulary – you know, we connect with people who sound like us and who like the same things as we do. We have common interests and certainly that was a bonding factor. Because, you know, trumpet players are very type one individuals usually, right? We're very proud, as all artists should be. We can do things, we can bring feelings, we can bring out emotions, we can create stuff that didn't exist before. That's a superpower! And to be able to do that and you're recognized for it and you're appreciated and you're loved for it – to then have that superpower taken away? Oh my gosh, that's heart breaking! And given that it was part of him for so long, I mean it's what he did, right? To have that taken away, per se, or an inability to do that can be very demoralizing, embarrassing, shameful, all the negative emotions. And to go to somebody and say, "I am struggling and I can't do this." To say that I can't do something that I know I can do and have done for years and then suddenly can't do it? Oh my gosh! Vulnerability doesn't even begin to describe it. And so, having that connection as a trumpet player – he knew that I would get it. And a long-time friendship and relationship, those two

things together, made it much easier to get off of the ground in order to get this project going. You know, getting over that shame and embarrassment because we all struggle with that and it does take time. So, I think that that relationship and that background certainly helped.

[00:45:21] DO: Mm. Yeah. You bring up some really good points about not only the physical aspects that have been limited in Greg Wing's case, but also the mental and emotional ramifications of having something that has been your identity –

[00:45:36] PP: Yes, your identity.

[00:45:37] DO: –your entire life, you know, ripped away as you know it or altered.

[00:45:41] PP: Mm-hmm.

[00:45:42] DO: Have you created any additional accessibility technologies since this project? I know this is pretty fresh and recent still.

[00:45:50] PP: Mm-hmm. No, we have not extended this. Like I said before, we haven't had any accessibility requests outside of Greg. And so, this has been on the shelf and been on his shelf there for him to use and try. And I know he's gone back and forth, much like we've talked about playing left-

handed and some of those challenges and how that can be a different kind of challenge and maybe an easier one to overcome than adapting to something like this. But no, we have not worked any further on this or on other accessibility projects.

[00:46:19] DO: I see. Yeah, I imagine, for him anyway, switching between all the different ways he could try to change playing trumpet is a little bit like playing the mouthpiece game for the rest of us.

[00:46:29] PP: Yes.

[00:46:30] DO: I can imagine that. Is there anything else we haven't discussed that you'd like to share or feel would be pertinent to this case study?

[00:46:38] PP: Going back just one topic here on the vulnerability and asking for help, I think this is an extreme example that we can all learn from when we have challenges. I think that being proud and confident and not seeking help is often upheld as a positive attribute and, you know, as much as pulling yourself up by your bootstraps is applauded, I think you can get further when you seek help. And this can be for something as severe as what Greg has been going through or as minor as like, *I can never get this fingering combination to be quite right on this lick. Maybe Drew over there has*

worked on this before and he found out these alternate fingerings and this and this on an e-flat trumpet work a lot better.

[00:47:24] DO: Right.

[00:47:25] PP: Okay, fine, I might come to that same conclusion but it's going to take me two weeks and I may not ever come to it. Whereas like [referencing the hypothetical situation above], *oh yeah, no problem. You just do this, Peter. That's how you do it and this works really well for me*. Asking for help on insignificant things helps you then ask for help on more significant things that are much harder to do. And everybody, no matter who they are, has gone through something. And I suspect that most people will admit in hindsight – probably not in the moment – that asking for help on whatever it is got them past their issue and to a better place, not only for them, but everybody around them. Think about players that have gotten through issues, whether it's substance abuse or musical challenges or emotional issues. You know, pick your thing. They got through it and you see them playing for people again. They are there because they got help. And bringing joy and artistry and teaching and all the benefits that they bring and all the value that they bring and enjoyment is because they were able to ask for help. So, like with Greg, he could say, "I'm just going to put the horn away. I can't do it. I'm just going to put the horn away." And he would probably have kept teaching. He would certainly give you a lesson

and listen. But you would have never heard him play another note. And I think the world would be less of a place – it's like Doc Severinsen, right? Doc still plays! How crazy is that?

[00:48:53] DO: Yeah.

[00:48:53] PP: And you know, no, he doesn't play like he was when he was forty or thirty or – pick your criticism. But there's still a joy and an energy and an emotion that comes out that adds to the world, every note he plays.

[00:49:08] DO: I agree.

[00:49:09] PP: And so, the same with Greg, right? He has worked through this, for better or for worse, there's still joy and energy and happiness and all the things that come out of the end of his horn with every note that he plays that wasn't there before because he sought help. He pushed through it, he struggled, he reached out to numerous people to continue that legacy.

[00:49:31] DO: Hmm. I think that's a great perspective. Thanks for sharing. And thank you, Peter, to wrap it up, for being part of the community who is willing to help when people come and ask for it. I think that's a great value and resource that you are and provide so much for us all. So, thank you for

that. Thank you for your time and sharing all this information with me. I can't say enough how appreciative I am.

[00:49:55] PP: Well, you're welcome. This is a pleasure. We have a staff meeting here at work every couple of weeks and we do lots of trade shows and get the chance to help and hear a lot of people. And one of the things I lecture about and preach about and constantly remind is, *it's not about me and it's not about you, it's about the experience and the collaboration that we have together as a community*. And a lot of that sounds very generic and blowing smoke but at the end of the day, none of us are here because of ourselves. And I think that is so hard to forget because we want so badly to be our own selves. And by again, going back and asking for help, recognizing that we are a community does not take away from you being who you are and a force to be reckoned with. And so that humbleness comes out, not in the form of words, but in actions as we all try to listen, we all try to collaborate, we try to not project our own philosophy on everybody. And as a result, it becomes much tighter of a community and everybody does better working together than anybody trying to be a hero. So, I think working together, whether it's just on a mouthpiece or whether it's on something like Greg Wing's project, is important to remember at any point in our career, whether you're a student, a teacher, a professor, or not even in the music industry. Whoever you come in contact with in the

community that you play in or that you exist in, you can make an impact. I think that's something that we all have to remember as we go along in life.

[00:51:36] DO: Those are phenomenal lessons for sure. To wrap up, would you be willing to send me a couple of photographs or designs from your CAD system that you may have laying around, easy to access –

[00:51:50] PP: Sure.

[00:51:50] DO: –to use in my paper for reference? Because obviously, we can talk about this and know it, but someone who has never seen this before may be thrown for a loop a little bit. If you wouldn't mind doing that, I would be exceptionally appreciative.

[00:52:06] PP: Sure thing.

[00:52:07] DO: Okay, thanks Peter. I think that wraps everything up for today. I appreciate your time again.

[00:52:11] PP: My pleasure.

[00:52:14] DO: Alright, have a good one! Bye.

[00:52:16] PP: Alright, thanks!