T H E K R Z Y S Z T O F P E N D E R E C K I
A C A D E M Y O F M U S I C I N K R A K O W

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The Leigh Howard Stevens Technique and the Classical Technique in Contemporary Marimba Performance – A Comparative Analysis and Methodology in Performance Practice

as part of the proceedings for the conferment of the doctoral degree in the field of arts, in the artistic discipline of musical arts

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I dedicate this dissertation to my wife Zuzanna

Contents

Preliminary Issues

Four-mallet performance techniques on melodic percussion instruments within the Western musical tradition have been developing for approximately one hundred years.[1] The first publications on this subject appeared in the United States at the beginning of the twentieth century. Since then, four-mallet playing has gained increasing popularity, as percussionists from around the world began to publish their own modifications of existing methods and to propose new, original approaches. The refinement and further development of four-mallet techniques remain a popular subject of both scholarly and pedagogical publications. Today, three principal methods are in general use: the traditional (classical) grip, the Burton grip, and the Stevens technique. Each continues to evolve through various revisions and variants which, for some, serve as inspiration, while for others they remain controversial.[2]

Undoubtedly, one of the most important and renowned figures associated with the advancement of four-mallet marimba performance is Leigh Howard Stevens, born in 1953 in the United States. Stevens is the author of the so-called *Stevens Technique*, the founder of Malletech, a company producing world-class keyboard percussion instruments, a registered inventor with the U.S. Patent Office, a composer, and a marimba soloist of international acclaim – described by Time magazine as "the world's greatest classical marimbist."[3]

While studying at the Eastman School of Music, Stevens decided to travel to New Zealand to study marimba with Vida Chenoweth, a distinguished marimbist active in the 1950s. This decision required him to modify his playing technique and adopt a new method of holding the mallets, which was of particular importance to his new teacher: the Clair Omar Musser grip. Not being fully convinced of its validity, Stevens began to experiment with Musser's approach. After several months of exploration, he significantly altered it and subsequently developed his own system of marimba performance – the Stevens Technique

[1] Dean Gronemeier, "An Evolution of Keyboard Percussion Pedagogy", *Percussive Notes* 31.2 (1992): 20.
[2] The explanation of the term "four-mallet grip" and its distinction from the term "four-mallet technique" is provided in the chapter "Terminology", while illustrations showing the various ways of holding four mallets are included in Chapter 1.
[3] Leigh Howard Stevens, *Bio*, [https://www.leighhowardstevens.com/bio, access: 07.25.2025]; Leigh Howard Stevens, *Press Quotes*, [https://www.leighhowardstevens.com/press, access: 07.25.2025].

– which he later described in his 1979 pedagogical treatise *Method of Movement for Marimba*[4].

In the book, Stevens asserts that the marimba performance methodology of the 1970s was inadequate for the needs of contemporary marimbists. The expanding marimba repertoire of that time demanded ever-greater technical skill from performers, revealing deficiencies in the pedagogical materials available. To address these shortcomings, a new four-mallet methodology was needed – one that treated the marimba as a fully specialized instrument, independent of other percussion instruments. Based on this assumption, *Method of Movement* was created.

> The technical demands of solo marimba literature have become complex in recent years. Although B-flats and F-naturals (etc.) are no more difficult to strike today than they were ten years ago, marimbists are now expected to strike more of them, further apart on the instrument, and in less time. Today's problem then is not so much striking individual notes or groups of notes as it is getting to those notes. The author believes that this is the area in which traditional methodology is inadequate to the demands made of the marimbist by contemporary music: efficiency of movement. This is the area that *Method of Movement* presumes to enlighten.[5]

Method of Movement revolutionized marimba pedagogy and remains one of the most detailed manuals devoted to four-mallet technique. Although the Stevens technique, due to its difference from traditional (or "classical") methods, was initially met with mixed reactions, it quickly gained a dominant position in both the United States and Europe. In later editions of his manual, Stevens consistently maintained his claim of the superiority of his approach, despite numerous examples of outstanding marimbists performing highly demanding works using the traditional technique. Nevertheless, despite its popularity in Western (Germany, France, the Netherlands) and Eastern countries (Belarus, Ukraine, Russia), the Stevens technique has not become the primary four-mallet method in Poland. It remains a niche approach used by only a few performers, while the classical technique of the traditional grip continues to dominate.

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[4]Marcos Torres, Damon Grant, *Discussions in Percussion*, [https://www.discussionsinpercussion.com/home/2018/2/7/58-leigh-howard-stevens-marimba-virtuoso-ceo-of-the-malletech-corporation, access: 04.15.2024].

[5] Leigh Howard Stevens, *Method of Movement for Marimba*, 25th Anniversary Edition (Asbury Park, NJ: Keyboard Percussion Publications, 2005), 2.

Why, then, did the Stevens technique fail to gain traction in Poland, despite its worldwide recognition and the author's assertion that it is superior to all others? Even after Stevens's visit to Poland – a few years after the first publication of *Method of Movement* – and the opportunity to learn his technique directly from him, Polish percussionists did not adopt it widely. Is the Stevens technique truly as unrivaled as its creator suggests?

I had the opportunity to experience firsthand the strength of Stevens's claims about his method's superiority in American percussion education when I began my bachelor's studies at the Eastman School of Music in 2009 – Stevens's alma mater. Students and doctoral candidates were surprised that I could perform technically advanced marimba pieces using the traditional technique I had learned in Poland. My American colleagues were equally astonished to discover that many acclaimed performers successfully use the traditional grip – such as Polish marimbists Katarzyna Myćka and Marta Klimasara, as well as artists from other countries including Keiko Abe and Theodor Milkov. These examples show that, more than three decades after the release of *Method of Movement*, Stevens's claims about his technique's superiority were still deeply rooted in the American percussion community. What is often overlooked, however, is that the traditional technique has evolved significantly over the years and, by the 21st century, differed greatly from the methods of the 1970s that Stevens described as outdated – an argument he used to justify his own method's superiority.

Knowledge and awareness of the traditional technique are now beginning to shift, thanks to the efforts of educators such as Nancy Zeltsman (Boston University) and, from a younger generation, Svet Stoyanov (University of Miami), who are introducing a "new," "advanced," and "refined" version of the traditional classical grip into American pedagogy. During my last visit to the PASIC [6] festival in Indianapolis in November 2024, I had a conversation with one of Professor Stoyanov's doctoral students, who, after beginning his PhD studies, switched from the Stevens technique to the traditional grip – an occurrence that would have been almost unthinkable until recently. Similar cases can be observed

[6] *Percussive Arts Society International Convention* – the world's largest percussion festival, held annually in the USA. In 2024, its 49th edition took place in Indianapolis, IN.

among Zeltsman's students, as well as among some Ukrainian percussionists studying in Poland who have made similar changes in their four-mallet playing technique.

Four-mallet techniques and the differences between them remain an active and often debated topic among marimbists worldwide. In my opinion, however, this subject has not been fully addressed in Polish-language literature, and English-language publications often present it through the subjective lens of authors who favor one method over another. Many instructional books on four-mallet playing include brief explanations of why their authors prefer a certain technique, but they generally lack solid research that could provide a more objective perspective.

In this dissertation, I aim to present the most objective and detailed discussion possible of four-mallet techniques by comparing and analyzing the two methods I use in marimba performance: the traditional (classical) grip and the Leigh Howard Stevens technique. I focus exclusively on these two methods, omitting, for example, the popular Burton grip, which – despite its versatility – is primarily associated with vibraphone playing due to its creator, the renowned vibraphonist Gary Burton. This narrowed scope allows for a more detailed examination of the two techniques in which I am personally proficient as a performer.

My analysis seeks to verify two key claims made by L.H. Stevens in *Method of Movement*:

1. The traditional four-mallet methodology is insufficient for the needs of the modern marimbist (as "modern" was understood at the time of the book's first publication, in 1979).
2. The Stevens technique produces better results than the traditional classical grip in nearly every case.

The validity of the first claim is examined in Chapter 1, where I analyze twenty-one pedagogical sources on four-mallet technique published before the first edition of *Method of Movement*. Most of these are American publications, though several European sources are also included. Many are rare, long out of print materials that I obtained from

online antiquarian bookstores, during visits to the Eastman School of Music and SUNY[7] University at Buffalo libraries, and via interlibrary loan through the Jagiellonian University. The analysis of these materials allowed me to draw conclusions regarding the adequacy of four-mallet instructional resources prior to *Method of Movement*.

Chapter 2 provides an analysis of the theoretical content of *Method of Movement*. I discuss in detail all the methods described by Stevens, with special emphasis on his recurring concept of "movement efficiency." I also analyze the similarities between Stevens's proposed solutions and elements I employ in my own variant of the traditional grip. The aim of this section is to identify which aspects of the Stevens technique might indicate its advantages over the traditional grip, thereby forming a foundation for the practical experiments presented in the following chapter. I also highlight areas of convergence between the two methods, as well as aspects of the Stevens technique that have influenced newer variants of the traditional grip. At the end of the chapter, I include a list of pedagogical works published after *Method of Movement* as examples of the continued development of both the Stevens and traditional methodologies.

Chapter 3 presents a series of experiments designed to compare the practical application of both techniques. Using my own skills in both the traditional and Stevens grips, I sought to test Stevens's second claim—that his technique is superior to the classical method. The chapter describes four experiments:

1. Speed Test No. 1 – an experiment comparing which technique allows for faster execution of exercises from *Method of Movement* in the base key (C major), without transposition. This test was conducted at the beginning of my research in 2022, when my proficiency in the Stevens technique was still lower than in the traditional grip method.
2. Movement Efficiency Test – an experiment to determine which technique allows for a greater reduction in motion range when performing *Method of Movement*

[7] SUNY – State University of New York.

exercises in transpositions, many of which require uncomfortable body positioning.

3. Speed Test No. 2 – a repetition of the first test, conducted in 2025, allowing comparison of results from 2022 and 2025 and assessment of my progress in the Stevens technique, which I had been intensively developing. This repetition also helped eliminate potential bias due to my initial lower proficiency in that technique.
4. Spectral Analysis Study – A preliminary exploration of a broader topic I plan to develop in future research. This study examines whether the choice of four-mallet technique can directly influence tone character and sound quality.

In addition to describing these experiments and their results, Chapter 3 also includes an analysis of the sources in which Stevens presented his claims of superiority over other four-mallet methods – particularly Chapter V of *Method of Movement* and his articles in Modern Percussionist. I also examine writings by other authors published after *Method of Movement*, which continued and popularized Stevens's hierarchical narrative of four-mallet techniques – where the traditional grip is considered the least effective, and the Stevens technique the best.

As an introduction to the Spectral Analysis Study, Chapter 3 also discusses sources concerning the acoustics of mallet instruments and publications analyzing factors that directly affect tone quality. These materials reveal how, throughout the 20th century, percussionists became increasingly aware of how striking method, mallet material, and contact point affect sound production – and how these variables can be measured. The final citation in this section is from Belgian marimbist Ludwig Albert, who, in an interview for Percussive Notes, suggested that the choice of four-mallet technique can directly influence marimba tone. His statement served as a starting point for my own sound spectrum research.

Chapter 4 analyzes the recorded repertoire forming the artistic component of this dissertation. These recordings exemplify the practical application of both the Stevens and traditional techniques, chosen according to the technical challenges of each piece.

Performances were executed using the technique best suited to the piece's specific demands. The chapter explains my choice of technique for each composition, drawing on conclusions from the practical experiments and theoretical analysis of *Method of Movement*.

The recorded repertoire is included with this dissertation on a USB drive. Works previously published on my YouTube channel are also linked via QR codes in Chapter 4, leading directly to the corresponding videos. The written portion of the dissertation contains not only musical examples, illustrations, and tables, but also embedded video examples illustrating the discussed technical issues. These are accessible through QR codes linking to YouTube, and all videos are also stored on the attached USB drive in a dedicated folder titled "Video Examples."

Terminology

The subject of this thesis involves a detailed discussion of specialized issues concerning marimba performance technique. Therefore, it is necessary to clarify several ambiguities related to the terminology I refer to in the following chapters.

The title of the thesis itself already consists of two terms that require clarification – *Leigh Howard Stevens' technique* and *classical technique*. In common percussionist language, *Stevens technique* is often associated with a specific way of holding the mallets, commonly referred to as the *Stevens grip*. However, L.H. Stevens clearly distinguishes between the term *Stevens grip* and *Stevens technique*, emphasizing that the grip is only a small part of the broader performance methodology he calls the *Stevens technique*.[8] Therefore, in this thesis, when I use the term *Stevens technique*, I refer to the entire set of technical concepts described by Stevens in his *Method of Movement for Marimba*, while the term Stevens grip refers specifically to his particular way of holding the mallets.

It should be emphasized that the grip itself, as used in the *Stevens technique*, was not invented by L.H. Stevens. Rather, it is a modification of an earlier *Musser grip*, created by marimbist Clair Omar Musser. Stevens' modification of the *Musser grip* turned out to

[8] Stevens, *Method of Movement*, 107.

be original enough that, within the first decade after the publication of *Method of Movement*, it became known among followers of the book as the Stevens grip. In everyday usage, alternative terms such as *Musser-Stevens grip* or *Modified Musser grip* also appear – both of which are terms used by Stevens himself in *Method of Movement*[9].

The concept of the *Stevens technique*, on the other hand, encompasses a complex system of body mechanics and instrument movement during sound production, and as such, constitutes Stevens' original pedagogical contribution. There are many examples of marimbists who use the Stevens grip but do not utilize Stevens technique fully, and on the contrary, those who do not use the Stevens grip yet apply certain elements of the Stevens technique in their playing. Nevertheless, the Stevens grip is an integral part of the Stevens technique, and despite making a conceptual distinction between the two, the author of *Method of Movement* strongly discourages the use of any other grip.

The term *classical technique*, as used in this thesis, refers to the traditional four-mallet marimba playing methodology that evolved from two-mallet techniques and originated in early 20th-century pedagogical practices. In this context, the term *traditional grip* is also used, referring to the oldest known method of holding four mallets – directly connected with the traditional teaching of four-mallet marimba technique. Thus, throughout this work, the following pairs of terms will be used: Stevens technique – Stevens grip, classical technique – traditional grip.

Summary of terms:

1. **Stevens Technique** – The comprehensive four-mallet performance methodology described in *Method of Movement*, encompassing mallet holding, sound production, efficient movement at the instrument, and differentiation of stroke types – all of which together enable the full range of musical possibilities on the marimba.
2. **Stevens Grip** – The method of holding mallets described in Method of Movement, which is L.H. Stevens' modification of the earlier Musser grip.

[9] Ibid. 8, 107.

3. **Classical Technique** – A set of traditional marimba playing methods derived from two-mallet techniques, which in some aspects differ significantly from the Stevens technique.
4. **Traditional/Cross Grip** – The oldest known way of holding four mallets, taught first and most commonly used by marimbists trained through traditional methods – that is, those who, within the distinctions made in this thesis, play the instrument using the *classical technique*.
5. **Burton Grip/Burton Technique –** A four-mallet grip and technique mentioned in this thesis, derived from the traditional grip, in which the mallets are crossed in the opposite order. This allows for certain types of strokes considered by many to be a modification of classical traditional-grip methods. The grip is attributed to American jazz vibraphonist Gary Burton.
6. **Independent Grip** – A way of holding four mallets in which the two mallets in each hand do not touch at any point, each resting in a different part of the hand. This group includes the Musser grip and Stevens grip.
7. **Dependent Grip** – A way of holding four mallets in which the two mallets in one hand intersect at a contact point. This group includes the traditional grip and Burton grip.

Chapter 1

Four-Mallet Techniques – A Scholarly and Didactic Discourse (1917–1979)

1.1 Introduction

The brief descriptions of available teaching materials for learning four-mallet techniques, compiled in this chapter, aim to present the historical context for the creation of the Method of Movement and to verify Stevens's thesis concerning the deficiencies in four-mallet playing pedagogy.

The list of titles begins with the earliest manual I was able to locate, from 1917, and ends with a publication from 1978 – one year before the first edition of *Method of Movement* appeared. It includes method books for learning marimba and percussion performance published in the United States and Europe, as well as scholarly articles and dissertations published in the U.S. The compilation includes only materials that explain the fundamentals of four-mallet playing. These are typically publications containing more or less detailed verbal explanations, often accompanied by illustrations and notated exercises. The list does not include method books or instructional materials focused solely on practical exercises that lack verbal descriptions or illustrations. General articles and interviews that merely mention four-mallet techniques were also omitted. The compilation includes only those publications that enable percussionists to learn the technique from the ground up.

Most of the materials I found originate from the United States; however, the list also includes several European publications from the United Kingdom, France, and Germany. It is likely that the number of available European materials is much larger, but I focused primarily on American publications. This decision stems from the fact that, for the purposes of this study, it is crucial to establish the historical context of the country where Leigh Howard Stevens comes from and where his method was published. I did not intend to create a complete list of educational materials, as this would require much broader research. My goal was to gather a sufficient number of titles to outline the historical

context and to verify the thesis regarding the inadequacy and incompleteness of four-mallet teaching materials prior to the publication of *Method of Movement*. Furthermore, in my view, American instructional materials continue to serve as the leading sources for percussion education in Poland, even though numerous valuable textbooks are now being published in European countries.

Polish publications are not included in the list below, as I was unable to locate any sources predating 1979 that discussed four-mallet technique in sufficient detail. The only Polish works I am aware of that mention the technique are *Szkoła na instrumenty perkusyjne* by Józef Stojko, first published in 1950, and two titles by Włodzimierz Kotoński: *Instrumenty perkusyjne we współczesnej orkiestrze* (1963). However, all of these works limit their descriptions of four-mallet technique to just a few sentences, which means they do not meet the criteria adopted for this compilation.

In the first edition of his 1950 textbook, Józef Stojko included a brief description of holding three mallets in the context of vibraphone playing, accompanied by a collection of chord exercises:

> The left hand holds the mallet in the same way as for timpani, while the right hand holds two mallets—one between the thumb and index finger, and the other between the index and middle finger. The index finger and thumb perform all necessary adjustments of the mallets depending on the interval.[10]

This is the only mention of four-mallet technique in Stojko's method, which also contains no illustrations of either the three- or four-mallet grip. Interestingly, this description was removed as early as the second edition in 1960 and did not reappear in any later versions – neither in the 1970 revisions nor in the new bilingual edition from 1978[11].

Włodzimierz Kotoński's 1963 publication, written more in the style of an encyclopedia, addresses the issue of four-mallet playing even more generally:

> Normally, the vibraphone is played with two mallets. Occasionally, in order to produce three or four notes, vibraphonists use three or four mallets, holding two in each hand (on either side of

[10] Source org: "Lewa ręka trzyma pałeczkę w taki sposób, jak przy kotłach, a prawa zaś trzyma dwie pałeczki, przy czym jedną pałeczkę trzyma się między kciukiem i wskazującym palcem, a drugą między wskazującym a środkowym. Wskazujący palec i kciuk wykonują wszelkie potrzebne odchylenia pałeczek w zależności od interwału." Józef Stojko, *Szkoła na instrumenty perkusyjne*, ed. 1 (Krakow: Polskie Wydawnictwo Muzyczne, 1950), 181.
[11] Ibid., ed. 2, 1960; Ibid., ed. 5, 1970; Ibid., ed. 6, 1978.

the index finger). By changing the angle between the two mallets, it is possible to play two-note intervals ranging from a second to a sixth with one hand. Wider intervals (up to an octave) are very difficult to achieve.[12]

The topic of four-mallet grips was described somewhat more thoroughly in the *Leksykon współczesnej perkusji* from 1999. This publication even includes one illustration each of the Musser and crossed grips. However, both the descriptions and the illustrations are still less detailed than those found in the least elaborate publication on the list covering the years 1917–1978[13].

I was unable to find any other Polish publications prior to the first edition of *Method of Movement* that discussed four-mallet playing. Based on my research and conversations with experienced Polish percussion educators, I assume that such works either do not exist or never circulated widely. Consequently, they could not have had any significant influence on the pedagogy of four-mallet technique in Poland, let alone beyond its borders.

1.2 A List of Didactic and Scholarly Materials Prior to the Publication of Leigh Howard Stevens' *Method of Movement*

1917 – National School of Vibracussion: *Home Study Course in Vibracussion* (USA)[14]

Publication type: textbook.

Instrumental scope: All mallet percussion instruments in the context of classical and popular music.

Four-mallet technique: classical, traditional grip.

[12] Source org.: " Normalnie gra się na wibrafonie dwoma pałeczkami. Wyjątkowo dla uzyskania trzech i czterech dźwięków posługują się wibrafoniści trzema lub czterema pałkami, trzymając po dwie w każdej ręce (po obu stronach wskazującego palca). Przez zmianę kąta ustawienia obu pałeczek można grać jedną ręką dwudźwięki od sekundy do seksty. Większe interwały (do oktawy) są bardzo trudno osiągalne.", Włodzimierz Kotoński, *Instrumenty perkusyjne we współczesnej orkiestrze* (Krakow: Polskie Wydawnictwo Muzyczne, 1954), 47.

[13] Włodzimierz Kotoński, *Leksykon Współczesnej Perkusji* (Krakow: Polskie Wydawnictwo Muzyczne, 1999), 90–91.

[14] National School of Vibracussion, *Home Study Course in Vibracussion* (Chicago, IL: National School of Vibracussion, 1917).

The textbook, published in 1917 with a chapter titled "Special Lesson on Four Mallet Playing" added in 1922, was issued by the National School of Vibracussion in Chicago, though the author's name was not provided. It contains instructional material intended for learning to play all mallet percussion instruments. In the introduction, the instruments – such as orchestra bells, xylophone, marimba, and tubular bells – are described with details regarding their construction materials, size, use, and types of cases. The main part of the textbook is divided into chapters covering both specialized topics, such as two- and four-mallet grips and the range of each mallet instrument, as well as general musical issues, including the basics of reading music, scales, modes, and intervals. The textbook also includes a series of two-mallet exercises and, notably, exceptionally detailed descriptions of technical problems, developed with the pedagogy of the beginner musician in mind.

The chapter "Special Lesson on Four-Mallet Playing" includes a page describing the traditional grip. It features drawings illustrating both correct and incorrect mallet positions. Of particular note is a technique identified as improper, in which the outer mallet rests on top of the inner one – a method that, forty years later, became the basis for the "Burton grip."[15] The instructions are clear, and the illustrations effectively demonstrate the proper way to hold the mallets and to perform interval changes. The description proves surprisingly detailed, especially considering that it was written over a century ago. The later part of the Special Lesson chapter presents an overview of different types of chords, several technical exercises, and guidance on using chordal playing on the xylophone within the idiom of ragtime and early 20th-century American dance music.

[15] Gary Burton, *Four Mallet Studies* (Glenview, IL: Creative Music, 1968), 3; Mitchel Peters, *Fundamental Method for Mallets* (Van Nuys, CA: Alfred Publishing Company, 1995), 115.

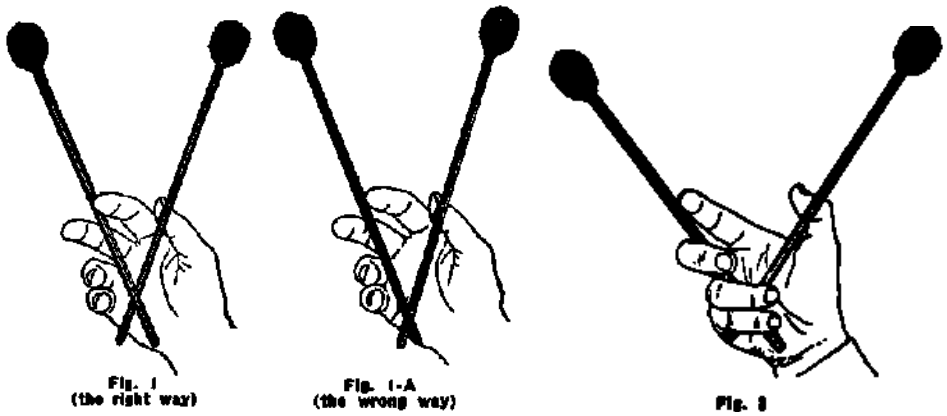


Figure 1. Drawings and descriptions of the correct traditional mallet grip from the textbook *Home Study Course in Vibracussion*

The textbook takes the form of a workbook. On the first page, there is a student identification number assigned to the copy, along with spaces to fill in the student's name and address. This suggests that the textbook was distributed within the National School of Vibracussion, likely intended for internal use by its students. It is possible that it was never published for general circulation, which may explain the absence of a named author.

1931 – Harry C. Thompson: *Elementary Instructor for Vibraphone* (USA)[16]

Publication type: textbook.

Instrumental scope: vibraphone.

Four-mallet technique: traditional grip.

One of the first textbooks on four-mallet technique to be released for general circulation. In the introduction, the author includes illustrations of the vibraphone and vibra-celesta, along with descriptions of the typical use of these instruments and their respective pitch ranges. The author then devotes two pages to technical issues such as the selection of appropriate mallets, the proper striking point on the bar, and explanations of both two- and four-mallet grips. The two-mallet grip is described in just a single paragraph, whereas the explanation of the four-mallet grip occupies an entire page. This indicates that as early as the early 1930s, instructional methods dedicated entirely to four-mallet technique were beginning to emerge.

[16] Harry C. Thompson, *Elementary Instructor for Vibraphone and Vibra-Celeste* (Chicago, IL: G.B. Tuthill, Ludwig & Ludwig, 1931).

In his publication, the author describes the traditional grip, supporting his explanation with three very clear photographs (fig. 2) that clearly demonstrate the correct way to hold the mallets. The description of the grip includes all the essential information and, in its precision, can rival later sources. However, it is somewhat less detailed than the explanation found in *Home Study Course in Vibracussion.*

The subsequent part of the textbook progressively introduces increasingly complex topics in music theory, which the author illustrates through exercises and numerous etudes – both arrangements of popular melodies and original compositions. The first fourteen pages are devoted to two-mallet technique and cover theoretical subjects such as reading musical notation, rhythmic values, meter, musical clefs, scales, modes, and intervals. With the introduction of triad construction, most of the musical material in the textbook begins to focus on four-mallet technique. The author provides detailed explanations of various types of chords (major, minor, dominant, altered, inverted, and others), issues related to melody harmonization, and offers examples of chordal exercises. In the subsequent chapters, increasingly advanced arrangements and compositions intended for performance with four mallets are presented.

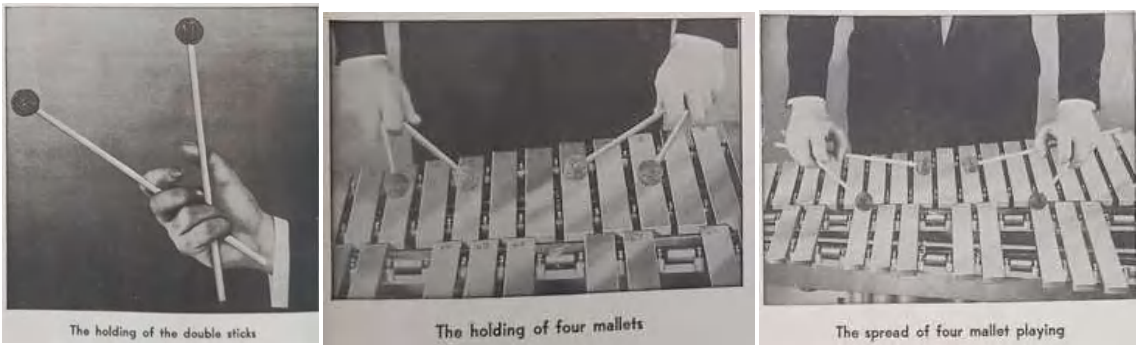


Figure 2. Illustrations of the traditional grip from *Elementary Instructor for Vibraphone* by Harry Thompson

1937 – Howard A. Greene: *Marimba Method* vol. 1 (USA)[17]

Publication type: textbook.

Instrumental scope: marimba.

Four-mallet technique: Musser grip.

A beginner's textbook designed for individuals who wish to learn to play the marimba but may not have the opportunity to take formal lessons on the instrument. It is likely the first textbook specializing in marimba performance, with an introduction that encourages the purchase of the instrument and presents it as "an instrument that is rapidly and deservedly becoming the most popular of all musical instruments."[18] However, the four-mallet pedagogy it contains can also be applied to learning any mallet percussion instrument.

The publication is aimed at students with a basic knowledge of music, although – like other textbooks from this period – it also includes several pages explaining fundamental concepts such as the staff, chromatic signs, rhythmic values, meter, scales, keys, arpeggios, and the circle of fifths. This is followed by a very detailed and comprehensive explanation of two-mallet playing, supplemented by a series of photographs illustrating both correct and incorrect mallet grips, posture at the instrument, and striking techniques. The later part of the textbook contains exercises based on scales, the chromatic scale, and popular melodies, graded according to difficulty level. In the subsequent chapters, Greene included more advanced pieces, arrangements, and duets of his own composition, accompanied by corresponding preparatory exercises.

At the very end of the textbook, there is a chapter devoted to four-mallet playing, written by Clair Omar Musser himself. It includes highly detailed illustrations showing how to hold the mallets using the Musser grip and how to properly perform four-note chords on the marimba[19].

[17] Howard A. Greene, *Marimba Method* (Kansas City, MO: Jenkins Music Company, 1939).
[18] Ibidem, s. 3.
[19] Ibidem, s. 54.

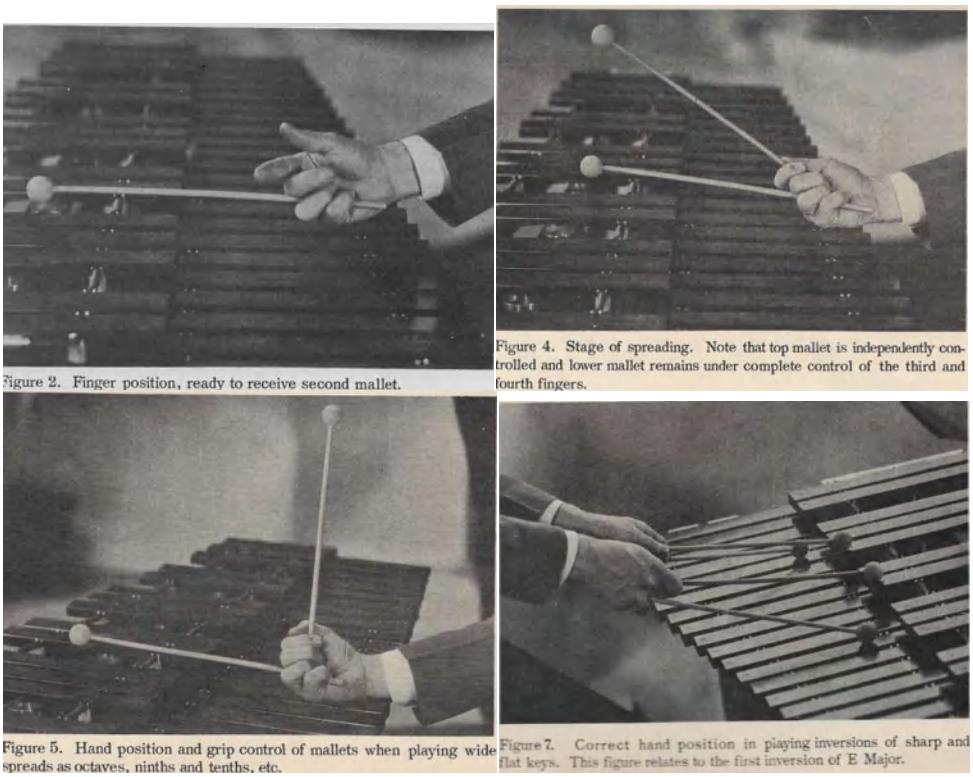


Figure 3. Illustrations of the Musser grip with explanations by Clair Omar Musser from *Marimba Method* by Howard A. Greene

1939 – Lionel Hampton: *Method for Vibraharp, Xylophone and Marimba* (USA)[20]

Publication type: textbook.

Instrumental scope: jazz vibraphone (with a possibility of usage on marimba and xylophone).

Four-mallet technique: Musser grip.

A comprehensive school of vibraphone playing in the jazz idiom, intended for musicians of all skill levels. At the beginning of the publication, the author includes a description of the instrument's keyboard layout, brief instructions on holding two mallets, explanations of musical notation symbols, presentations of scales and keys, and simple etudes in various keys based on well-known melodies and jazz standards. The following chapters discuss chords and feature progressively more challenging etudes and short pieces written in

[20] Lionel Hampton, *Method for Vibraharp, Xylophone and Marimba* (New York, NY: Robbins Music Corporation, 1939).

standard notation. Later in the book, there is a chapter dedicated to four-mallet technique, in which the author presents the Musser grip method.

The entire description of the four-mallet technique is limited to just two paragraphs, making it far from comprehensive. Moreover, the illustrations suggest that the author's way of holding the mallets differs depending on whether they are in the right or left hand (fig. 4). However, the author added a short subsection titled "Movement of the Body and Hands," which appears to be a new element compared to existing teaching methods. Earlier authors focused mainly on how to hold the mallets and position the hands correctly when playing chords, whereas Hampton expands this scope to include aspects of movement – a topic to which Leigh Howard Stevens devotes considerable attention in *Method of Movement*. In the subsection on body movement, Hampton includes a larger number of illustrations showing various hand positions while playing chords on the vibraphone (fig. 5). The later part of the book contains a collection of chord exercises, etudes based on jazz standards, and a chapter devoted to creating one's own vibraphone arrangements using the four-mallet technique.

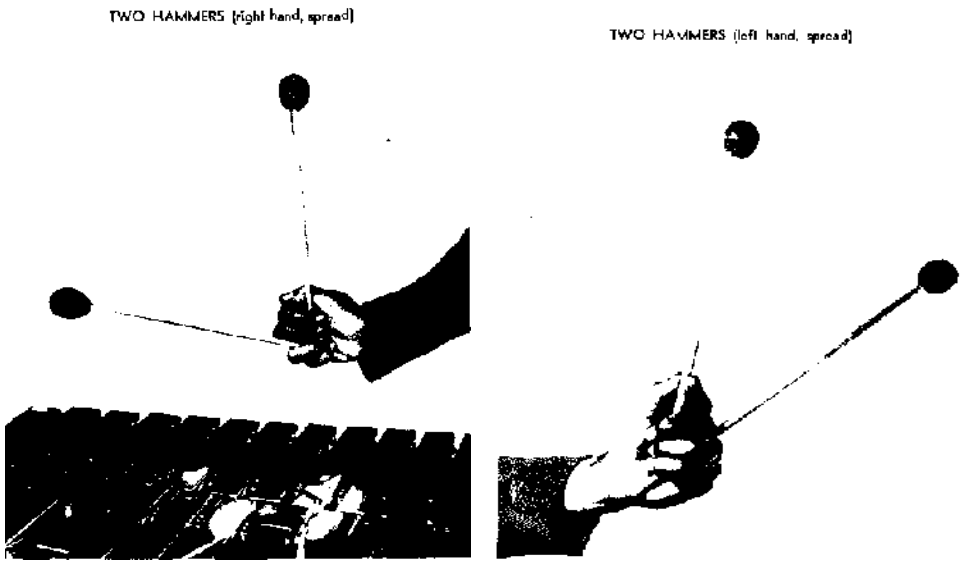


Figure 4. Different methods of opening the mallet angle depending on the hand, as presented in *Method for Vibraharp, Xylophone and Marimba* by Lionel Hampton

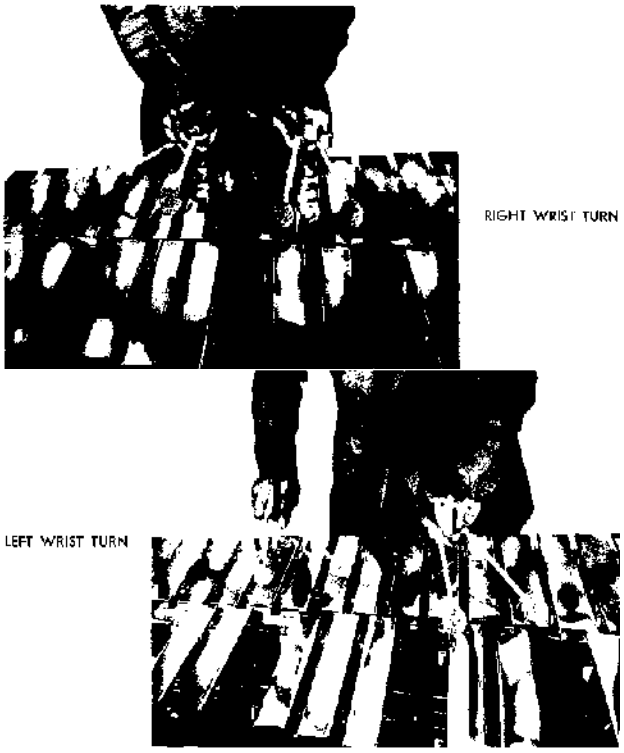


Figure 5. Illustrations showing various body positions at the instrument in *Method for Vibraharp, Xylophone and Marimba* by Lionel Hampton

1945 – Robert Tourte: *Méthode de xylophone* (France)[21]

Publication type: textbook.

Instrumentatal scope: xylophone, vibraphone, marimba, glockenspiel – classical idiome.

Four-mallet technique: traditional grip.

A textbook in French, published both in France and in the United States. It includes a range chart and descriptions of various percussion instruments, including the celesta, along with the corresponding types of mallets. The descriptions begin with the celesta and xylophone, and the chapter dedicated to the xylophone features illustrations showing the correct hand position for holding two mallets, as well as suggested exercises and etudes in musical notation.

[21] Robert Tourte, *Méthode de xylophone* (Paris: Editions Salabert, 1945).

The following sections of the textbook include chapters devoted to bells and the vibraphone. In the vibraphone section, there are illustrations depicting the traditional four-mallet grip and chord exercises. At the end of the textbook, there is a chapter dedicated to the xylorimba (Le xylophone-marimba). Explanations regarding the proper use of the traditional grip (as well as the two-mallet grip) are limited solely to illustrations (fig. 6).

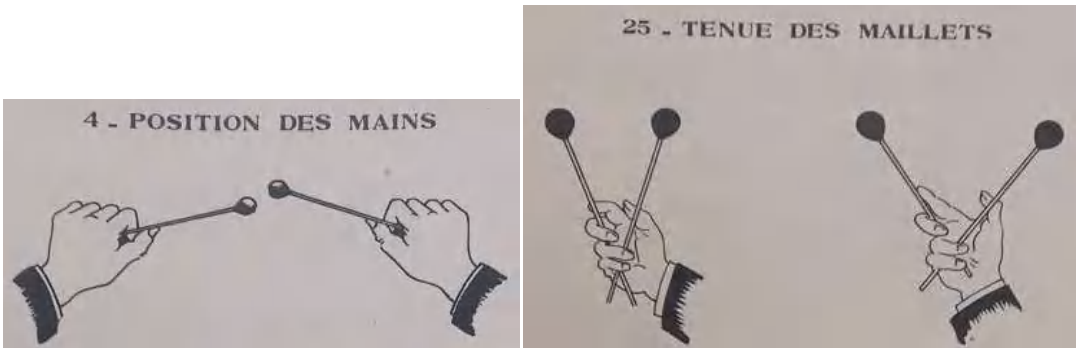


Figure 6. The only drawings illustrating mallet-holding techniques in Robert Tourte's *Méthode de xylophone*

1957 – Andrew A. Shivas: *The Art of Tympanist and Drummer* (UK)[22]

Publication type: educational book in pocket edition.

Instrumentatal scope: snare drum, tipani, ksylophone, glockenspiel.

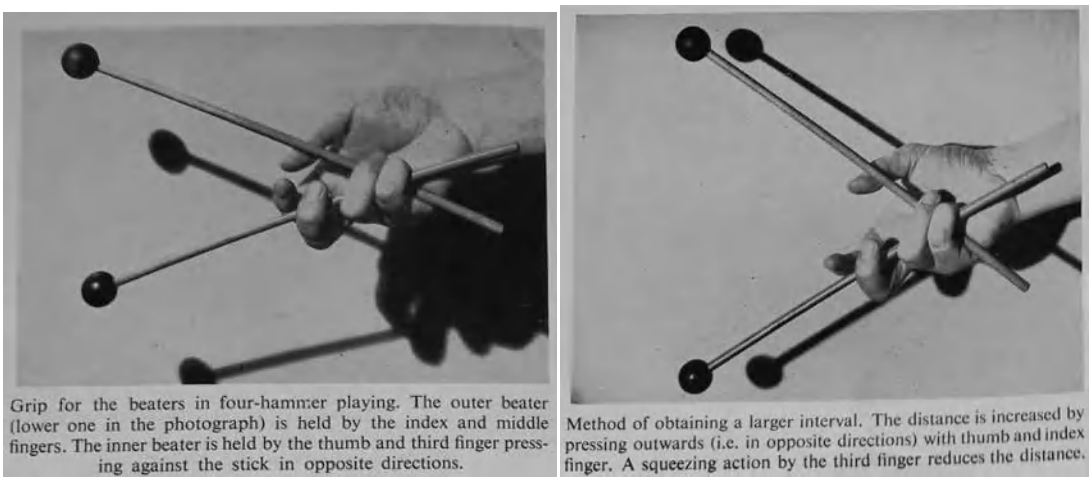
Four-mallet technique: traditional grip.

The book does not include practical exercises; instead, its content focuses mainly on describing the characteristics of playing various percussion instruments. The author's aim was to fill a gap in percussion teaching materials, which, in his opinion, focus solely on written exercises while neglecting explanations of how to perform them correctly.[23]

The publication was written for classical percussionists specializing in drums who wish to expand their skills by learning the basics of mallet instrument performance. The chapter devoted to these instruments contains brief written instructions on improving playing technique through the use of available exercise books with musical notation. In addition, it includes tips on developing sight-reading skills and technical advice on two-mallet playing, all of which relate directly to techniques previously discussed for snare

[22] Andrew A. Shivas, *The Art of Tympanist and Drummer* (London: Dobson Books LTD, 1957).
[23] Ibidem, 9–10.

drum and timpani. At the very end, there is a general description of the xylophone's characteristics. The author does not discuss four-mallet technique in the main body of the xylophone chapter; instead, he includes photographs in the middle of the book showing the four-mallet grip, accompanied only by very brief explanations beneath the illustrations (fig. 7).[24]



Grip for the beaters in four-hammer playing. The outer beater (lower one in the photograph) is held by the index and middle fingers. The inner beater is held by the thumb and third finger pressing against the stick in opposite directions.

Method of obtaining a larger interval. The distance is increased by pressing outwards (i.e. in opposite directions) with thumb and index finger. A squeezing action by the third finger reduces the distance.

Figure 7. The only sections describing the four-mallet technique in Andrew A. Shivas's *The Art of Tympanist and Drummer*

1960 – Phil Kraus: *Modern Mallet Method for Vibes, Xylophone, and Marimba* vol. 3 (USA)[25]

Publication type: textbook.

Instrumentatal scope: wibrafon, ksylofon, marimba.

Four-mallet technique: traditional grip.

The publication was released in three volumes, the last of which is devoted to four-mallet technique. The textbook combines music theory and practical study in an engaging way – it contains forty-one chapters, each addressing a different theoretical concept and expanding on it with practical guidance and notated exercises. The first chapter features simple interval exercises, while the following ones cover major, minor, diminished, and

[24] Ibidem, s. 40.
[25] Philip Kraus, *Modern Mallet Method for Vibes, Xylophone, and Marimba*, vol 3 (Ne York, NY: Henry Adler, 1960).

augmented chords with their inversions, various types of seventh chords, and progressively more complex topics in functional harmony.

In the book's introduction, there are descriptions of mallet percussion instruments such as the xylophone, marimba, vibraphone, and orchestral bells, including the range of each instrument and a diagram of the keyboard with note names. The next part of the introduction focuses on playing technique, divided by the author into nine paragraphs, of which only one explains the correct way to hold the mallets using the traditional grip. The remaining paragraphs discuss proper sound production methods using the wrist, the execution of different types of strokes at appropriate points on the bars, and techniques for pedaling and damping resonance on the vibraphone. The technical explanations are additionally illustrated with four photographs (fig. 8).

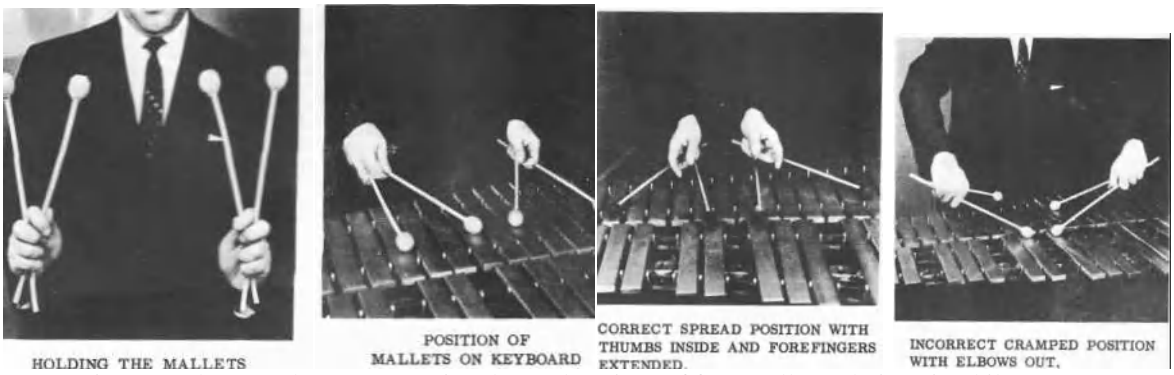


Figure 8. Photographs accompanying the explanations of four-mallet technique in Phil Kraus's *Modern Mallet Method*, Vol. 3

1961 – James Blades: *Orchestral Percussion Technique* (UK)[26]

Publication type: book in pocket edition.

Instrumentatal scope: orchestral percussion.

Four-mallet technique: traditional grip.

This publication is issued in a format similar to *The Art of Tympanist and Drummer* – a compact, handy "essential guide" for percussionists. Unlike that work, however, the

[26] James Blades, *Orchestral Percussion Technique* (London: Oxford University Press, 1961).

instruments and playing techniques are discussed here in greater detail, and the book also includes short notated excerpts featuring basic technical exercises.

In the chapter devoted to mallet instruments, the author presents each instrument, focusing on its characteristics, construction, and the corresponding types of mallets. He begins with orchestral bells, followed by the xylophone (with the marimba and vibraphone treated as its subtypes), and concludes with tubular bells. The final part of the chapter deals with playing techniques, beginning with a discussion of two-mallet technique and ending with an explanation of the traditional grip. However, the description of the traditional grip is reduced to just three sentences, accompanied by two drawings (fig. 9). The illustrations are not very clear, making it difficult to fully understand some key aspects, such as the order in which the mallets cross. Unlike the more extensively covered two-mallet technique, the publication does not include any notated exercises designed to develop four-mallet technique.

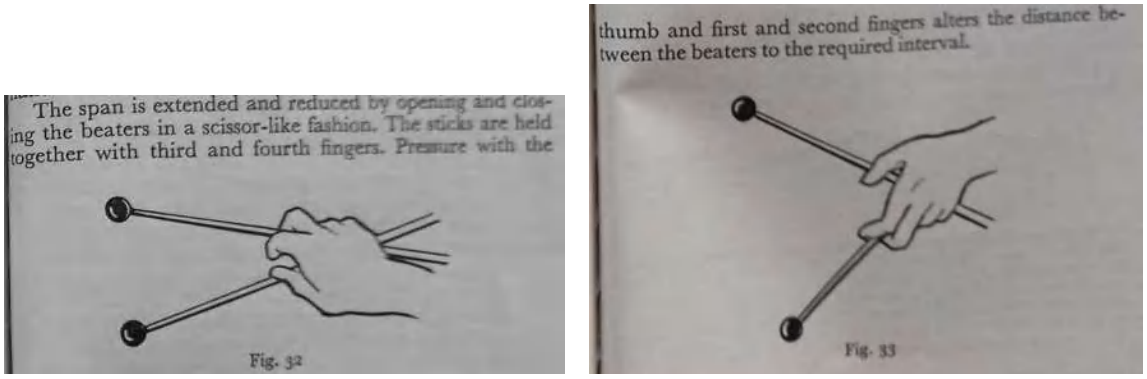


Figure 9. The only explanation of the traditional grip in James Blades's *Orchestral Percussion Technique*

1963 – Jacques Delécluse: *Méthode Compléte de Vibraphone* (France)[27]

Publication type: textbook.

Instrumental scope: vibraphone in classical music idiom.

Four-mallet technique: traditional grip.

This two-volume textbook was written as a comprehensive, complete course in vibraphone performance. The first volume includes the history of the instrument, a description of its

[27] Jacques Delécluse, *Méthode Compléte de Vibraphone* (Paris: Alphonse Leduc, 1963).

construction and range, as well as explanations of two-mallet technique, enriched with numerous exercises and notated etudes.

The second volume begins with more advanced two-mallet exercises and etudes focused on developing double-note playing, hand independence, and the ability to perform wide intervals requiring a broad hand span. Midway through the second volume, the author introduces an explanation of the four-mallet grip. He provides a detailed verbal description of how to hold two mallets in one hand using the traditional grip; however – similarly to James Blades – he omits an important detail regarding the order in which the mallets cross. The accompanying drawings also fail to clarify this point, as the crossing area is obscured by the fingers holding the mallets (fig. 10).

The author then discusses methods of playing chords using the edges of the bars on both the diatonic and chromatic keyboards and presents an extensive set of four-mallet exercises. A particularly interesting addition – unseen in the previously discussed publications – is a chart of chords accompanied by diagrams showing the mallet positions required for proper execution (fig. 11). The textbook concludes with etudes designed to refine four-mallet technique..

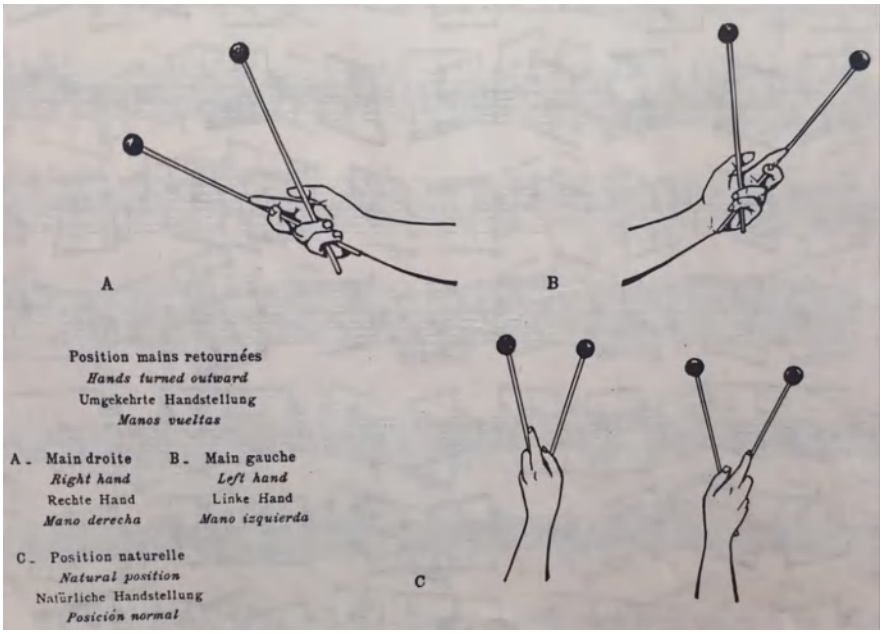


Figure 10. Drawings illustrating the four-mallet technique in Jacques Delécluse's *Méthode Complète de Vibraphone*

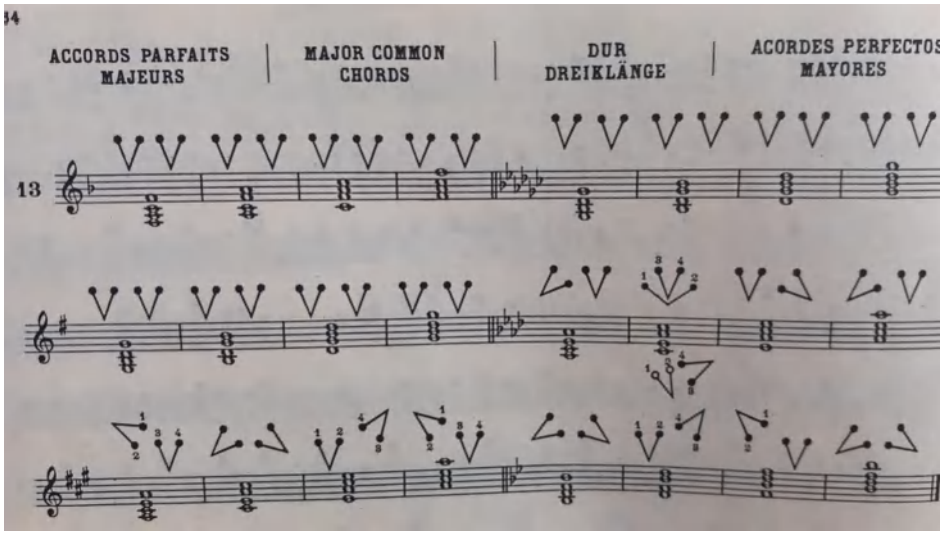


Figure 11. List of chords with explanations of mallet positions during performance – Jacques Delécluse's *Méthode Complète de Vibraphone*

1963 – Vida Chenoweth: "4-Mallet Technique" (USA)[28]

Publication type: article in *Percussionist*.

Instrumental scope: not specified.

Four-mallet technique: traditional grip and Musser grip (comparison in favor of the Musser grip).

The first scholarly article I found devoted to four-mallet techniques was written by the renowned marimba soloist and pedagogue Vida Chenoweth, who also taught Leigh Howard Stevens. The article's purpose is to provide a precise explanation of the mechanics of the traditional and Musser grips and to compare them. Chenoweth briefly describes how to hold the mallets in both techniques and illustrates them with two rather poorly executed drawings (fig. 12). However, the main goal of the article is not to present the basic principles of four-mallet grips and techniques, but rather to analyze their advantages and disadvantages, with a clear emphasis on encouraging readers to study the Musser grip. The author points out certain "problems" associated with the traditional grip – issues that L. H. Stevens later explores in greater detail in *Method of Movement*.

[28] Vida Chenoweth, "4-Mallet Technique", *Percussionist* 1.3 (1963).

The article also mentions the possibility of performing a different, and in Chenoweth's opinion superior, type of four-mallet tremolo using the Musser grip, which she claims cannot be executed with the traditional grip. Today, however, it is known that the so-called Musser Tremolo (Musser Roll or Ripple Roll) can in fact also be performed using the traditional grip (vid. 1).

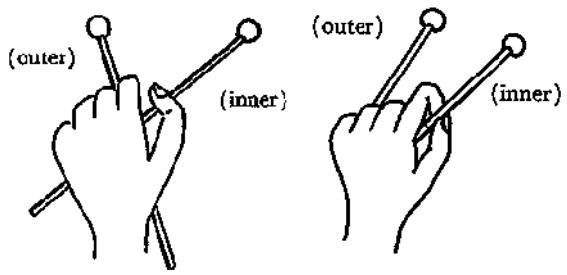


Figure 12. Illustrations from Vida Chenoweth's article "4-Mallet Technique"

Video 1. The Musser Roll performed using both the Stevens and the classical techniques

1964 – Harry R. Bartlett: *Guide to Teaching Percussion*, ed. 1 (USA)[29]

Publication type: textbook for percussion teachers.

Instrumental scope: all percussion instruments.

Four-mallet technique: precursor of the Burton grip.

So far, this is the most extensive publication I have found. The author undertook the challenge of creating a comprehensive compendium on percussion instruments, drawing on both personal experience and previously published, fragmentary informational materials (such as the titles discussed above).

[29] Harry R. Bartlett, *Guide To Teaching Percussion*, ed. 1 (Dubuque, IA: WM. C. Brown Company Publishers, 1964).

The textbook was written as a didactic aid for percussion instructors at higher education institutions. It contains ten chapters covering the following topics: fundamental aspects of percussion performance; the author's teaching philosophy; a list of fifty-six percussion instruments along with their acoustic characteristics, playing techniques, and applications in music; as well as methodology for playing the snare drum, bass drum, cymbals, mallet instruments, timpani, and small percussion instruments. Additional chapters are devoted to percussion in the context of dance and marching music.

A short subsection devoted to four-mallet technique includes a few sentences describing how to hold the mallets, accompanied by several photographs (fig. 13). Interestingly, from this description we learn that the outer mallets are placed above the inner ones—meaning that Harry R. Bartlett, in his textbook, taught the four-mallet grip that would later become known as the "Burton grip."

> The handholds for playing with three and four mallets are illustrated in figures 100 to 103. Notice that the handles of the highest and lowest mallets go over the other two handles as they are held by the thumb and fingers of each hand.[30]

Thus, in Guide to Teaching Percussion we find a description of the four-mallet grip that is today known as the "Burton grip," named after its supposed inventor. However, the first edition of Mallet Studies by Gary Burton – in which he describes his method of holding four mallets – was published four years after Bartlett's book. This suggests that the author of Guide to Teaching Percussion may have developed this grip around the same time as Gary Burton (or even earlier) and was the first to describe it in the literature.

It is also possible that Harry Bartlett learned the grip from his younger colleague, Gary Burton, and decided to include it in his book without mentioning its creator by name. The most likely explanation, however, is that both men invented the "Burton grip" independently, as determining its exact date of origin and authorship is problematic. Michael Udow mentions this in his book Percussion Pedagogy: A Practical Guide for Studio Teachers, where he describes a method of holding four mallets very similar to the

[30] ibidem, 86.

Burton grip. This technique was used in Europe long before Gary Burton's rise to international fame and was, by some, known as the "Classical European Grip."[31]

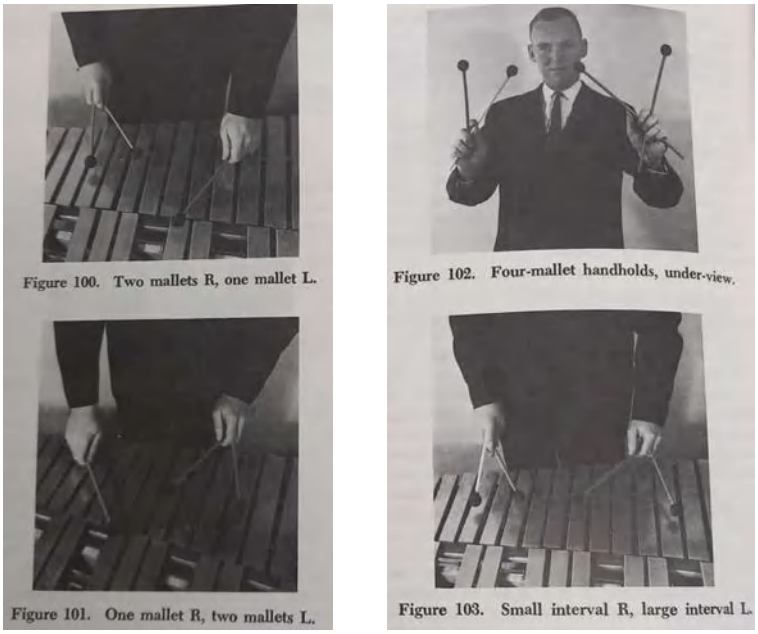


Figure 13. Photographs illustrating the four-mallet grip from Harry R. Bartlett's *Guide to Teaching Percussion*

1965 – James Moore: "Use Four Mallets" (USA)[32]

Publication type: article in *Percussive Notes*

Instrumental scope: marimba.

Four-mallet technique: Musser grip.

Most of the article's content is devoted to methods of arranging for the marimba for performers who use the four-mallet technique. However, at the very beginning, the author briefly mentions the available four-mallet grips and describes their basic characteristics.

The article also includes two photographs illustrating the Musser grip, reprinted from the previously discussed textbook *Marimba Method* by Howard A. Greene. The author does not favor the Musser grip over the traditional grip; however – similarly to Vida Chenoweth – he suggests that the two mallet-holding methods differ in the way they

[31] Michael Udow, *Percussion Pedagogy: A Practical Guide for Studio Teachers* (New York, NY: Oxford University Press, 2019, 176.
[32] James Moore, "Use Four Mallets", *Percusssive Notes* 4.2 (1965).

produce chordal tremolo. While dependent grips allow for tremolo only in the form of two-note alternation between the right and left hands, the Musser grip makes it possible to use the Musser Roll.[33] As I already mentioned in my discussion of Vida Chenoweth's article, both types of tremolo can be executed using either the Musser/Stevens grip or the traditional grip (vid. 1).

1966 – Friedrich Hartung: *Schule für Vibraphon, Xylophon, Glockenspiel, Marimbaphon* (Germany)[34]

Publication type: textbook.

Instrumental scope: vibraphone, xylophone, marimba, glockenspiel.

Four-mallet technique: traditional grip.

A short publication in German and English. Although the title suggests it is intended for all mallet instruments, the author focuses mainly on the vibraphone and uses its pitch range as a reference for all exercises included in the book.

The first part of the book consists of exercises based on scales and modes, while the second part focuses on chordal exercises. Before the beginning of the second part, the author includes photographs—the first two showing the correct traditional four-mallet grip, and the following ones illustrating the hand positions used when playing specific chords on the vibraphone (fig. 14). However, no verbal explanation is provided regarding the method of holding the four mallets.

[33] ibidem, 5.
[34] Friedrich Hartung, *Schule für Vibraphon, Xylophon, Glockenspiel, Marimbaphon*, B. Schott's Söhne, Mainz 1966.

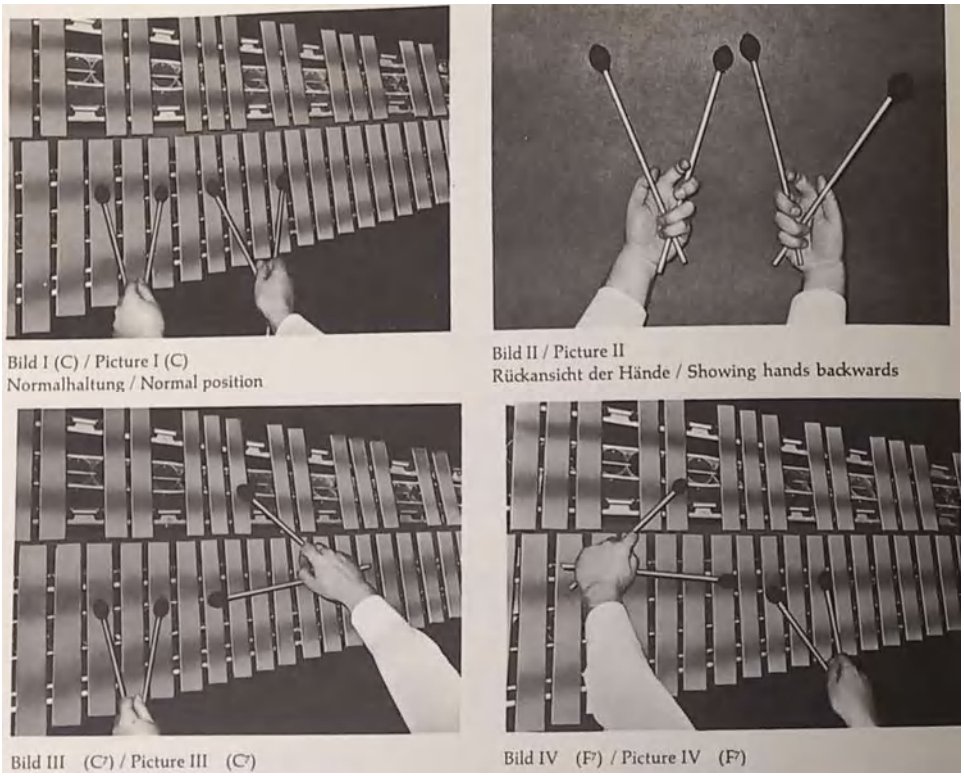


Figure 14. Photographs from the textbook *Schule für Vibraphon, Xylophon, Glockenspiel, Marimbaphon* by Friedrich Hartung.

1966 – Howard M. Peterson: *The Mallet Instrumental Fundamental Series*, vol. 2 (USA)[35]

Publication type: textbook.

Instrumental scope: all keyboard percussion instruments.

Four-mallet technique: traditional grip.

Howard M. Peterson's textbook was published in three volumes—the first dedicated to two-mallet technique, the second to three-mallet technique, and the third to four-mallet technique. In this way, the author progressively presented comprehensive knowledge of playing mallet instruments. In the second volume – the only one I was able to access – the author focuses exclusively on chordal exercises. He does not verbally explain how to hold two mallets in one hand, limiting himself instead to a few overhead photographs (fig. 15).

[35] Howard M. Peterson, *The Mallet Instrumental Fundamental Series – Book Two* (New York, NY: Henry Adler, 1966).

The author divides types of interval grips into “closed position” and “spread position.” The open positions, however, generally do not exceed the interval of a fifth. Most of the included photographs show the correct hand placement for performing specific chords. The chord exercises are divided into sections corresponding to particular hand configurations, each section being preceded by an illustration depicting the given setup (fig. 16).

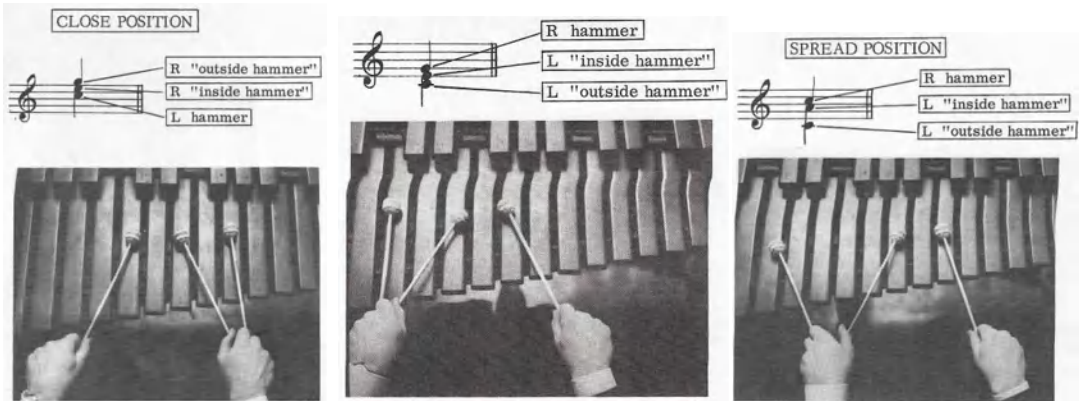


Figure 15. Photographs illustrating the three-mallet grip from Volume II of *The Mallet Instrumental Fundamental Series* by Howard M. Peterson

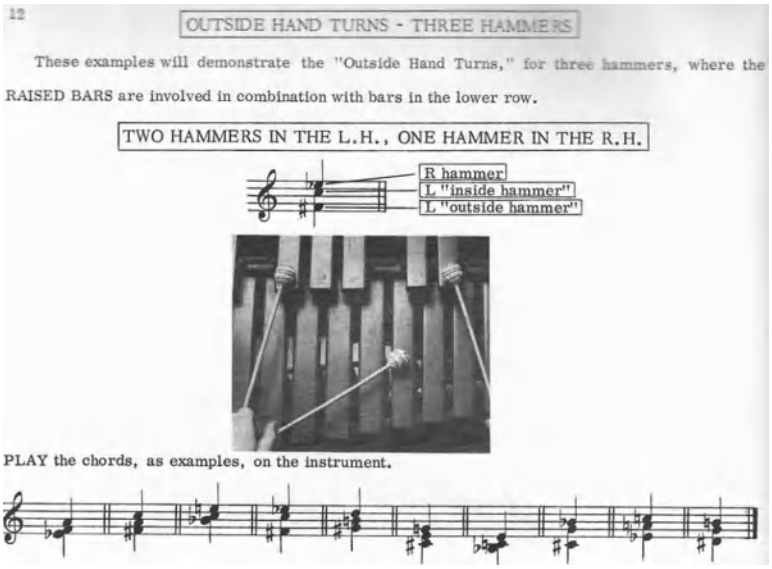


Figure 16. Photograph of hand positioning along with the corresponding chord exercises from *The Mallet Instrumental Fundamental Series* by Howard M. Peterson

1968 – Gary Burton: *Four Mallet Studies* (USA)[36]

Publication type: textbook.

Instrumental scope: vibraphone.

Four-mallet technique: Burton grip.

Among the publications I have found, *Four Mallet Studies* is so far the most detailed textbook describing the four-mallet technique. This may be one of the reasons for the worldwide popularity of the Burton grip – particularly among jazz vibraphonists, but also among marimbists and classical percussionists.

In earlier sources, even the more detailed ones, authors focused mainly on explaining the manner of holding four mallets and the correct hand positions for playing block chords. This pedagogical approach was consistent with the most common application of four-mallet playing on mallet instruments in the first half of the twentieth century, which in many cases was limited to performing chords that accompanied another instrument or ensemble.

Four Mallet Studies, however, is a textbook aimed at performers seeking to expand the possibilities of four-mallet playing on the vibraphone in a way that reflects contemporary performance practices of the twenty-first century. In it, Gary Burton attempts to develop the skills of the average percussionist playing mallet instruments by introducing the concept of independence between the two mallets held in one hand, as well as the execution of melodic lines combined with block chords and polyphonic textures.

It is also the first source I have found that introduces the concept of "efficiency of movement," which later became a starting point for Stevens's *Method of Movement*. In his textbook, Burton suggests opening the right-hand grip so that the mallets form a ninety-degree angle. This allows the outer mallet of the right hand – which, in the idiom of four-mallet jazz improvisation, often carries the moving melodic lines – to remain independent from the inner mallet, which in this case stays stationary.

[36] Gary Burton, *Four Mallet Studies* (Glenview, IL: Creative Music, 1968).

> The right hand grip, however, differs somewhat from the usual. Again, the outside mallet is crossed over the inner mallet. In the right hand, you will notice that if the mallets are opened to a 90° angle, that the outer mallet can move up and down in the same attacking motion used in all playing (no sideways motion), and that the outer mallet will sort of roll back and forth over the inner mallet which will remain almost motionless. This movement allows the hand to retain the up-and-down striking motion whether playing with two or four mallets, bringing about a smoothness in the attacking. And, it allows the player to execute single note lines without having to also move the idle mallet. Obviously, the dexterity is greatly increased in this situation.[37]

The possibility of immobilizing the inner mallet—and thus increasing the agility of the outer mallet—is an argument repeatedly emphasized by L.H. Stevens. He suggests that the Burton grip represents an "improvement" upon the traditional grip.

In addition to the description of the grip, the textbook also provides explanations concerning the performance possibilities of the vibraphone within the jazz idiom, along with a set of exercises designed to develop these skills in beginning performers. Interestingly, the author of the grip and the technique described in the textbook does not claim full authorship of it, but rather refers to it as "not too widely used" up to that point."[38] This suggests that the grip described in Burton's textbook had already been used earlier (as confirmed, for instance, by Harry Bartlett's textbook), though not widely. Burton expanded its pedagogical foundation by enriching it with additional performance possibilities and methods of execution, which can indeed be considered his original contribution. The term "Burton grip" has since become the official nomenclature for the technique described in *Four Mallet Studies.*[39]

[37] ibidem, 4–5.
[38] Ibidem, 4.
[39] Gerhard Kubik, James Blades, James Holland, „Marimba", *Grove Music Online*, 2001, [https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000040082, access: 09.30.2024].

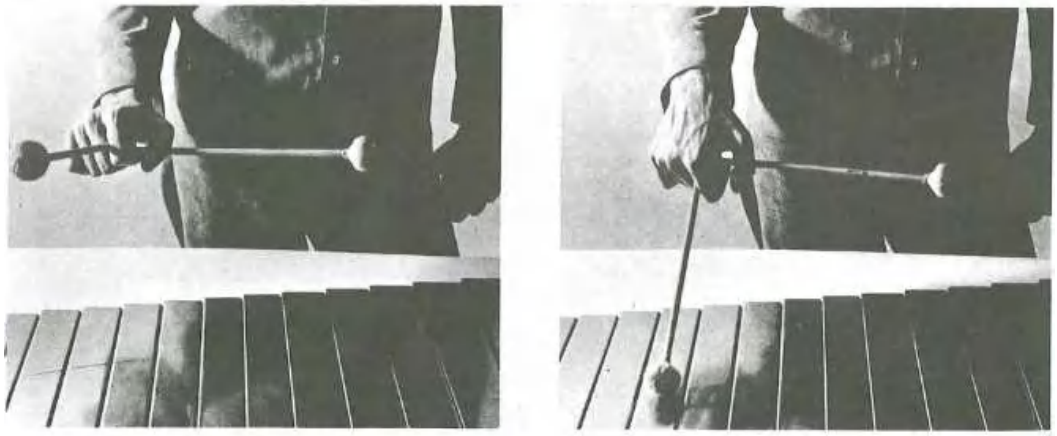


Figure 17. Photographs illustrating the Burton grip from Gary Burton's textbook *Four Mallet Studies*

1971 – Lynn Glassock: *A Study of Four-Mallet Grips in Playing Keyboard Percussion Instruments* (USA)[40]

Publication type: master degree thesis (University of North Texas).

Instrumental scope: keyboard percussion instruments.

Four-mallet technique: traditional grip, Burton grip, Musser grip (comparison).

The main topic of the study is the evaluation of the efficiency of the three most popular four-mallet grips in 1971. The author examined the speed of interval changes performed with each grip by professional percussionists and by individuals with no prior percussion experience. Four tests were conducted: Test 1 measured the speed of interval change using the outer mallet among beginners; Test 2 measured it using the inner mallet; Test 3 involved both mallets simultaneously; and Test 4 repeated Test 1 with professional musicians who used a four-mallet grip. The results confirmed Vida Chenoweth's thesis that the traditional grip is the easiest for beginners to master.[41]

Lynn Glassock's master's thesis is included on my list of materials because the author provided detailed descriptions of all three grips examined in her study. In her explanations, she drew upon knowledge gathered from the available instructional materials for four-mallet playing, which I discussed earlier. The Musser grip was described based on

[40] Lynn Glassock, *A Study of Four-Mallet Grips in Playing Keyboard Percussion Instruments* [master's thesis], North Texas State University, Denton, TX 1971, [https://digital.library.unt.edu/ark:/67531/metadc663379/m1/46/, access: 07.23.2024].
[41] Vida Chenoweth, *Four-Mallet Technique*…, op. cit., 5.

the articles by James Moore and Vida Chenoweth, as well as Lionel Hampton's textbook. For the description of the Burton grip – referred to in the thesis as *Cross Stick Grip No. 1* – the author relied on Gary Burton's *Four Mallet Studies*. The description of the traditional grip (*Cross Stick Grip No. 2*) was based on a compilation of information from the textbooks of Howard M. Peterson, Phil Kraus, and Jacques Delécluse. By compiling these sources, Glassock created a detailed account of the ways of holding the mallets and executing interval changes for all three grips, supplementing her explanations with precise drawings (fig. 18).

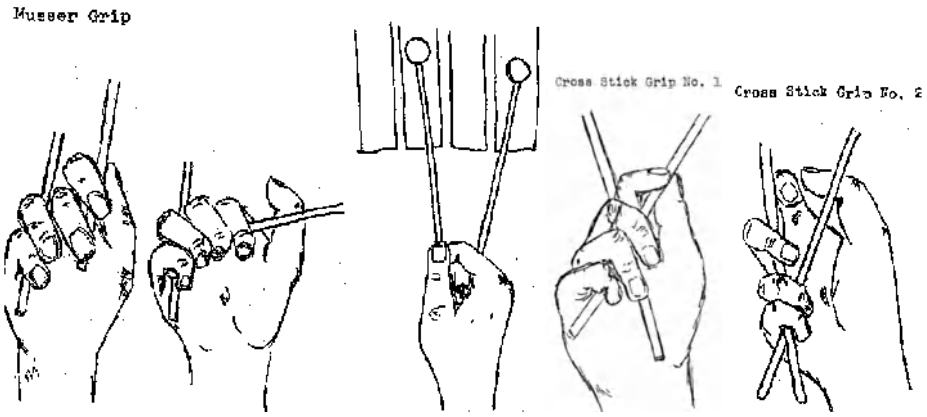


Figure 18. Drawings of the three types of mallet grips from Lynn Glassock's master's thesis

1972 – Fred Wickstrom: *Keyboard Mastery for the Mallet Percussionist*, vol. 2 (USA)[42]

Publication type: textbook.

Instrumental scope: vibraphone, marimba, xylophone, glockenspiel.

Four-mallet technique: traditional grip, Musser grip, Burton grip.

The textbook was published in two volumes, and – as the author emphasizes in the introduction – the second volume serves as instructional material for teaching harmony to percussionists. All of the exercises included in it focus on aspects of functional harmony and are designed for the four-mallet technique. The contents of the textbook cover topics such as chord construction, inversions, closed and open positions, and various types of major, minor, and dominant chords. The material resembles *Modern Mallet Method* by

[42] Fred Wickstrom, *Keyboard Mastery for the Mallet Percussion* (Coral Gables, FL: University of Miami Music, 1971).

Phil Kraus (1960) and *Elementary Instructor for Vibraphone* by Harry Thompson (1931), though it is less detailed than its predecessors.

In the introduction, the author discusses all three commonly used four-mallet grips. The brief descriptions of the grips are accompanied by illustrations showing a hand holding the mallets, similar to the drawings found in Lynn Glassock's publication (fig. 19). These drawings are fairly clear and may serve as a valuable resource for learning the four-mallet grip. However, the verbal descriptions of the grips are less detailed than those in the works of Burton or Glassock. The Burton grip is discussed most thoroughly and is favored by the author. As in *Four Mallet Studies*, he addresses the issue of movement efficiency related to the technical improvements introduced by Burton to the four-mallet technique.

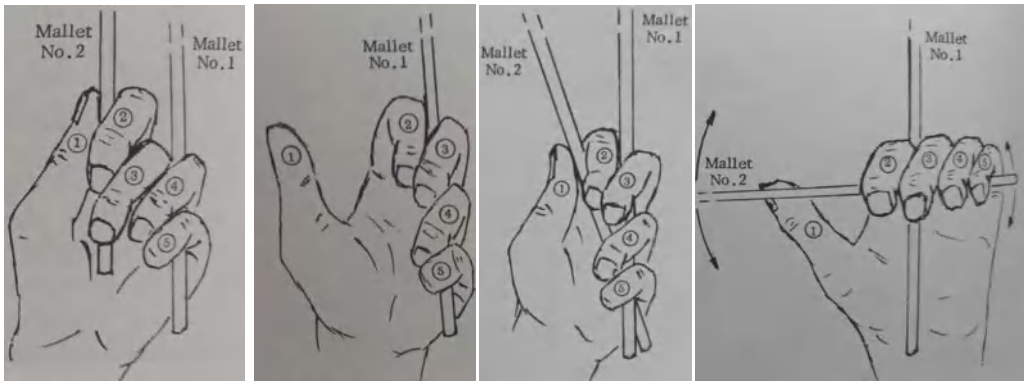


Figure 19. Illustrations of four-mallet grips from Fred Wickstrom's textbook *Keyboard Mastery for the Mallet Percussion*

1972 – Kenneth A. Mueller: *Teaching Total Percussion* (USA)[43]

Publication type: textbook for teachers.

Instrumental scope: all percussion instruments.

Four-mallet technique: Burton grip, Musser grip.

A comprehensive publication aimed at high school teachers covers a wide range of topics, including issues of percussion pedagogy, effective management of percussion classes, coordination of practical instruction with school orchestra requirements, and teaching timpani, mallet instruments, snare drum, small percussion instruments, and drum set.

[43] Kenneth A. Mueller, *Teaching Total Percussion* (West Nyack, NY : Parker Publishing Company Inc., 1972).

It also discusses developing musical sensitivity through percussion playing, as well as organizing and directing orchestral and marching percussion sections. The chapter devoted to mallet instruments includes subsections on their construction and on two- and four-mallet playing techniques.

The section on four-mallet techniques presents the principles of proper grip with Burton and Musser grips, which the author describes as "commonly used" methods. This indicates that only a few years after the first publications on the Burton grip appeared, it had gained enough popularity for the author to omit the traditional grip from his extensive book. The description of four-mallet playing techniques, as in many previously discussed publications, focuses on proper mallet holding and interval changes, supplemented with several illustrations. The author, like his predecessors, also includes a statement suggesting that the only way to play four-mallet technique using the Burton grip is by striking two notes simultaneously – thereby excluding the possibility of performing a Musser Roll.

> When striking the bars with this method, both sticks should strike simultaneously.[44]

In the case of the Musser grip, the author acknowledges that the mallets may strike either simultaneously or one after the other.

> When using this method the sticks may strike either simultaneously or in a staggered fashion depending on the effect desired.[45]

From the above descriptions, it follows that, compared to the methodology and technical possibilities of four-mallet vibraphone playing described four years earlier in Gary Burton's textbook, *Teaching Total Percussion* contains significantly outdated information.

[44] ibidem, 53.
[45] ibidem, 55.

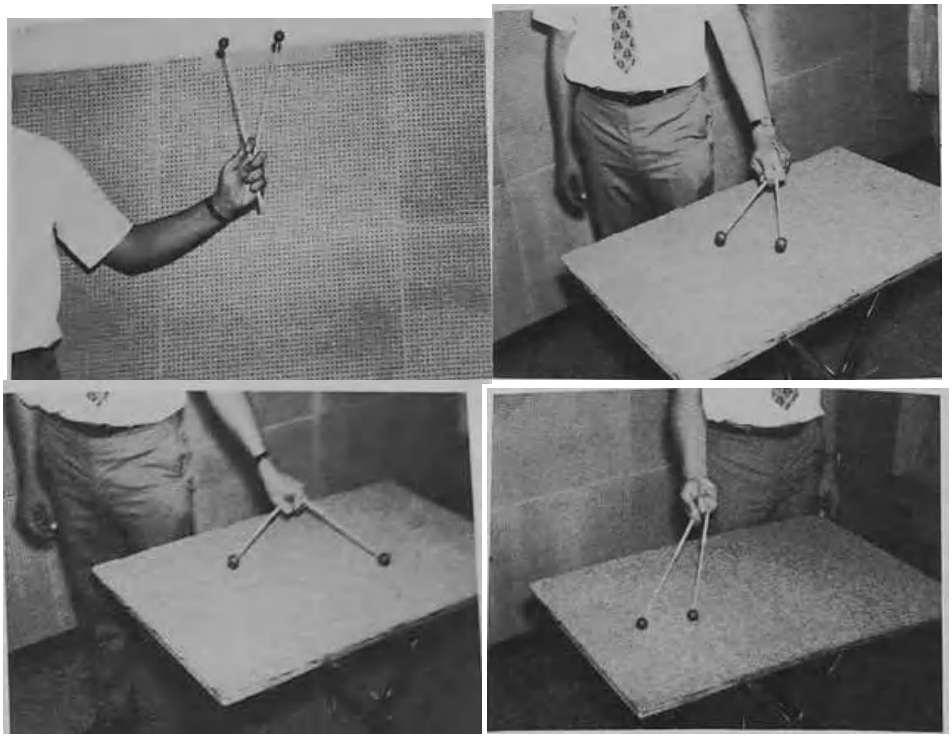


Figure 20. Demonstration photographs from *Teaching Total Percussion* by Kenneth A. Mueller

1973 – Lynn Glassock: "Four-Mallet Grips" (USA)[46]

Publication type: article in *Percussionist*.

Instrumental scope: not specified.

Four-mallet technique: traditional grip, Burton grip, Musser grip.

The article is a publication of the section explaining four-mallet playing techniques from the master's thesis "A Study of Four-Mallet Grips in Playing Keyboard Percussion Instruments," which I described above.

[46] Lynn Glassock, "Four-Mallet Grips" *Percussionist* 11.1 (1973): 2–11.

1975 – Karen Ervin: *Developing Keyboard Mallet Technique* (USA)[47]

Publication type: article in *The Instrumentalist*.

Instrumental scope: not specified.

Four-mallet technique: traditional grip, traditional grip „version B", Burton grip, Musser grip.

A short article discussing key aspects of two- and four-mallet technique. However, the vast majority of the text is devoted to four-mallet technique – the two-mallet technique is addressed only briefly at the beginning of the article, along with references to available instructional materials. The description of four-mallet techniques includes more detailed explanations and several specific exercises in musical notation, supplemented with references to existing pedagogical resources.

The author limits the explanation of four-mallet technique to a single paragraph, in which she describes the traditional grip. She then devotes more space to presenting four types of musical material most commonly found in four-mallet literature – a topic that had rarely been discussed previously but was later explored in detail by L.H. Stevens in *Method of Movement*. The actual description of four-mallet technique, however, is rather modest and restricted to the traditional grip, while the other techniques are only mentioned. The text includes two illustrations (Fig. 21).

An interesting detail not previously encountered in the reviewed literature is the author's distinction between two versions of the traditional grip (referred to here as the cross grip). In the first version (Cross Grip A), the arrangement of the mallets corresponds to the commonly accepted traditional grip, in which the inside mallet lies above the outside mallet. In version B, the mallets are crossed the other way, similarly to the Burton grip. Interestingly, however, the author treats this way of holding the mallets as distinct from the Burton grip, considering the Burton grip to be a variation of version B of the cross grip. Such a distinction between the version B cross grip and the Burton grip is reminiscent of

[47] Karen Ervin, "Developing Keyboard Mallet Technique" *The Instrumentalist* 1975, in: *Percussion Anthology – A Compendium of Percussion Articles* from *The Instrumentalist*, ed. 3 (Evanston, IL: The Instrumentalist Company, 1984).

the differentiation between the "Musser grip" and the "Stevens technique" – a topic I will discuss in greater detail in the following chapter.

> Cross Grip B is the same grip as Cross Grip A, but the outer mallet-handles are crossed over the inner. Burton Grip is a variation of Cross Grip B. For a complete explanation see Gary Burton's *Four Mallet Studies* (Creative Music), pp. 3–5.[48]

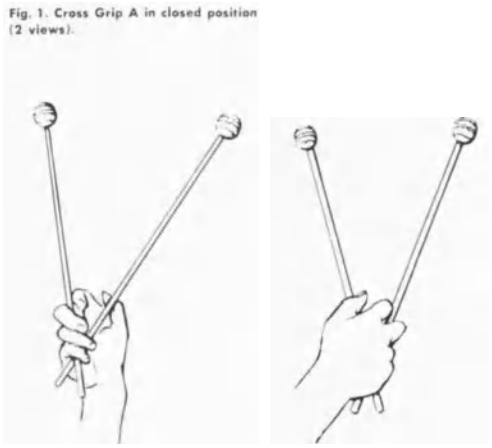


Figure 21. Illustrations of the traditional grip, version A, from Karen Ervin's article *Developing Keyboard Mallet Technique*

1978 – James Holland: *Yehudi Menuhin Music Guides: Percussion* (UK)[49]

Publication type: textbook.

Instrumental scope: all percussion instruments.

Four-mallet technique: traditional grip.

The textbook describes the full range of percussion instruments from the perspective of a classical orchestral musician. In the introduction, the author emphasizes the high standard of percussion pedagogy in the United States and notes that his publication aims to fill this gap in the United Kingdom. Compared to American textbooks such as Mueller's *Teaching Total Percussion* or Bartlett's *Guide to Teaching Percussion*, however, it covers significantly fewer topics. The content is divided into three chapters: the first deals with timpani playing, the second with other percussion instruments used in the orchestra, and the third focuses on the role of the percussion section in the symphony orchestra and

[48] ibidem, 464.
[49] James Holland, *Yehudi Menuhin Music Guides: Percussion* (London: McDoland and Jane's, 1978).

chamber ensembles. The four-mallet technique is described in only three sentences, accompanied by a single illustration showing the traditional grip (Fig. 22) and examples of orchestral excerpts from works by Hackford, Milhaud, and Boulez.

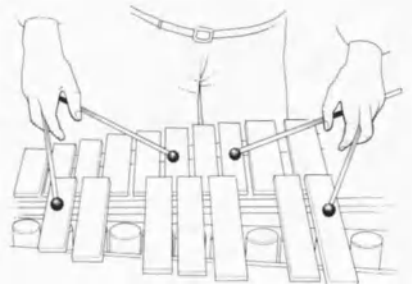


Figure 22. Illustration showing the traditional grip from
Yehudi Menuhin Music Guides: Percussion by James Holland

1.3 Conclusions

From the publications discussed in this chapter, it becomes clear that many of the topics addressed by Leigh Howard Stevens in *Method of Movement* were, in 1979, entirely new to the pedagogy of four-mallet playing. The textbooks published before the first edition of *Method of Movement* are often imprecise and insufficient, and none of them can compare to the accuracy and thoroughness of Stevens's pedagogical approach. In general, early sources from the 1920s and 1930s describe four-mallet technique with a level of detail similar to that found in sources from the 1940s, 1950s, and even 1960s. Although these textbooks often contain extensive sections of notated exercises, the descriptive explanations of technical issues remain inadequate.

A turning point appears to be Gary Burton's 1968 textbook *Four Mallet Studies*, which provides a much more detailed description of the four-mallet grip and, for the first time, introduces into the pedagogy of this technique the concept of movement efficiency – previously discussed only in the context of two-mallet playing.[50] Burton also develops more complex aspects of polyphonic playing on the vibraphone, which, compared to earlier sources, represent a significant step forward.

[50] George Hamilton Green, *Instruction Course for Xylophone*, (Lauderdale, FL: Meredith Music Publications, 1984), 3.

Although some authors aspired to create a self-sufficient textbook capable of teaching four-mallet technique to a student without access to a percussion instructor, in my view, none of the publications adequately fulfills this role. The analysis of these works leads to the following conclusions about the deficiencies in the pedagogy of four-mallet techniques prior to the publication of *Method of Movement*:

1. The vast majority of sources focus on two-mallet technique, treating four-mallet technique as a marginal topic.
2. The descriptions of four-mallet grips are imprecise and insufficient. In many cases, the authors likely assumed that these explanations would be supplemented by oral instruction from a percussion teacher.
3. Most four-mallet exercises focus solely on performing block chords and lack exercises designed to develop independence between the mallets held in one hand.
4. There is a lack of discussion regarding body movement at the instrument.
5. There is a lack of material addressing the performance of wide intervals with one hand; most examples remain within the range of a fifth.
6. Some publications contain incorrect or misleading information.

An exception can be found in Gary Burton's *Four Mallet Studies*, which provides a comprehensive description of the Burton grip and covers a broader range of topics. However, the book does not address body movement at the instrument or the issue of proper sound production. It is written primarily with jazz vibraphone playing in mind, and the included notated exercises are not exhaustive. It also lacks the detailed methodology and graded progression of difficulty proposed by Stevens. While Burton's textbook is more comprehensive than the other sources discussed here – since its description of the Burton grip is nearly as detailed as Stevens's description of his own grip in *Method of Movement* – other aspects of instrumental pedagogy are treated only superficially, making the overall discussion of four-mallet technique far less thorough than in Stevens's work.

Very precise descriptions of four-mallet grips can also be found in Lynn Glassock's work. However, her publication is an academic study that contains no practical exercises and was never intended to serve as instructional material.

An analysis of pedagogical materials published before 1979 clearly confirms that Leigh Howard Stevens's claim regarding the shortcomings of four-mallet pedagogy is well founded. In this context, *Method of Movement* indeed fills those gaps and remains absolutely unrivaled in terms of descriptive precision, methodological rigor, and the breadth of topics covered.

Chapter 2

Leigh Howard Stevens and His *Method of Movement* – Adaptive Possibilities and Comparison with the Classical Technique

2.1 Table of Contents and Outline of the Book Analysis

The *Method of Movement* manual consists of three parts: a theoretical section, a practical section, and an appendix titled *Ten Years Later*, which, since the second edition in 1990, has become an integral part of the publication. The first section covers topics related to the Stevens grip, methods of movement around the instrument, sound production techniques, and the categorization and description of the four types of strokes that form the foundation of marimba performance technique. The second section is a collection of 590 exercises divided into four categories corresponding to the aforementioned stroke types. Additionally, it includes a fifth chapter containing exercises that combine all four categories. The third section supplements certain topics from the theoretical part that the author considered in need of further clarification.

The content of the first part of the manual is divided into the following chapters:

I. *How To Use Method of Movement* – a chapter describing the basic concepts of the manual and the ways to implement the exercises from the practical section.
II. *Numeration* – a chapter explaining the system of numbering the mallets from 1 to 4, counting from the outer mallet in the left hand to the outer mallet in the right hand (the same method used in this dissertation), along with an explanation of terminology referring to parts of the hand.
III. *Sticking Permutations* – a chapter explaining how the author determined the permutations of stroke combinations for each mallet in the practical exercises.
IV. *General Principles of Marimba Technique* – an explanation of the division of labor between larger and smaller muscle groups involved in body movement during marimba performance.

V. *Four Mallet Grip* – a description of the four most popular four-mallet grips, their advantages and disadvantages, and an explanation of the superiority of the Stevens grip and technique over other playing methods.

VI. *Holding the Mallets* – an explanation of how to hold the mallets using the Modified Musser Grip (later referred to as the "Stevens Grip").

VII. *Interval Changes* – an explanation of how to control mallet span and thereby interval changes when using the Stevens grip.

VIII. *Stroke Height* – a brief chapter explaining the correct mallet height above the instrument at the start of a stroke.

IX. *Stroke Efficiency and Accuracy* – a chapter describing the correct and incorrect types of strokes used to produce sound from the instrument.

X. *Shift and Interval Change Efficiency* – an explanation of how to move efficiently across the marimba.

XI. *Tone, Lift, Legato, Staccato* – a discussion of issues related to articulation and sound production on the marimba, in relation to pre-existing views and methods.

XII. *The Fundamental Strokes of Four-Mallet Marimba Technique* – an introduction to the concept of the four fundamental stroke types performed with four mallets in all possible note arrangements on the marimba.

XIII. *Single Independent Strokes* – an explanation of the first type of stroke, used for performing single notes with one of four mallets.

XIV. *Single Alternating Strokes* – an explanation of the second type of stroke, used for playing alternating notes between the mallets of one hand.

XV. *Double Vertical Strokes* – an explanation of the third type of stroke, used for performing double stops with two mallets in one hand.

XVI. *Double Lateral Strokes* – an explanation of the fourth type of stroke, used for playing two notes in quick succession with two mallets in one hand.

XVII. *Summary* – a summary of the theoretical section.

XVIII. *Leigh's Laws* – an additional chapter containing several general principles of good playing technique, presented in the form of aphorisms.

The second part contains 49 exercises in the Single Independent Strokes category, 112 in Single Alternating Strokes, 117 in Double Vertical Strokes, 136 in Double Lateral Strokes, and 176 in the Mixed Strokes category, which combines the previous ones. The exercises within these five categories are divided into subgroups, which the author separates with brief remarks regarding methods of execution and explanations of the types of technical challenges they contain.

The third part contains five chapters:

I. *Other Ways to Use MOM* – a chapter that complements *How to Use Method of Movement*. Here, the author expands on the topic of proper practice methods for the exercises in the manual and highlights the most common mistakes made by beginner marimbists learning his technique.
II. *Daily Exercise Routines* – in this chapter, the author offers a structured practice plan for working through the practical section of the manual.
III. *Table of Repertoire* – a table listing marimba compositions along with the specific exercises from the manual assigned to each piece.
IV. *Amplifications* – a chapter in which the author elaborates on certain topics he felt were omitted or insufficiently addressed in the first edition.
V. *A Retrospective* – historical and biographical notes concerning events in L.H. Stevens's career that influenced the content of the manual.

Continuing the second chapter of this paper, I will discuss in detail those chapters of the theoretical part of *Method of Movement* that concern sound production and movement around the marimba – that is, all the elements of Stevens's technique that may overlap with classical technique. In my analysis, I will focus on a thorough understanding of L.H. Stevens's methodology and on the concept of "efficiency of movement," which the author particularly emphasizes. This concept is based on playing the instrument using the minimal amount of motion necessary to achieve the intended result. Furthermore, I will address issues related to the aesthetics of artistic creation and the problem of visualizing marimba performance, which constitutes an important aspect of musical interpretation and stage presentation.

I will compare the above aspects of Method of Movement with methods taught in the traditional approach – that is, with everything that constitutes the broadly understood "classical technique." In this comparison, I will look for both similarities and contrasts between Stevens's technique and the classical technique. Particular attention will be given to elements that can be adapted from Stevens's technique to the classical approach and its traditional grip, which is rooted in Polish percussion pedagogy. The primary sources of information regarding the classical technique will be my own experience as well as the contents of the manuals *Four Mallet Marimba Playing* by Nancy Zeltsman and *Four Mallets Method – My Pianistic Approach* by Theodor Milkov.

In my comparative analysis, however, I will not address the differences between the Stevens grip and the traditional grip, as the distinctions between four-mallet grips have already been thoroughly discussed in the literature and are generally well known to percussionists interested in marimba performance. Therefore, Chapters VI and VII of the first part, which describe the Stevens grip, have been omitted, and readers interested in learning more about this grip are referred to the manual itself or to the educational materials listed in subsection 2.7. In the discussion of *Method of Movement*, Chapters I–IV will also be omitted (they serve only as a general introduction to the subject of the manual), as well as the entire third part, which mainly contains additional remarks and elaborations on the chapters from the first part that I have excluded. Chapter V, *The Four-Mallet Grip*, will be discussed as an introduction to the next chapter, which is devoted to the analysis of the efficiency of Stevens's technique in comparison with the classical technique.

2.2 Chapter VIII – *Stroke Height*

Stroke Height is a very short chapter containing only three paragraphs, describing one very simple relationship: playing quietly is easier when the stroke begins closer to the keyboard of the instrument, and playing loudly is easier when the stroke begins from a greater distance. If, in a fortissimo dynamic, the stroke begins too close to the instrument, the sound becomes stiff and forced. Conversely, in a piano dynamic, if the stroke begins too high, the resulting sound, according to the author, becomes "too vague." According to

Stevens, every dynamic level on the marimba has its own appropriate height at which the mallets should be positioned at the start of the stroke.[51]

However, the issue of selecting the appropriate stroke height depending on the dynamic level is not as straightforward as it might seem, because the question arises: what exactly is the proper distance between the mallets and the instrument, and to what extent can it be precisely defined? What a marimbist considers the correct distance may fall within a fairly wide margin of error. This depends, among other things, on the hardness of the mallets and the type of stroke used at a given moment. Often, the stroke height that a marimbist deems appropriate may fall within quite a large range – for example, between 3 and 6 inches above the marimba keyboard, as Stevens describes. In such cases, the author recommends choosing the smallest possible distance between the mallets and the keyboard at any given moment in performance, since being closer to the marimba bars makes it easier to strike the correct note accurately[52].

The concept of minimizing the distance between the mallet and the bar, like many other topics discussed in the *Method of Movement* manual, revolves around the idea of efficiency of motion at the instrument – an idea the author considers the key to good marimba technique.[53] These concepts continue the traditions of two-mallet xylophone playing methods that have been known since the early twentieth century, as described, for example, by George Hamilton Green – the author of fifty xylophone lessons written and circulated in the 1920s. These lessons were later collected and published by Meredith Music Publications in a volume titled *Instruction Course for Xylophone*, released in 1983. On one of the first pages of this collection, there is a chapter titled *Rules for Practice*, in which the author lists twelve principles that a student of the xylophone should follow while working through the lessons. Under numbers 2, 3, and 4, we find the following guidelines:

[51] L.H. Stevens, *Method of Movement…*, op. cit., s. 15.
[52] Ibidem, s. 15.
[53] Ibidem, s. 2, 16, 19, 20, 26, 31.

2. Keep your hands LOW…
3. Always strike with the WRIST. Do not attempt to strike with an arm movement. When raising a hammer to strike a note, use wrist action only. The forearm should not move.
4. Always keep the hammers LOW…[54]

By reducing the distance to the xylophone keyboard, Green was able to play faster and more efficiently. L.H. Stevens clearly drew inspiration from this concept, emphasizing the principle of movement efficiency as a key element necessary to achieve good marimba technique.

Is the issue of movement efficiency the only criterion a marimbist should follow while playing the instrument? According to Stevens, the answer to this question is rather affirmative. However, it seems worth considering (yet again in this type of study) whether movement on an instrument such as the marimba serves another function – one that goes beyond the mere process of sound production. Can movement during marimba performance also have other purposes that support artistic creation? Should movement, to some extent, be inspired by purely aesthetic values, such as its visual qualities?

The debate about the aesthetic value of movement in percussion performance has been ongoing for a very long time. Besides numerous dissertations and academic papers in the topic of percussion, the references to the influence of movement on sound production can also be found in historical textbooks dedicated to mallet instrument performance, such as *Mental and Manual Calisthenics for the Mallet Player* by Elden "Buster" Bailey. In his publication, Bailey discusses the differentiation of movement to achieve varied accents, as well as the concept of producing a "legato feeling" through appropriate mallet motion.

Many problems result from the physical characteristics of the mallet instruments themselves. Foremost of these problems is the fact that there is no way to produce a natural sustained tone (except of vibraphone or bells) other than the quasi sustained sound produced by trills or rolls. Consequently, we should acquire a technique which will enable us to project a legato feeling when desired even though it is impossible to have a legato sound in the true sense of the word.[55]

[54] G.H. Green, *Instruction Course for Xylophone*…, op. cit., 3.
[55] Elden „Buster" Bailey, *Mental and Manual Calisthenics for the Modern Mallet Player* (Van Nuys, CA: Alfred Music Publishing, 1963), V–VI.

An interesting example of a dissertation examining the impact of movement during a marimba strike on the perception of sound resonance is one writen by Adam B. Davis from the University of North Texas, titled *The Art of Marimba Articulation: A Guide for Composers, Conductors, and Performers on the Expressive Capabilities of Marimba*. In his work, Davis, drawing on several scientific articles, describes the results of studies on the physical properties of sounds produced by the marimba and analyzes how these findings relate to traditional assumptions about the execution of staccato and legato articulation, as discussed in many percussion performance manuals.[56]

One of the studies described in Davis's dissertation is the article *Hearing Gestures, Seeing Music: Vision Influences Perceived Tone Duration* by Michael Schutz and Scott Lipscomb. The article presents an experiment that used recordings of world-renowned marimba soloist Michael Burritt. In the experiment, Burritt played several single notes in different registers of the marimba, raising his mallets either high or low after striking each note. These recordings were then shown to a control group of Northwestern University students who had no background in percussion performance.

The participants in the experiment were presented with the recordings in two formats: as audio-only and as combined audio and video. After listening to each sound, they were asked to determine how long they believed the resonance of each note lasted. The purpose of the experiment was to examine whether raising the mallet high after striking a note affects the perceived duration of its resonance. Additionally, in some cases, the audio and visual tracks were swapped – audio tracks featuring notes played with a high mallet lift were paired with video tracks showing a low gesture, and vice versa.[57]

The study produced very interesting results. When the control group evaluated the recordings based solely on the audio tracks, they distinguished differences in sound duration only according to the marimba's register – notes in the lower register resonated

[56] Adam B. Davis, *The Art of Marimba Articulation: A Guide for Composers, Conductors, and Performers on the Expressive Capabilities of Marimba* [doctoral dissertation], University of North Texas, Denton, TX 2008, [https://digital.library.unt.edu/ark:/67531/metadc1248483/m2/1/high_res_d/DAVIS-DISSERTATION-2018.pdf, access: 05.25.2024], 70–76.
[57] Michael Schutz, Scott Lipscomb, "Hearing Gestures, Seeing Music: Vision Influences Perceived Tone Duration" *Perception* 36 (2007), 891.

longer, while those in the higher register had shorter resonance. However, no significant differences were found that could be linked to the height of the mallet lift after striking. The conclusion from the first, purely auditory part of the experiment is therefore clear: the height of the mallets after sound production has absolutely no effect on the perceived duration of the note's resonance.[58]

The second part of the experiment, which included a visual component in addition to the audio track, produced an intriguing result. After watching the audiovisual presentation, participants consistently perceived notes accompanied by a high gesture as lasting several seconds longer than those with a low gesture – even despite the earlier swapping of the audio and video tracks mentioned before. The conclusions from the entire experiment clearly indicate that visual elements have a significant influence on the auditory perception of the sound produced by a marimbist. Perhaps this is precisely why gestures and the visual aspect of marimba performance are so often used by soloists as a means of enhancing the overall artistic expression.[59]

Despite the results of acoustic research, opinions on the influence of movement and its aesthetic value in relation to the perception of sound remain highly divided. For example, Leigh Howard Stevens does not consider the visual qualities of movement in marimba performance to be noteworthy and, in *Method of Movement*, focuses exclusively on movement as a tool for sound production.[60] In contrast, a different approach to the aesthetics of movement is presented by the renowned marimbist and Boston Conservatory professor Nancy Zeltsman, who plays the marimba using classical technique and the traditional grip. Her contrasting perspective can be explored in her textbook *Four-Mallet Marimba Playing*, which, to the best of my knowledge, remains the most detailed instructional book dedicated to learning marimba performance using the classical technique.

[58] Ibidem, 892–893.
[59] Ibidem, 893.
[60] L.H. Stevens, *Method of Movement*, op. cit., 16-18.

> After the attack, I try, whenever possible, to hold the mallet head over the bar for the correct length of time. I imagine that, by stopping the mallet head a short distance above the bar, I am physically trapping the sound waves, and causing the resonance to be more pronounced for a longer period. Admittedly, the effect is mostly visual…[61]

Zeltsman proposes the idea that holding the mallets above the bar to indicate the length of a note makes sense from an acoustic standpoint, as the sound waves are supposedly "trapped" between the mallet and the marimba bar, reflecting off each other and thereby extending the note's resonance. However, this theory is not supported by any acoustic research, and Zeltsman herself admits that the effect is almost entirely visual. Based on existing acoustic studies, it can be assumed that Zeltsman's belief in the acoustic benefits of holding the mallets above the bars is more a matter of faith than fact – yet her opinion on the subject remains an unchanged part of the most recent edition of her textbook.

The extension of marimba resonance through a specific type of stroke is a topic that could be described as somewhat "esoteric." Many marimbists believe that they are indeed capable of extending the marimba's sound – in the manner of the high and low gestures described by Schutz and Lipscomb. It is likely that, through this belief and by virtue of a "placebo effect," they actually perceive the lengthening of the notes they play, much like the participants in Schutz and Lipscomb's experiment.

Some of these marimbists are aware that visual suggestion may play a key role here, while others are convinced that they have "magically" managed to prolong the acoustic resonance of the marimba bar. Nancy Zeltsman seems to be among those who believe that lengthening a note on the marimba is acoustically possible, although she does not state this directly and includes contradictory remarks on the subject. An example of this can be found in the column *Various Note Durations on page 59 of Four-Mallet Marimba Playing*, where she begins by asserting that "differentiating note lengths on the marimba is not a myth"; she then proceeds to discuss the aforementioned technique of holding the mallets

[61] Nancy Zeltsman, *Four-Mallet Marimba Playing: a Musical Approach for All Levels* (Milwaukee, WI: Hal Leonard Corp, 2003), 59.

above the bars, arguing that it makes sense acoustically, only to conclude by admitting that the effect is, in reality, primarily visual.[62]

Relating the issue of visualizing sound production to my own reflections and playing technique, I must admit that I do not reject the aesthetic values associated with the visual aspect of marimba performance. However, I strive to apply visualization in a balanced way, with the production of a high-quality, properly articulated sound always taking priority. When the opportunity arises to convey something beyond what the instrument alone can offer, I do not dismiss such possibilities, as I believe that visual elements in solo marimba performance can positively influence the audience's overall perception of the music. An appropriate visual interpretation of a piece can be so evocative that it helps listeners better understand its meaning. Nevertheless, I am opposed to overly theatrical playing, which at times turns performances into something closer to parody than a sincere and faithful musical interpretation.

2.3 Chapter IX – *Stroke Efficiency and Accuracy*

After a brief discussion of the principle concerning the proper height of the mallets above the marimba keyboard during stroke execution, Stevens moves on to a very detailed analysis of the so-called piston stroke. According to the author of Method of Movement, the piston stroke is the only correct type of stroke for producing sound on mallet instruments.[63]

To better explain what the piston stroke is, I will once again refer to the Rules for Practice section from George Hamilton Green's manual. As the third rule, Green writes::

> When striking a note, do not raise the hammers any higher than necessary. The lower you keep the hammers the better. Remember, it takes more time to raise the hammers six inches and bring them back, than it does to raise them only three inches.[64]

[62] Ibidem, 59.
[63] L.H. Stevens, *Method of Movement*…, op. cit., 16.
[64] G.H. Green, *Instruction Course for Xylophone*…, op. cit., 3.

The principle of the piston stroke originates from Green's concept as well as from the issue of the proper height of the mallets above the instrument's keyboard, previously discussed by Stevens. According to this principle, after striking a note, the mallets should not be raised higher than the minimum height necessary to play the next sound. In line with this idea, the mallet should not be held above the bar for the duration of the note's rhythmic value (as suggested by Zeltsman), because doing so takes away time needed to prepare for the next stroke. Likewise, the mallets should not be lifted higher than necessary for the sake of visualizing the note's length, since that would involve more movement than required. Stevens strongly discourages any additional motion either before or after the stroke, considering such movements unnecessary and inefficient.[65]

In the chapter Stroke Efficiency and Accuracy, the author illustrates this issue using diagrams (fig. 23).

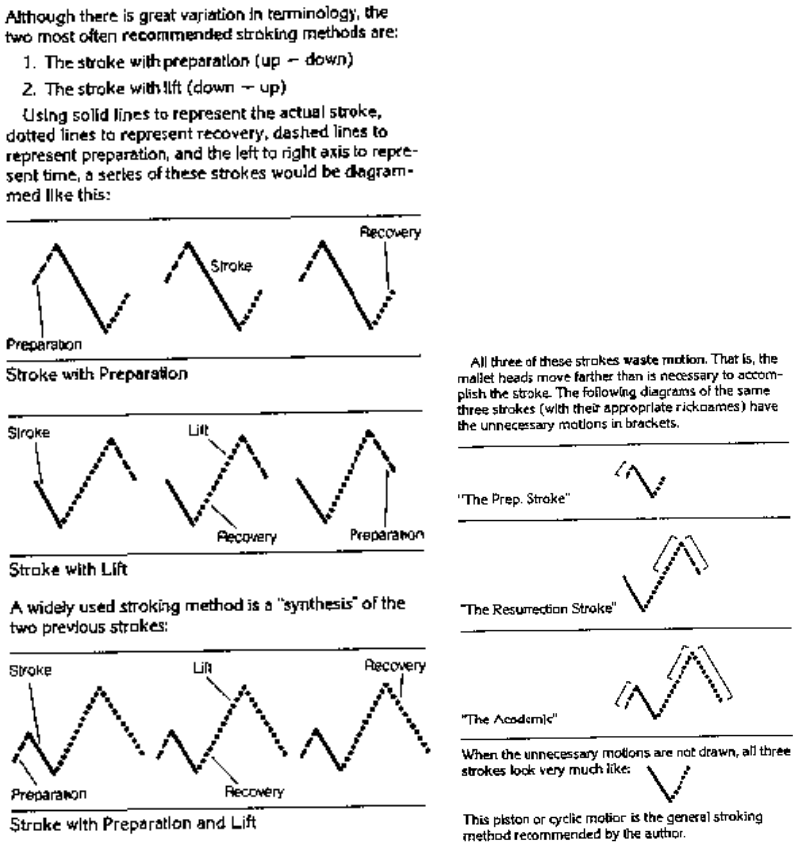


Figure 23. Types of strokes illustrated in the form of diagrams, in Chapter IX *Method of Movement*

[65] L.H. Stevens, op. cit., 16–18.

The diagrams present three examples of incorrectly executed marimba strokes, which Stevens respectively calls *The Prep Stroke*, *The Resurrection Stroke*, and *The Academic*. In his graphic notation, Stevens uses three types of lines to illustrate the different stages of the mallet's movement:

- A solid line indicates the moment when the mallet strikes the bar (*stroke*).
- A dotted line indicates the moment the mallet is lifted after the stroke (*recovery*).
- A dashed line represents the motion that prepares the mallet for the stroke (*preparation*).

In the diagrams I placed on the right side of Figure 23, Stevens additionally includes brackets that clearly indicate all unnecessary elements of motion. Only those parts that illustrate the correct execution of the piston stroke are retained, emphasizing the importance of minimizing movement to increase technical efficiency.

Any movements occurring after the stroke, as well as additional preparatory motions, are rejected by the author unless they result directly from the mallet's downward motion toward the keyboard (*stroke*) or from the preparation for the next note (*preparation*). As we learn later in the chapter, the motion following the stroke should simultaneously serve as the preparation for the next one – in other words, the recovery motion becomes at the same time the preparation motion. According to this principle, when performing successive strokes using the piston stroke technique, the marimbist should lift the mallet in the recovery motion no higher than the minimal height required to execute the next note (fig. 24).

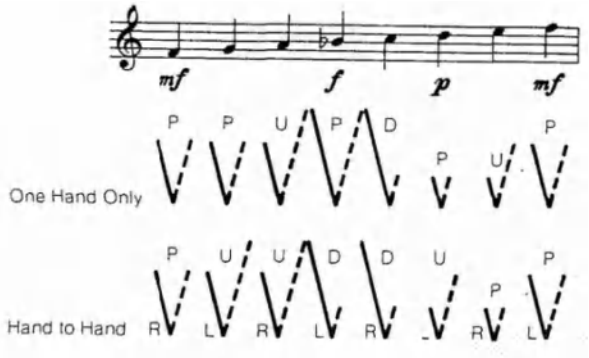


Figure 24. Diagrams illustrating successive Piston Stroke strikes in various dynamics

To summarize Chapter IX Method of Movement, we can identify three main advantages of executing strokes using the piston stroke technique:

1. efficiency and economy – the marimbist does not waste energy on unnecessary motion,
2. increased accuracy – the piston stroke eliminates superfluous movements that could confuse the performer and reduce precision,
3. The ability to produce the most cohesive legato melodic line – each motion involved in producing a sound on the marimba simultaneously serves as preparation for the next one, allowing for greater continuity between successive notes (more on legato articulation in subsection 2.5).[66]

The *piston stroke* is a very natural and logical method of executing strokes on the marimba and can be applied regardless of the preferred playing technique—it works well with both the Stevens grip and the traditional grip. However, when using the *piston stroke*, one must accept certain limitations in employing gestures that visually enhance musical interpretation

I consider the piston stroke to be the only logical and natural method for performing musical passages that require fast tempos. The reduction of unnecessary movements is, in many situations, essential for playing accurately at high speed without causing undue muscular tension. Whether maintaining the piston stroke principle is necessary when playing at slow tempos remains a question each marimbist must answer individually. Leigh Howard Stevens clearly advocates for maintaining consistent movement principles regardless of tempo. He believes that using different types of motion for various tempo ranges has no practical value and could potentially lead to a lack of kinesthetic consistency—such as in situations where the performer wishes to transition smoothly from a slow to a fast tempo.

[66] Ibidem, 17–18.

2.4 Chapter X – *Shift and Interval Change Efficiency*

The next chapter of *Method of Movement* addresses the issue of hand movement between strokes when playing notes located in distant areas of the marimba keyboard. Stevens introduces another simple principle: the movement of the hands across the distance required to strike two widely spaced notes should take place entirely within the *recovery/preparation* motion. According to this rule, after playing a note, the performer should immediately move the hands to the new position, as illustrated in the diagram included by the author in the manual (fig. 25).[67]

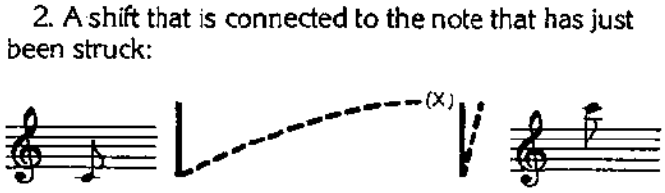


Figure 25. Diagram illustrating the correct execution of hand movement between distant notes (the recovery/preparation motion indicated by a dashed line)

Stevens denies the existence of any advantage in keeping the hands positioned above a note that has just been played, since, in his view, using the time between notes in this way offers no practical benefit. Therefore, the author of *Method of Movement* recommends applying the above principle even in slow tempos, where quickly moving the hands from one note to another may not seem necessary. Waiting to play the next note with the hands already positioned over the correct bars provides a greater opportunity to correct errors if the marimbist realizes that an incorrect note has been selected.[68]

In relation to my own playing style, however, I disagree with the author's view that the principle of moving the hands over the marimba keyboard within the recovery/preparation motion is applicable in every situation. An example would be a circumstance in which it is necessary to clearly separate independent musical phrases. In my opinion, when aiming to conclude a musical passage in a visually clear and expressive

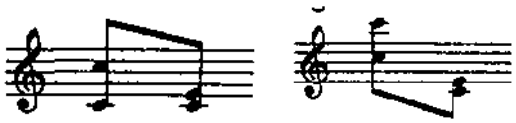
[67] Ibidem, 19.
[68] Ibidem, 20.

way, the hands should not be immediately moved to the position of the next passage right after the previous one ends. Doing so may mistakenly suggest to the audience a continuation of the musical thought – the very opposite of the intended interpretation of closure and new beginning.

However, this is yet another example related to the issue of the aesthetics of performance visualization – a problem rarely addressed by Stevens. Nevertheless, the author includes a brief reference to the aesthetics of visualization in this chapter, asserting that employing hand motion in the recovery/preparation movement always ensures an "elegant" appearance of the mallet motion.[69]

The next topics discussed in the chapter are: moving the hands over the keyboard of the instrument using the elbow as the leading element – *elbow-led shifts*; and minimizing energy expenditure during interval changes with one of the mallets remaining stationary – *passive interval changes* (vid. 2).

Passive interval change is another example of the principle of movement efficiency, in which the author recommends keeping one of the mallets stationary and supporting the interval change with the outer mallet by using its inertial motion. The practice of the passive interval change method is illustrated by examples of performing successive pairs of double stops with one hand – with one of the mallets remaining on the same note – or pairs of double stops spaced far enough apart that a horizontal hand movement is required (example 1).



Example 1. Pairs of double stops performed with one hand, allowing for the application of the passive interval change principle

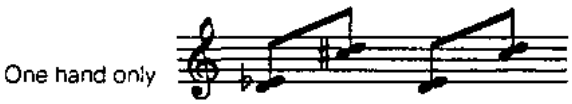
In the first case, the inner mallet should remain stationary on the note C4, while the interval change is executed through the inertial motion of the outer mallet alone. In the second case, the octave leap from C5 to C4 should be performed exclusively by a

[69] Ibidem.

horizontal hand movement, with the outer mallet changing the interval from an octave to a third in the same manner as in the previous example. While one of the mallets remains motionless, the other adjusts the interval, utilizing the momentum generated by the hand's movement across the surface of the marimba keyboard.[70] The passive interval change can also be performed using the traditional grip, but it is more effective in Stevens technique, as the Stevens grip allows for greater independence of movement between the two mallets held in one hand (vid. 2).

Video 2. Passive Interval Change performed using the Stevens and traditional techniques

In the section discussing the elbow-led shifts issue, the author of *Method of Movement* includes an example of two successive minor-second intervals containing notes from both the diatonic and chromatic keyboard, separated by the distance of an octave (Example 2). The Stevens technique does not allow this example to be executed with one hand without using elbow movement, and since the elbow is a larger body part than the wrist, it should, according to the author, lead the entire motion process. The wrist, in turn, should remain relaxed and follow the elbow. This is an example in which the traditional grip of the classical technique (thanks to the shorter mallet length) may work better than the Stevens grip (vid. 3).



Example 2. Pairs of double stops performed with one hand, requiring the use of the elbow in the Stevens technique

[70] ibidem, 21.

Video 3. Elbow-led shift performed using the Stevens technique, and the same example executed with the wrist (wrist-led shift) using the traditional technique

The main premise of *Method of Movement* is the principle of maximizing efficiency in instrumental movement. However, there are situations in which holding the mallets at the very ends of the shafts (as in the Stevens grip) works against this principle of movement efficiency. In performing the example above, the shorter mallets used in the traditional grip allow for greater use of the wrist alone, without the need for excessive elbow movement (vid. 3). This is therefore an instance in which the traditional grip provides greater efficiency of motion than the Stevens grip, as minimizing elbow movement allows the performer to conserve the energy required to execute the passage.

A similar situation is described by Nancy Zeltsman in *Four-Mallet Marimba Playing*. In the column *Virtues of Traditional Grip*, she lists as one of its advantages the ability to perform a tremolo with one hand on a single note. Thanks to the shorter mallets of the traditional grip, the marimbist can rely much more on wrist motion to achieve the proper angle between the mallets and the keyboard, which enables an efficient tremolo execution. To achieve such an angle with the Stevens grip, it is necessary to extend the elbow significantly outward (vid. 4). Nancy Zeltsman also mentions the possibility of holding the marimba mallets at varying distances from the end of the shaft, allowing them to be shortened or lengthened depending on the player's needs..

> Because you can vary how choked-up you are on the mallet handles, certain moves will be much easier. For example, take a one-handed roll on one note. With traditional grip, your elbow doesn't need to be nearly as extended as it does with Stevens grip. With the latter grip, a player must cope with the full extension of the mallets held at the ends. The contorted movements that can result sometimes distract from the music.[71]

[71] N. Zeltsman, *Four-Mallet Marimba Playing*…, op. cit., 9.

Video 4. One-handed independent tremolo on a single note performed using the Stevens and traditional techniques

2.5 Chapter XI – *Tone, Lift, Legato, Staccato*

In Chapter XI, Method of Movement, Stevens begins by discussing three assumptions that, in his view, are common but incorrect regarding the production of sound on the marimba. The third point serves as the starting point for a further discussion on the proper way to produce sound using the wrist and the piston stroke method.

> 3. Lift strokes make the bars ring longer. FALSE. Lift strokes reduce the velocity of the mallet head before contact with the bar. Less energy means sorter ring length.[72]

Here, the author refers to the striking technique involving an additional upward motion of the mallets, known as lift strokes, which he illustrated with a diagram in Chapter IX (fig. 23). He emphasizes that, from an acoustical and physical point of view, a sound produced on the marimba using lift strokes has a rather shortened resonance rather than an extended one. Focusing attention on lifting the mallets during the execution of a lift stroke shortens the contact time between the mallet and the bar, thereby reducing the amount of kinetic energy generated at the moment of impact and, as a result, limiting the duration of the bar's resonance. Later in his discussion, Stevens reminds us of the formula for kinetic energy ($\frac{1}{2} M \times V^2$), as the only one relevant in the context of the resonance length of the excited bar.

Stevens's claims regarding the factors influencing the duration of the produced sound are also valid in the context of research conducted by other authors. As shown by the results of the experiment by Schutz and Lipscomb (see subsection 2.2), long or short

[72] L.H. Stevens, op. cit., 22.

gestures performed after striking have no actual effect on the physical duration of the sound. However, whether the sound is indeed shortened when using the lift stroke largely depends on the performer, since the same study also demonstrated that long gestures – if visible to the listener – create the illusion of an extended sound through visual suggestion.[73]

For Stevens, the formula for kinetic energy also serves as evidence that the force of the strike (that is, the intensity with which the bar's vibrations are excited) can be controlled solely by the velocity of the mallet as it falls onto the bar. Knowing that in the kinetic energy formula the mass is divided by two, while every change in velocity is squared, changes in mass have little significance for the total amount of kinetic energy produced. Therefore, according to the author, there is no meaningful reason to add extra weight to the stroke by involving the arm – we can fully control the excitation of the bar's resonance through the velocity, which is managed entirely by the wrist.

Stevens also described a series of experiments he conducted, through which he, like Schutz and Lipscomb, concluded that the type of stroke (provided that the same dynamics, striking point, and angle of mallet contact with the bar are maintained) has no effect on the duration of the bar's resonance. If, therefore, it makes no difference which part of the body executes the strike, the marimbist should, according to the author, limit striking motion to the wrist alone, ensuring maximum efficiency of movement without the use of the slower and less precise elbow or arm.[74]

In the next part of the chapter, the author moves on to critique the terminology surrounding "legato" strokes, often used by percussionists (and, by implication, its counterpart "staccato," which, however, is not discussed in the explanatory section). He points out that a stroke on the marimba, by definition, has no connection to the concept of *legato*, which refers to the smooth connection of sounds. What marimbists mistakenly call

[73] M. Schutz, S. Lipscomb, *Hearing gestures, seeing music*…, op. cit., 892.
[74] L.H. Stevens, op. cit., 22.

a “legato” stroke actually refers to imitating that effect by appropriately matching the dynamics of the new sound to the loudness of the preceding, still-resonating sound.[75]

The terminology of “legato” and “staccato” strokes is very common in instructional materials for timpani playing, where one of the fundamental aspects of tone color is the control of how vibrations are excited in the drumhead. The terms *legato stroke* and *staccato stroke* can be found, among others, in method books such as *The Artist Timpanist* by Duncan Patton and *Exercises, Etudes and Solos for the Timpani* by Raynor Carroll.[76]

The *legato* and *staccato* strokes in timpani playing are based on a simple principle. A *legato* stroke involves a slow descent of the mallet onto the drumhead, which lengthens the contact between the mallet and the surface of the instrument. As a result, the drumhead vibrates over a larger area, producing a fuller sound with a clearly defined fundamental tone. In the case of a *staccato* stroke, the mallet’s contact with the drum head is shorter, and its motion is quicker. This excites a greater number of upper partials, making the attack itself more audible and giving the sound a brighter character and a stronger initial impact.

This technique also applies to idiophones such as the marimba, though the differences may be less pronounced than on the timpani. In both cases, the duration of mallet contact with the drumhead (or the bar) has little effect on the actual length of the instrument’s resonance. Therefore, the terms *legato* and *staccato* in this context are more of an approximation, referring primarily to tone color rather than to true articulation.

According to Stevens, the primary factors influencing the tone color of the sound produced on the marimba are the force, angle, and point of contact on the bar – alongside the type of mallets and the instrument itself. The unique sound of each marimbist is a complex combination of these three elements. However, the key conclusion Stevens draws in the chapter *Method of Movement* is that one of the most important aspects of marimba tone – the striking force – can be controlled solely through the velocity of the mallet, without altering the mass involved in the stroke (as confirmed by the kinetic energy

[75] Ibidem, 23.
[76] Raynor Carroll, *Exercises, Etudes and Solos for the Timpani* (Pasadena, CA: Batterie Music, 2001), 24, 33.

formula). Stevens considers the control of stroke mass, which requires engaging body parts other than the wrist in the mallet's motion, to be unnecessary. For this reason, he rejects the technique, popular among marimbists, of striking with the use of the arm.

According to the author of *Method of Movement*, playing the marimba with the arm is far more common among performers using the traditional grip in classical technique than among those employing the Stevens technique. I can confirm this observation based on my own experience. Stevens believes that the reason for this phenomenon lies in the natural limitations of the traditional grip within classical technique, which he describes in detail in Chapter V of his method book..

> The basic method for opening the interval with traditional grip, and to a lesser extent Burton grip, involves spreading out the thumb and first finger as in figure A. The more these two appendages are spread (the larger the interval) the tighter and more restricted the wrist becomes. So, using traditional or Burton grips, as the interval opens it becomes increasingly difficult to produce the stroke with the wrist… I believe this is at the root of the obvious phenomenon that traditional grip players use their arms more than Burton players and Burton grip players use their arms more than Stevens technique players.[77]

Without a doubt, performing a natural stroke using only the wrist while maintaining a wider mallet spread is easier with the Stevens grip than with the traditional grip. Excessive extension of the thumb and index finger in the traditional grip inevitably leads to hand stiffness, the degree of which depends on the performer's skill. More advanced marimbists using classical technique can minimize this stiffness by holding the mallets more loosely or by adjusting the pivot points within the traditional grip. Nevertheless, a wide separation between the thumb and index finger will always cause some degree of rigidity in the hand, which is necessary to achieve the mallet spread required for performing large intervals using the traditional grip.

We can therefore consider Stevens's claim to be valid, assuming that the more frequent use of arm-based strokes among marimbists employing classical technique is related to the greater difficulty of using the wrist effectively for striking when the mallet spread is wide in the traditional grip. Following this line of reasoning, it is also reasonable to conclude that the use of the Stevens technique is generally more appropriate in passages

[77] Oryg.: „”, L.H. Stevens, op. cit., s. 9.

that require an increased mallet spread. The Stevens grip allows for a greater range between the mallets than the traditional grip, and its proper application when playing large intervals with a wide mallet spread provides freedom of wrist movement as well as a more relaxed and efficient execution of musical material (these points are developed further through experimental examples in the following chapter).

However, it should be remembered that playing percussion instruments with arm motion has a long-standing tradition in percussion pedagogy. The idea of a stroke resulting from the "cooperation" between the wrist and the arm dates back to the early twentieth century and is reflected in the teaching methods of prominent percussion pedagogues such as George Lawrence Stone and Sanford Moeller. Their techniques – based on combining the action of various parts of the body and utilizing the instrument's natural rebound (e.g., the *Moeller technique*) – are still taught by percussion educators around the world today.

It is worth noting, however, that all of these methods have their roots in the somewhat forgotten traditional school of percussion playing developed by Harry A. Bower and described in his method book *The Harry A. Bower System for Drums, Bells, Xylophone, Timpani*, published in 1912. This book contains numerous guidelines regarding the role of the arm in percussion playing.

The Harry A. Bower System consists of three parts, the second of which is dedicated to playing melodic percussion instruments (xylophone and bells). Although Bower describes his striking methodology primarily in the first part (using the snare drum as an example), in the second part, in the subsection *Position of Hands and Sticks*, he includes the following remark concerning sound production on the xylophone:

> The whole arm should be held loosely and blow made with the fore-arm and wrist (*do not* play with wrist only)…[78]

In this brief sentence lies the fundamental contradiction between Bower's methodology and that of the aforementioned George Hamilton Green, whose very first principle was:

[78] Harry A. Bower, *The Harry A. Bower System for Drums, Bells, Xylophone, Timpani*, cz. 2 *Bells and Xylophone* (New York, NY: Carl Fisher, 1912), 10.

> Always strike with the WRIST. Do not attempt to strike with an arm movement. When raising the hammer to strike a note, use wrist action only. The forearm should not move.[79]

The publications of both authors appeared within a relatively short period of time – Bower's method was published in 1912, while Green's method emerged in the early 1920s. Thus, it can be observed that from the very beginning of the written methodologies for mallet instrument performance, two opposing concepts regarding sound production had already appeared. The first advocated the use of arm movement as the basis for all types of strokes, while the second strictly prohibited the use of arm-driven strikes.

The previously mentioned Sanford Moeller and his striking technique, known as the *Moeller stroke* or *whip stroke*, also play an important role in marimba performance methodology.[80] References to this relationship can be found in Theodor Milkov's method book *Four Mallets Method – My Pianistic Approach*.

> There are two well-known concepts that I incorporate into the pianistic approach: rotation of the wrist/forearm… and the Moeller technique… I make a single motion with my wrist/arm in order to execute an entire musical line rather than making an up/down striking motion for each individual note in a phrase.[81]

> I often try to imagine that a set of notes I am trying to phrase together all fall out of one arm movement. By this I mean that I try to make one heavy, weighted motion based at my shoulder. (You wouldn't be able to see that I am involving my shoulder; I would just feel that the gesture stems from there).[82]

Although the marimba bars do not rebound the mallets in the same way a snare drumhead does, the fundamental principle of the Moeller technique – allowing the performer to execute multiple strokes by using the energy of a single motion initiated from the arm – finds its application here as well. The *Moeller stroke* serves as an example of incorporating arm movement within classical technique, helping Milkov increase the efficiency of motion when performing rapid musical passages. This example clearly

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[79] G. H. Green, *Instruction Course for Xylophone*…, op. cit., 3.
[80] The Moeller technique consists of performing strokes on membranophones by using the energy generated through an arm or forearm motion combined with a relaxed wrist. By applying this technique, a percussionist can produce multiple strokes with a single arm motion instead of using separate wrist movements for each stroke. Explanations of the Moeller technique can be found in numerous snare drum and drum set method books, beginning with Sanford Moeller's original *The Moeller Book*, and later in materials written by his students – such as *Speed, Power, Control, Endurance* by Jim Chapin – or in other publications like *It's Your Move – Motions and Emotions* by Dom Famularo.
[81] Theodor Milkov, *Four Mallets Method – My Pianistic Approach* (Frederiksberg : Edition Svitzer, 2021), 9.
[82] ibidem.

contrasts with the principles of the Stevens technique, according to which arm movement is, in the author's view expressed in *Method of Movement*, inefficient and results in unnecessary energy waste.

The role of arm movement in marimba performance is also repeatedly emphasized by Nancy Zeltzman in *Four-Mallet Marimba Playing*.

> … I am conscious of using arm as well as wrist motions, which play a part in my control of the tone.[83]

> Subtle shifts of finger pressure and various types and combinations of… wrist, and arm movements can produce numerous different articulations and musical nuances in your playing.[84]

Another example is the previously mentioned quotation concerning the visual aesthetics of marimba performance, in which the author regards arm movement as a factor that enables control over the length of the sound on the instrument. It is not entirely clear whether she truly believes in the possibility of extending the marimba's resonance solely through the type of stroke; however, she does refer to arm movement as one that may influence the duration of the produced sound

> Dynamics, touch, and weight of arm stroke can also be used to differentiate between note durations. To produce "weighty arm strokes," my strokes don't begin too much higher than my normal strokes; the difference is that I'm aware of my strokes beginning at my shoulder, with the weight of my arm exaggerating the tenuto stroke.[85]

Personally, both in my own adaptation of the classical technique and when using the Stevens technique, I strive to combine the methodologies of Bower and Green described above. Of course, L.H. Stevens's reasoning—that the wrist provides greater efficiency of motion—is entirely valid. However, I believe that this should not limit the performer's ability to use other parts of the body when the marimbist deems it appropriate within the context of the musical passage being performed. Although in most cases the use of the wrist alone is sufficient when playing the xylophone, it is important to remember

[83] N. Zeltsman, *Four Mallets Marimba Playing*…, op. cit., 10.
[84] ibidem, 57.
[85] ibidem, 59.

that the marimba is a much larger instrument, which, from a logical standpoint, more often requires the involvement of larger muscle and joint groups.

Referring to L.H. Stevens's claim that the kinetic energy of a marimba stroke can be controlled solely by adjusting the speed of the mallet, I conducted the following simple experiment:

1. Holding the mallet approximately 30 cm above the instrument, I performed several strokes using only the wrist, aiming to produce a soft dynamic.
2. Next, without changing the distance from the instrument, I executed several strokes using arm movement and the weight of the entire arm, allowing it to fall freely onto the instrument along with the mallet, which produced a noticeably louder sound due to the added weight.
3. Returning to wrist-only strokes from the same height above the instrument, I attempted to reproduce the volume achieved with arm weight by increasing only the speed of the wrist motion.

From this experiment, I drew the following conclusion: it was sufficient to slightly increase the speed of the wrist stroke to obtain a sound volume comparable to that achieved earlier through the use of the arm's weight falling freely onto the instrument. Then, by slightly increasing the mallet speed once more, I was able to significantly exceed the volume produced using arm weight. The experiment clearly confirmed L.H. Stevens's thesis.

Since mallet speed alone is sufficient to control the volume of the sound produced on the marimba, and the tone itself can be fully controlled by the wrist, the question arises: are there any remaining reasons to use the arm in marimba playing? In my own technique, I tend to recognize two such reasons worth considering for the use of the arms and forearms:

1. To achieve a volume level that exceeds the natural limit of wrist motion.
2. To employ the body's natural movement in expressing the intended musical interpretation.

Using only the wrist in marimba performance allows for an appropriate sound volume in most cases, depending on the repertoire and the performer's playing style. However, the height of the mallets above the instrument achievable through wrist motion alone has its limits and may sometimes be insufficient to produce the desired sound volume. Stevens does not address this issue in his method, perhaps assuming that raising the mallets higher than the wrist's natural range is unnecessary. There are, however, marimbists such as the renowned Japanese performer Keiko Abe who believe that the Stevens technique does not provide enough power for performing certain passages found in Japanese marimba repertoire.[86]

The second reason why, in my opinion, it is worth considering the use of the arm in marimba playing is the natural slowing of the striking motion achieved by adding the weight of the entire arm as it falls together with the mallet onto the bar. The natural characteristics of arm movement can be beneficial to the produced sound in appropriate contexts. I do not dispute Stevens's claim that a diverse palette of marimba tones can be achieved through adjustments in striking angle, point of contact, and mallet speed controlled solely by the wrist. However, I disagree with his view that the efficiency of motion provided by wrist-only playing is always necessary or beneficial for musical interpretation.

We do not always need to follow the principle of maximum movement efficiency to achieve the desired tone. Adding the weight of the whole arm to the stroke helps the marimbist maintain longer contact between the mallet and the bar, which enhances the

[86] Due to the lack of written sources, I can refer only to my own experience with Keiko Abe during the marimba workshop "Académie de Villecroze" in Villecroze, France, in 2007. At that time, she discussed the advantages and disadvantages of various marimba techniques, referring to the Stevens technique as insufficient for achieving the power and volume necessary for proper performance of Japanese works – such as her own compositions or major pieces like *Mirage pour marimba* by Yasuo Sueyoshi and *Convergence* by Yoshihisa Taira. Abe also mentioned her discussions on this topic with the renowned marimbist Robert van Sice, who was her student and an advocate of the Stevens technique. Van Sice attempted, without much success, to convince Abe that the Stevens technique could adequately serve the performance of Japanese repertoire. This discourse between Abe and van Sice was also mentioned by marimbist Ludwig Albert during my participation in a workshop in Cremona, Italy, in July 2010.

presence of the fundamental tone relative to the higher overtones in the produced sound. This type of tone is, in many cases, highly desirable.

Of course, the length of mallet contact with the bar can also be controlled through wrist-only strokes. However, the wrist is a light part of the hand made up of small joints, and in my view, its more natural function is playing in faster tempos or producing tones with short mallet-bar contact (sometimes referred to as staccato strokes).

A good example of this is the xylophone – a small instrument whose sound is typically produced using hard plastic or wooden mallets. For this reason, the use of the arm is rarely necessary in xylophone playing, and the wrist-based technique described by G.H. Green is entirely appropriate in this case. Hard mallets provide sufficient sound volume, and the nature of the instrument as well as most of its repertoire generally requires quick motions with reduced mallet contact time.

The nature of marimba playing, however, demands greater flexibility from the performer in terms of articulation and dynamics, as well as much broader bodily movement due to the instrument's size. As I have already mentioned, it is possible to achieve the full range of articulations using the wrist alone – but not necessarily the full dynamic range. In such cases, the engagement of larger muscle and joint groups becomes helpful and, in some instances, even essential. A good example of this can again be found in the Japanese marimba repertoire, which often requires achieving the instrument's maximum sound volume.[87]

2.6 Chapter XII – *The Fundamental Strokes of the Four-Mallet Marimba Technique*

In Chapter XII of *Method of Movement*, Stevens presents a classification of the types of strokes used in four-mallet marimba technique. He considers this classification to be universal, encompassing the full range of mallet movements a marimbist may encounter

[87] Leigh Howard Stevens, *Recital Repertoire*, [https://www.leighhowardstevens.com/recital-repertoire, access: 04.15.2024].

when performing any repertoire on the instrument. This classification also forms the foundation of the second part of the method, which contains practical exercises based on four fundamental types of strokes:

1. **Single Independent Strokes** – single strokes alternating between the two hands,
2. **Single Alternating Strokes** – single strokes alternated between the mallets of one hand,
3. **Double Vertical Strokes** – simultaneous strokes with two mallets in one hand,
4. **Double Lateral Strokes** – strokes played by the two mallets of one hand in quick succession, one after the other.

Oprócz wyżej wymienionych czterech podstawowych rodzajów uderzeń, autor wyróżnia także tremolo niezależne (wykonywane pałkami jednej ręki) oraz *Multi-lateral Strokes*, które stanowią rozwinięcie *Double Lateral Strokes* i obejmują więcej niż dwa dźwięki w sukcesji pomiędzy pałkami jednej ręki (np. obiegniki barokowe grane jedną ręką). Stevens wskazuje te dwa dodatkowe rodzaje uderzeń jako wymagające odrębnych kategorii, jednak nie zawiera ich w części praktycznej podręcznika, przez co temat ten nie został w *Method of Movement* rozwinięty ponad krótką wzmiankę w rozdziale XII. Autor zamieszcza również w tekście zapowiedź kolejnego podręcznika, który miał zaoferować rozszerzenie owych zagadnień.

In addition to these four basic types of strokes, Stevens also identifies the **Independent Tremolo** (executed with the mallets of one hand) and **Multi-lateral Strokes**, which are an extension of the Double Lateral Stroke and include more than two notes played in succession by the mallets of one hand (for example, one-handed baroque ornaments). Stevens designates these two additional stroke types as separate categories; however, he does not include them in the practical section of *Method of Movement*, leaving the topic undeveloped beyond a brief mention in Chapter XII. He also includes in the text

an announcement of a forthcoming method book that was intended to expand on these topics[88].

The further development of the *Independent Roll* and *Multi-lateral Strokes* concepts has not appeared in any later publications by L.H. Stevens. However, it has been explored by other authors, such as David Skidmore in his method *A Fresh Approach to Technique and Musicianship with Four Mallets*, which continues Stevens's pedagogical framework. Skidmore adopts Stevens's nomenclature for the four stroke types described in *Method of Movement* and extends it with three additional stroke types: **Triple Lateral Strokes** (the equivalent of Stevens's *Multi-lateral Strokes*), **One-Handed Roll** (i.e., *Independent Roll*), and **One-Handed Isolated Accents** – a new stroke type not included by Stevens in *Method of Movement*.

Stevens devotes a separate chapter of his method to each of the four fundamental stroke types, describing in detail every aspect of their correct execution. In my summary, however, I will focus solely on the basic principles of movement involved in performing these four categories of strokes, as well as on the cases in which these movements may differ when executed using the classical technique. For marimbists interested in the detailed instructions for the proper execution of each stroke, I recommend consulting Chapters XII–XVI of Part One of *Method of Movement*.

2.6.1 *Single Independent Strokes*

The most important principle in the correct execution of Single Independent Strokes is the skillful use of rotational wrist movement. Proper performance of this stroke type relies exclusively on a rotary motion, without involving any vertical movement. When the rotational movement is executed correctly, the axis of rotation of the inactive mallet remains fixed in one position. As a result, the inactive mallet rotates only around its own axis, without performing any additional vertical motions that could lead to unnecessary energy loss and reduced efficiency of movement. Minimizing the motion of the inactive

[88] David Skidmore, *A Fresh Approach to Technique and Musicianship with Four Mallets* (Leander, TX: Mark Wessels Publications, 2018), 11.

mallet during Single Independent Strokes helps maintain independence between the two mallets in one hand and allows the performer to execute the strokes effortlessly with minimal physical exertion. Reducing unnecessary motion also lowers the risk of hand stiffness, thereby ensuring greater freedom and facilitating playing at faster tempos[89].

One of the fundamental misconceptions that has historically diminished the value of the classical technique is the belief – widespread even before the publication of *Method of Movement* – that the traditional grip prevents achieving independence between the two mallets of one hand due to their contact at the crossing point. In the second paragraph of the chapter devoted to Single Independent Strokes, Stevens describes examples of performers using the traditional grip who expend twice as much energy when executing strokes. This occurs because they are unable to effectively minimize the motion of the inactive mallet, which leads to unnecessary energy loss and reduces playing efficiency.

> To appreciate the advantages of an independent single stroke, let us imagine the opposite extreme: when playing passagework with the inside mallets, traditional crossed-stick grip players often use twice the energy they would use playing the same passage holding two mallets. Because the shafts are held as a unit, the unused mallet often flails wildly – even during mezzo-forte playing. This excess motion in the unused mallet not only siphons off energy which could be channeled into the stroke but also adversely affects accuracy by pushing and pulling the sticking mallet from its intended targets.[90]

Excessive vertical motion of the inactive mallet in the traditional grip during the execution of Single Independent Strokes is not, however, a problem inherent to the natural limitations of the grip itself. The issue lies in the performer's inability to apply rotational movement, which is entirely possible to execute using the traditional grip (vid. 5).

Video 5. Single Independent Strokes using rotational movement demonstrated with both the Stevens and classical techniques

[89] L.H. Stevens, *Method of Movement*…, op. cit., 26–27.
[90] Ibidem, 26.

However, I agree with the author of *Method of Movement* that the issue of excessive vertical motion of the inactive mallet occurs more frequently among performers using the classical technique, precisely because of the interdependence between the mallets inherent to the traditional grip. In my opinion, the core of the problem lies in the omission of the concept of rotational movement in much of the pedagogical literature on traditional grip playing. Moreover, the large number of variations within the classical technique means that there is no single, unified school of playing. As a result, not all marimbists employing the classical technique use rotational movement to the same extent. For example, Nancy Zeltsman, in her method book, mentions the element of rotational motion only briefly and only in one specific context – when performing Single Independent Strokes with the inner mallets. The same strokes, when played with the outer mallets, are executed by her in an entirely different manner.

> The stroke is different for the inner mallets, numbers 2 and 3. The power for single strokes with the inner mallets will come from your thumb. With the inner mallets, your stroke will involve some wrist rotation.[91]

The role of rotational movement in the classical technique, although presented with little detail, is shown in a positive light in Theodor Milkov's method book published a few years ago.

> In order to access the full range of musical expression on the marimba and play passages and ornaments with one hand, complete control of the muscles responsible for inner and outer rotation of the forearm is required.[92]

There are absolutely no reasons for marimbists using the classical technique to feel limited by an alleged inability to achieve independence between the two mallets of one hand when using the traditional grip. In the case of Single Independent Strokes, the key element is the rotational movement employed in the Stevens technique, which can be fully adapted to the classical technique.

[91] N. Zeltsman, *Four Mallet Marimba Playing*…, op. cit., 8.
[92] T. Milkov, *Four Mallets Method…*, op. cit., 5.

2.6.2 *Double Vertical Strokes*

While Single Independent Strokes require the full use of rotational wrist movement, Double Vertical Strokes are executed exclusively through vertical motion, without any rotational component. Although Stevens discusses this stroke type third in order in *Method of Movement*, I have chosen to present it second, as it reveals an interesting relationship: Single Independent Strokes rely on rotational motion, Double Vertical Strokes on vertical motion, and the remaining two stroke categories combine these two types of movement.

If the reader is already familiar with the chapters discussing the *Piston Stroke* principle and the general concepts of movement economy (Chapters IX and X), understanding the principles behind the Double Vertical Stroke should be relatively straightforward. This stroke consists of a vertical wrist motion during which both mallets strike two bars of the keyboard simultaneously. The first challenge Stevens points out is the synchronization of both mallets so that they hit the keyboard at exactly the same moment.

The problem of mallet synchronization in Double Vertical Strokes arises as a consequence of what I previously mentioned as one of the advantages of the Stevens technique – the independence between the mallets resulting from the absence of a contact point between them. One of the drawbacks of this independence, however, is the difficulty in achieving perfect synchronization when both mallets must strike the bars simultaneously, as in the case of Double Vertical Strokes. This issue can also affect more advanced marimbists, especially when they are using two different types of mallets with unequal weight in the same hand. Uneven mallet mass makes achieving perfect synchronization during Double Vertical Strokes more demanding, requiring additional attention to the problem of proper mallet balance within the hand.

The synchronization issue between mallets of one hand is practically nonexistent in the traditional grip, where the mallets share a point of contact. The interdependence between the mallets in this grip generally ensures synchronization, even when their weights differ slightly. Following this line of reasoning, Double Vertical Strokes can be considered

more natural and easier to execute using the classical technique with the traditional grip than with the Stevens technique.

An additional argument supporting this conclusion comes from the challenges of performing Double Vertical Strokes with the Stevens technique when they involve notes placed simultaneously on the diatonic and chromatic keyboards, especially in small intervals in the upper register of the marimba. I have already touched upon this issue when discussing the *Elbow-led Shift* concept, and it will be further developed in the subsection describing "Experiment No. 2".

2.6.3 *Single Alternating Strokes*

Single Alternating Strokes, like Single Independent Strokes, are based primarily on rotational motion. However, in this case, the rotational movement is complemented by a vertical component. According to Stevens, Single Alternating Strokes are executed using approximately eighty percent rotational motion and twenty percent vertical motion. As a result, the axis of rotation of the inactive mallet does not remain fixed, as it does in Single Independent Strokes; instead, it shifts from left to right depending on which mallet produces the sound at a given moment – when the outer mallet strikes, the axis moves toward the inner mallet, and vice versa. While one mallet produces a sound, the other rises upward in preparation for the next stroke, making the motions of the two mallets somewhat interdependent (unlike in Single Independent Strokes, where the mallets remain fully independent). Stevens advises against trying to minimize this interdependence and instead encourages performers to use its natural effects to achieve a relaxed and fluid execution of the strokes.[93]

Single Alternating Strokes have a maximum tempo beyond which they transition into a different type of stroke. When maintaining continuous motion and significantly increasing the tempo, Single Alternating Strokes evolve into the Independent Tremolo. Conversely, when pairs of Single Alternating Strokes are separated and the tempo is

[93] L.H. Stevens, *Method of Movement*…, op. cit., 30.

increased, they transform into Double Lateral Strokes[94]. Their execution using the classical technique is very similar (vid. 6).

Video 6. Transformation of stroke types demonstrated using both the Stevens and classical techniques

2.6.4 *Double Lateral Strokes*

In the very first sentence of his description of Double Lateral Strokes, the author makes the reader aware of an important principle: Double Lateral Strokes use a single motion to produce two strokes. The execution of two consecutive Single Alternating notes involves two separate, though interdependent, movements – one motion per note. In contrast, performing a pair of Double Lateral notes requires only one motion, which, as in the case of Single Alternating Strokes, combines vertical and rotational movement.

When performing downward Double Lateral Strokes, the outer mallet descends toward the keyboard in a vertical motion that transitions into a rotational motion as it strikes the first note. The second note of the pair is then produced by the inner mallet through a rotational motion similar to that used in a Single Independent Stroke[95]. As with the other stroke types, Double Lateral Strokes can be executed in exactly the same way using the traditional grip (vid. 7).

[94] Ibidem.
[95] Ibidem, 35

Video 7. Double Lateral Strokes performed in slow motion and at full tempo using both the Stevens and traditional grips

2.7 Continuation of Four-Mallet Pedagogy After the First Edition of *Method of Movement*

After the publication of *Method of Movement*, the pedagogy of four-mallet marimba technique was described in the following sources, listed here in chronological order and categorized according to the level of detail they provide. The gradation of descriptive precision for four-mallet technique is defined as follows (with *Method of Movement* considered the most comprehensive reference – rated as Level 5 in the scale below):

Level 1 – A brief general description or only illustrations, requiring supplementation and often containing references to more detailed sources.

Level 2 – A moderately detailed description, requiring some supplementation but sufficient to serve as a primary source of information.

Level 3 – A detailed, self-sufficient description containing original pedagogical insights and modifications of existing technical solutions.

Level 4 – A highly detailed description, comparable in precision to Stevens's explanation of the grip in *Method of Movement*, including original pedagogical concepts and suitable as a main or sole source for learning the four-mallet grip.

Level 5 – A very detailed and comprehensive description, comparable to the entire content of *Method of Movement*, which, in addition to all aspects of Level 4, expands upon topics of mallet instrument performance beyond the mechanics of the four-mallet grip itself.

Sources classified at the lower levels of this scale may contain more extensive discussions of other issues related to keyboard percussion playing, beyond the description of four-mallet technique itself. However, the main criterion for this scale remains the amount of information necessary for learning the grip and technique from the ground up – analogous to the list of materials presented in Chapter 1. Most of the titles listed are publications from the United States, though a few come from the United Kingdom, Switzerland, Germany, Russia, and Denmark.

1980 – Garwood Whaley: *Primary Handbook for Mallets* (USA)[96]

Publication type: textbook.

Instrumental scope: mallet percussion.

Four-mallet technique: Musser grip.

Level of descriptive precission: 1.

1981 – Harry R. Bartlett, Ronald A. Holloway: *Guide to Teaching Percussion*, vol. 3 (USA)[97]

Publication type: textbook.

Instrumental scope: all percussion instruments.

Four-mallet technique: precursor of Burton Grip.

Level of descriptive precission: 2.

1981 – James Blades, Michael Skinner: *Play Tuned Percussion* (UK)[98]

[96] Garwood Whaley, *Primary Handbook for Mallets* (Lauderdale, FL: Meredith Music Publications, 1980).
[97] Harry R. Bartlett, Ronald A. Holloway, *Guide to Teaching Percussion*, ed. 3 (Dubuque, IA: Wm. C. Brown Company Publishers, 1981).
[98] James Blades, Michael Skinner, *Play Tuned Percussion* (London:Faber Music, 1981).

Publication type: textbook.

Instrumental scope: mallet percussion.

Four-mallet technique: Traditional Grip.

Level of descriptive precission: 1.

1981 – Lionel Hampton, Jean Claude Forester: *The New Lionel Hampton Vibraphone Method* (Switzerland)[99]

Publication type: textbook.

Instrumental scope: vibraphone (jazz and classical idiom).

Four-mallet technique: Burton Grip

Level of descriptive precission: 1.

1981 – Mario A. Gaetano, Jr.: *Beginning Four-Mallet Playing* (USA)[100]

Publication type: article in *The Instrumentalist*.

Instrumental scope: not specified.

Four-mallet technique: Traditional Grip, Burton Grip, Stevens Grip.

Level of descriptive precission: 1.

1982 – David Samuels: *A Musical Approach to Four Mallet Technique for Vibraphone* (USA)[101]

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[99] Lionel Hampton, Jean Claude Forester, *The New Lionel Hampton Vibraphone Method* (Zurich: Musik Hug Verlage, 1981).

[100] Mario A. Gaetano, Jr., "Beginning Four-Mallet Playing", *The Instrumentalist* 1981, in: *Percussion Anthology – A Compendium of Percussion Articles* from *The Instrumentalist*, ed. 3 (Evanston, IL: The Instrumentalist Company, 1984), 621–623.

Publication type: textbook.

Instrumental scope: jazz vibraphone.

Four-mallet technique: Burton Grip.

Level of descriptive precission: 3.

1982 – Mario A. Gaetano: *Teaching the Vibraphone* (USA)[102]

Publication type: article in *The Instrumentalist*.

Instrumental scope: vibraphone.

Four-mallet technique: Traditional Grip, Burton Grip.

Level of descriptive precission: 1.

1983 – Valentin Snegirev: *Skola igry na dvuhrjadnom ksilofone (marimbe)* (Russia)[103]

Publication type: textbook.

Instrumental scope: marimba.

Four-mallet technique: Burton Grip, Musser Grip.

Level of descriptive precission: 1.

1985 – Leigh Howard Stevens: *Four-Mallet Grip Needed* (USA)[104]

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[101] David Samuels, *A Musical Approach to Four Mallet Technique for Vibraphone* (New York, NY: Excelsior Music Publishing, 1982).

[102] Mario A. Gaetano, "Teaching the Vibraphone", *The Instrumentalist* 1982, in: *Percussion Anthology – A Compendium of Percussion Articles* from *The Instrumentalist*, ed. 3 (Evanston, IL: The Instrumentalist Company, 1984), 660–662.

[103] Valentin Snegirev, *Skola igry na dvuhrjadnom ksilofone (marimbe)* (Школа игры на двухрядном ксилофоне (маримбе)) (Moscow: Izdatel'stvo Muzyka (Издательство Музыка), 1983).

Publication type: column in *Modern Percussionist*.

Instrumental scope: not specified.

Four-mallet technique: Traditional Grip, Burton Grip, Musser Grip, Stevens Grip.

Level of descriptive precission: 1.

1985 – Leigh Howard Stevens: *This Column Is Not About UFOs And Mummies* (USA)[105]

Publication type: column in *Modern Percussionist*.

Instrumental scope: not specified.

Four-mallet technique: Stevens grip.

Level of descriptive precission: 3.

1988 – Gary D. Cook: *Teaching Percussion*, vol. 3 (USA)[106]

Publication type: textbook.

Instrumental scope: all percussion instruments.

Four-mallet technique: Traditional Grip, Burton Grip, Stevens Grip.

Level of descriptive precission: 3.

1993 – Jerry Leake: *Mallets, Meters & Multiple Percussion* vol. 3 (USA)[107]

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[104] L.H. Stevens, "Four-Mallet Grip Needed", *Modern Percussionist* 1.3 (1985), 30–31.
[105] L.H. Stevens, "This Column Is Not About UFOs And Mummies", *Modern Percussionist*, 1.4 (1985), 44–45.
[106] Gary D. Cook, *Teaching Percussion*, ed. 3 (New York, NY: Schirmer Books, 1988).
[107] Jerry Leake, *Mallets, Meters & Multiple Percussion*, vol 3 (Boston, MA: Rhombus Publishing, 1993).

Publication type: textbook.

Instrumental scope: all percussion instruments

Four-mallet technique: Burton Grip, Musser Grip.

Level of descriptive precission: 1.

1994 – Garwood Whaley: *4 Mallet Exercises* (USA)[108]

Publication type: textbook.

Instrumental scope: mallet percussion.

Four-mallet technique: Musser Grip.

Level of descriptive precission: 1.

1995 – Mitchell Peters: *Fundamental Method for Mallets* (USA)[109]

Publication type: textbook.

Instrumental scope: mallet percussion.

Four-mallet technique: Traditional Grip, Burton Grip, Stevens Grip.

Level of descriptive precission: 2.

1995 – Nancy Zeltsman: *Traditional Four-Mallet Grip* (USA)[110]

Publication type: article in *Percussive Notes*.

[108] Garwood Whaley, *4 Mallet Exercises* (Lauderdale, FL: Meredith Music Publications, 1994).
[109] Mitchell Peters, *Fundamental Method for Mallets* (Van Nuys, CA: Alfred Publishing Company, 1995).
[110] Nancy Zeltsman, "Traditional Four-Mallet Grip", *Percussive Notes* 33.4 (1995), 50–54.

Instrumental scope: not specified.

Four-mallet technique: Traditional Grip.

Level of descriptive precission: 3.

1996 – Wessela Kostowa, Mark Giesecke: *Compendium of Four-Mallet Techniques for Vibraphone,Marimba, and Other Percussion Instruments* (Germany)[111]

Publication type: textbook.

Instrumental scope: vibraphone, marimba.

Four-mallet technique: Traditional Grip, Burton Grip, Musser Grip, Stevens Grip, Stout Grip, Mainieri Grip.

Level of descriptive precission: 2.

1998 – Ney Rosauro: *Crossing Grip Extensions* (USA)[112]

Publication type: article in *Percussive Notes*.

Instrumental scope: not specified.

Four-mallet technique: Burton Grip.

Level of descriptive precission: 3.

2003 – Peter Sadlo: *Hauptsache Mallets* (Germany)[113]

[111] Wessela Kostowa, Mark Giesecke, *Compendium of Four-Mallet Techniques for Vibraphone, Marimba, and Other Percussion Instruments* (Frankfurt am Main: Zimmermann, 1996).
[112] Ney Rosauro, "Crossing Grip Extensions", *Percussive Notes* 36.1 (1998), 32–35.

Publication type: textbook

Instrumental scope: marimba.

Four-mallet technique: Traditional Grip, Burton Grip, Musser Grip, Stevens Grip.

Level of descriptive precission: 4.

2003 – Nancy Zeltsman: *Four-Mallet Marimba Playing: A Musical Approach for all Levels* (USA)[114]

Publication type: textbook.

Instrumental scope: marimba.

Four-mallet technique: Traditional Grip.

Level of descriptive precission: 5.

2006 – Johnny Lee Lane, Samuel A. Floyd: *Four-Mallet Independence for Marimba* (USA)[115]

Publication type: textbook.

Instrumental scope: marimba.

Four-mallet technique: Traditional Grip, Stevens Grip.

Level of descriptive precission: 2.

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[113] Peter Sadlo, *Hauptsache Mallets* (Frankfurt am Main: Zimmermann, 2003).
[114] Nancy Zeltsman, *Four-Mallet Marimba Playing: a Musical Approach for All Levels* (Milwaukee, WI: Hal Leonard Corp, 2003).
[115] Johnny Lee Lane, Samuel A. Floyd, *Four-Mallet Independence for Marimba* (Milwaukee, WI: Hal Leonard Corp, 2006).

2009 – Gifford Howarth: *Simply Four: 4-Mallet Technique as Easy as 1-2-3…4* (USA)[116]

Publication type: textbook with video examples.

Instrumental scope: marimba.

Four-mallet technique: Stevens Grip, Burton Grip.

Level of descriptive precission: 4.

2011 – Juan Alamo: *Four Mallet Music For The Modern Marimba Player* (USA)[117]

Publication type: textbook.

Instrumental scope: marimba.

Four-mallet technique: Stevens Grip.

Level of descriptive precission: 4.

2015 – Chris Colaneri: *Modern Etudes and Studies for the Total Percussionist* (USA)[118]

Publication type: textbook with audio and video examples.

Instrumental scope: all percussion instruments.

Four-mallet technique: Stevens Grip.

Level of descriptive precission: 2.

2016 – Mark Boseman: *Mallets and Music: A Guide to Four Mallets Marimba* (USA)[119]

[116] Gifford Howarth, *Simply Four: 4-Mallet Technique as Easy as 1-2-3…4* (Portland, OR:Tapspace, 2009).
[117] Juan Alamo, *Four Mallet Music for the Modern Marimba Player* (Denton TX: Drop6 Media, 2011).
[118] Chris Colaneri, *Modern Etudes and Studies for the Total Percussionist* (New York, NY: Oxford University Press, 2015).

Publication type: textbook with video examples.

Instrumental scope: marimba.

Four-mallet technique: Stevens Grip.

Level of descriptive precission: 4.

2018 – Christian Dierstein, Michel Roth, Jens Ruland: *The Techniques of Percussion Playing Mallets, Implements and Applications* (Germany)[120]

Publication type: textbook.

Instrumental scope: multipercussion.

Four-mallet technique: Traditional Grip, Burton Grip, Stevens Grip.

Level of descriptive precission: 3.

2018 – David Skidmore: *A Fresh Approach to Technique and Musicianship with Four Mallets* (USA)[121]

Publication type: textbook with video examples.

Instrumental scope: marimba.

Four-mallet technique: Traditional Grip, Burton Grip, Stevens Grip.

Level of descriptive precission: Stevens Grip: 4, other grips: 2.

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[119] Mark Boseman, *Mallets and Music: A Guide to Four Mallets Marimba* (Laredo, TX: Mark Boseman Percussion, 2016).
[120] Christian Dierstein, Michel Roth, Jens Ruland, *The Techniques of Percussion Playing Mallets, Implements and Applications* (Kassel: Bärenreiter-Verlag, 2019).
[121] David Skidmore, *A Fresh Approach to Technique and Musicianship with Four Mallets* (Leander, TX: Mark Wessels Publications, 2019).

2019 – David Steinquest: *Marimba For Four* (USA)[122]

Publication type: textbook with video examples.

Instrumental scope: marimba.

Four-mallet technique: Stevens Grip.

Level of descriptive precission: 3.

2019 – Julia Gaines: *Sequential Studies for Four-Mallet Marimba* (USA)[123]

Publication type: textbook.

Instrumental scope: marimba.

Four-mallet technique: Traditional Grip, Burton Grip, Stevens Grip.

Level of descriptive precission: 1.

2021 – Theodor Milkov: *Four Mallets Method – My Pianistic Approach* (Danmark)[124]

Publication type: textbook.

Instrumental scope: marimba.

Four-mallet technique: Traditional Grip.

Level of descriptive precission: 3.

[122] David Steinquest, *Marimba For Four* (Nashville, TN: Row-Loff Productions, 2019).
[123] Julia Gaines, *Sequential Studies for Four-Mallet Marimba* (Portland, OR: Tapspace Publications, 2019).
[124] Theodor Milkov, *Four Mallets Method – My Pianistic Approach* (Frederiksberg: Edition Svitzer, 2021).

Chapter 3

Experiments

3.1 Chapter V – *The Four-Mallet Grip*

Chapter V of the *Method of Movement* manual plays a key role in this study, serving both as an inspiration and as a pretext for undertaking the research whose results will be discussed in the following subsections. In this part of the book, titled *The Four Mallet Grip*, we learn – with full conviction – about the superiority of the technique developed by Leigh Howard Stevens over other four-mallet playing methods available to percussionists at the time of the publication's creation. The purpose of this section is to encourage the reader to abandon previous playing methods and to make the effort to master the Stevens technique. In the following part of the chapter, "Experiments," the main task will be to verify the validity of these assumptions through a series of experiments.

At the beginning of Chapter V, the author presents a brief overview of three four-mallet grip methods that were well known to him (and commonly used at the time the manual was written): the traditional grip, the Burton grip (developed by Gary Burton), and the Musser grip (developed by Clair Omar Musser). The order in which these methods are presented is not accidental—it reflects the chronological progression of the techniques the author used throughout his artistic education[125]. It is also a hierarchy proposed by L.H. Stevens, illustrating the gradual development and performance potential of the available four-mallet playing techniques. Starting with the traditional grip, which according to the author offers the least possibilities, and moving through the Burton and Musser grips, the reader eventually arrives at the Stevens technique—presented last as the most advanced. This technique represents an evolution of the Musser grip, offering the widest range of performance possibilities.[126]

[125] L.H. Stevens, *Method of Movement*, op. cit., 8.
[126] Ibidem.

> Although the author has used all three of the above grips (in the order presented) for various lengths of time and has experienced improved facility with each change of grip, he cannot heartily recommend any of them for solo marimba playing.[127]

Another important issue discussed in Chapter V of *Method of Movement*, crucial for understanding the advantages of the Stevens technique, is the explanation of its foundations, which stem from the Musser grip. At the same time, the author firmly emphasizes its significant differences from the original method, pointing out key modifications and improvements that make the Stevens technique more functional and efficient.[128] Moreover, this distinctiveness also arises from the fact that, at the time *Method of Movement* was written, the pedagogy associated with the Musser grip was relatively limited. It focused mainly on aspects concerning the physical holding of the mallets and the correct execution of basic (usually chordal) strokes. The author highlights this lack of a comprehensive approach both in Chapter V and in the subsection *The Dark Ages*, located in the third part of the manual, emphasizing the need for a more systematic and extensive approach to four-mallet playing technique..

> The grip used by this author (around which the bulk of this text revolves) is a child of Musser grip, but it does not resemble or operate like the family of Musser grips described in various "Total Percussion" method books.[129]

> While my ideas about grip were unquestionably inspired by and based on Musser grip, the technique I teach and use in performance today bears little resemblance to [it]..[130]

The pedagogy proposed by Stevens, associated with his “new version” of the Musser grip, was expanded to include a number of detailed concepts that I have already discussed in Chapter 2. For this reason, the Musser grip – like the traditional and Burton grips – was described by the author of *Method of Movement* merely as a way of holding the mallets. In contrast, the innovative approach to marimba performance derived from the Musser grip was termed the “Stevens technique,” rather than the “Stevens grip” (which resembles the Musser grip but features several fundamental differences). Thus, although both the Stevens technique and the Stevens grip originate from the Musser grip, the key distinction between them is not limited to Stevens’s modification or refinement of

[127] Ibidem.
[128] Ibidem, 8, 106.
[129] Ibidem, 8.
[130] Ibidem, 106.

Musser's grip. The difference lies primarily in the development of an entire concept of four-mallet performance, encompassing numerous aspects related to the efficiency of bodily movement at the instrument. Hence the title of the manual, *Method of Movement* for Marimba.

> In my opinion, the identification of what I do as "Stevens Grip" overlooks the more important aspect of my technique: a "Method of Movement." After all, this book is not called "Method of Gripping." Holding the mallets is surely important, but it does not assure an accurate technique in and of itself.[131]

In the following part of the chapter, Stevens explains five issues related to the differences between his technique and the classical techniques of the traditional grip and, to a lesser extent, the Burton grip. According to the author, these differences form the foundation of his method's superiority over traditional four-mallet playing techniques.

Just as the Stevens grip evolved from the Musser grip (both belonging to the category of independent grips, in which the two mallets held in one hand do not touch each other), the Burton grip evolved from the traditional grip (both classified as dependent grips, where the mallets in one hand cross each other). For this reason, Stevens summarized the Burton and traditional grips as techniques that share similar "problems" and, when compared to the Stevens technique, are considered equivalent in terms of performance limitations. However, the author acknowledges the advantage of the Burton grip over the traditional one, as he believes that Gary Burton, in developing his method of holding the mallets, introduced significant improvements to the traditional grip, making it more functional.[132]

Feeling "Secure"

The first issue addressed by the author concerns the strong sense of stability felt by beginner marimbists who use dependent grips. This stability results from the minimal risk of losing control of the mallets, which helps to avoid problems with grip destabilization and the potential for the mallets to slip out of the hands. Grip control is one of the main challenges faced by beginner marimbists; therefore, the perceived stability of dependent

[131] Oryg.: „.", ibidem, s. 107.
[132] Ibidem, s. 8.

grips often leads them to choose the traditional or Burton grip instead of the Stevens technique.

However, the author emphasizes that this sense of stability is, to some extent, an illusion arising from the fact that in dependent grips, the mallets are held closer to the head and farther from the end of the shaft. This positioning indeed increases the subjective feeling of stability compared to independent grips, where the mallets are held at the very ends of the shafts. Moreover, Stevens notes that a similar sense of stability can be achieved in the Stevens/Musser grip by shortening the standard mallet shaft length by one inch. Nevertheless, he stresses that such a modification becomes unnecessary once the marimbist gains experience and develops sufficient control over the Musser/Stevens grip.[133]

I agree with the author of *Method of Movement* that the difficulties beginners face in achieving stability and control of the mallets when learning the Stevens technique can be relatively easily overcome by strengthening the appropriate hand muscles necessary for maintaining a secure grip. However, one may question whether the stability of dependent grips results solely from the fact that the mallets are held closer to their heads.

An additional sense of stability may also stem from the specific structure of the grip itself – in dependent grips, the mallets touch each other and are encircled by the middle, ring, and little fingers. When performing smaller intervals, all three of these fingers hold both mallets simultaneously, which enhances the feeling of stability. In the Stevens grip, each of the two mallets in the hand is held differently, and the outer mallets are supported only by the ring and little fingers, which are naturally weaker than the others. This is precisely why properly strengthening these fingers is crucial to achieving comfort and control over the grip. In contrast, the sensation of holding two mallets in one hand using the traditional grip is more similar to holding a single mallet – the performer can grip it more firmly by wrapping all fingers around it, providing additional stability. Although a tight grip is not the preferred playing method, the ability to freely adjust tension – from a relaxed hold to a firm grasp—can give beginners a greater sense of control.

[133] Ibidem, s. 8.

While I personally do not advocate gripping the mallets tightly, I believe that the ability to fully modulate the grip pressure gives novice percussionists a greater sense of comfort when learning four-mallet technique. Nevertheless, the key remains finding the right balance between grip stability and hand relaxation – a challenge that can arise in advanced classical playing. In the Stevens technique, however, this issue does not occur: when properly developed, the grip remains both relaxed and stable.[134]

Speed and interval change

The second important difference described by Stevens concerns changing interval sizes – that is, the speed with which a marimbist can adjust the opening angle of the mallets in the hand to execute an interval change. Here, the author points to a significant relationship between hand muscle tension and the mallet opening angle in the traditional grip.

In essence, the greater the angle between the mallets, the more the hand muscles stiffen, because a wide spread of the thumb and index finger forces increased tension. In addition, to minimize grip destabilization, the ring and little fingers must clamp down ever more firmly as the span increases. This additional clamping causes the hand to stiffen, which limits mobility and reduces the speed of interval changes. In the Stevens technique, this problem does not occur, because the hand remains relaxed regardless of the mallet opening angle [135]. This means that interval changes can be executed more smoothly and quickly, without the risk of hand stiffening. The experiments I conducted should allow for a more precise analysis of the significance of this issue.

Interval limit

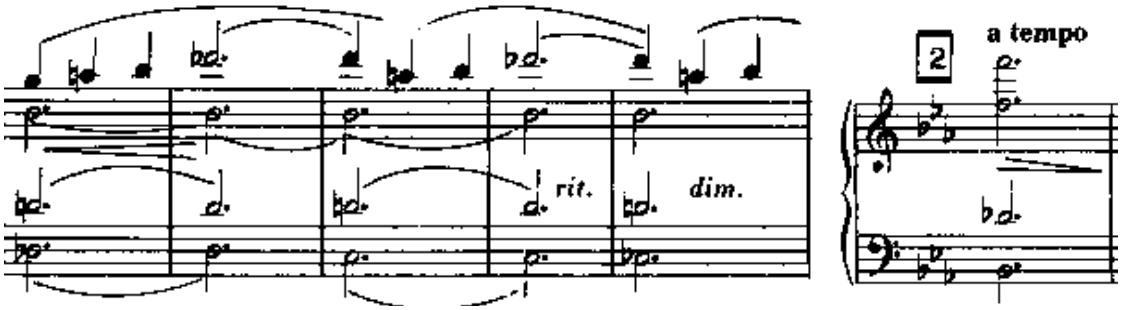
The next issue concerns the limitation of the mallet opening angle in dependent grips and the resulting restricted ability to perform wide intervals. The author begins his discussion of this problem by noting that, even at the time *Method of Movement* was written (1979), there already existed numerous works in the marimba repertoire that were virtually

[134] A more detailed discussion of this issue, with reference to specific examples from *Method of Movement*, can be found in Chapter 2 and in the descriptions of Experiments 1 and 2 in Chapter 3.
[135] Ibidem, 8.

unplayable using the traditional or Burton grip. The main obstacle was the severe limitation in achieving large intervals.

> At the time of this writing, there are numerous pieces in the solo marimba literature which are virtually impossible to play with traditional or Burton grips because of their limited reach. The degree to which a grip allows the mallets to approach a straight line (opening angle = 180°) is a measure of its large interval capability.[136]

The author may be referring here, for example, to the second movement of *Concerto for Marimba and Orchestra*, Op. 34 by Robert Kurka, written in 1957 for the famous marimbist Vida Chenoweth, a well-known advocate of the Musser grip. In the chorale-like second movement, there appear intervals of a tenth (Example 3), which are indeed difficult to play using the traditional grip. Modern methods of playing with the traditional grip make it possible to perform passages from Kurka's concerto that require playing a tenth between the mallets of one hand, but this is done with greater difficulty than when using the Stevens technique (vid. 8)[137].



Example 3. Robert Kurka, *Concerto for Marimba and Orchestra*, movement II, Weintraub Music Company, 1960, p. 9, mm. 17–22

Video 8. Concerto for Marimba and Orchestra by Robert Kurka, movement II, measures 17–22, performed using the Stevens and classical techniques

[136] Ibidem.
[137] More on performing large intervals using the traditional grip can be found in Chapter 3.2.4..

Wrist maneuverability

In this section of the chapter, Stevens addresses the problem of limited wrist mobility that occurs when the mallets are held in a hand positioned flat relative to the marimba keyboard – in accordance with the guidelines of the traditional grip and Burton grip pedagogy of his time. However, in my opinion, this is a mistaken assumption, as it implies that using classical technique and the traditional grip requires the hand to remain exclusively in a horizontal position.

For reasons unknown to me, most instructional materials for the traditional grip do indeed prescribe keeping the hand flat and do not take into account the possibility of a vertical position, as is the case with the Stevens technique. I have already mentioned this issue in Chapter 2, and it will be analyzed in detail based on conducted experiments. It is worth noting, however, that while at the time *Method of Movement* was written, traditional grip pedagogy may have focused primarily on a horizontal hand position, modern pedagogy employs both horizontal and vertical orientations. An example of this approach can be found in *Four Mallets Method – My Pianistic Approach* by Theodor Milkov, published in 2021. For this reason, I believe that this part of *Method of Movement* would benefit from being updated, as it may mislead contemporary readers into thinking that the traditional grip is limited solely to a horizontal hand position.

A second example of issues related to hand mobility among performers using dependent grips is the gradual reduction of wrist flexibility as the mallet spread increases – a problem already discussed in relation to the limited speed of interval changes in the traditional grip.

Finger control

The issue of finger control of the mallets concerns the independence of each mallet and the role played by the fingers of the hand in achieving it. L.H. Stevens believes that finger control is essential for achieving independence between the mallets and that it is significantly limited in performers using the traditional grip.[138]

[138] Ibidem, s. 9.

It is difficult to disagree with the author of *Method of Movement* that achieving mallet independence through finger-assisted control is easier with the Stevens technique, in which the mallets do not touch each other and the very design of the grip naturally ensures their independence. However, today it can no longer be claimed that achieving such independence using the classical technique is impossible. It depends on the performer's ability to hold the mallets loosely, to employ rotational movement, and to position the hand vertically. When the grip is relaxed and the rotational motion properly applied, dynamic control of each mallet can be achieved just as effectively with the traditional grip as with the Stevens technique (vid. 9).

Video 9. Dynamic control of individual mallets using the Stevens and traditional techniques

As shown by the issues discussed above, L.H. Stevens clearly expresses his belief in the superiority of his technique over other four-mallet playing methods, supporting his position with various arguments. However, in my view, some of these arguments may stem from the author's limited knowledge of the technical possibilities of the traditional grip, which were developed independently of the Stevens technique in the years following the publication of the first edition of *Method of Movement*.

This development took place mainly in Europe and Asia, where the Stevens technique appeared later and, in some cases, met with a degree of skepticism. In the United States, however, within the community of marimbists, the Stevens technique gradually began to replace other methods in the years following the publication of *Method of Movement*. It seems that one of the main reasons for this dominance was Stevens's (and other authors') continuation of the aforementioned hierarchy of four-mallet techniques, which Stevens first introduced in the chapter *The Four Mallet Grip*.

The narrative of a gradual progression in technical capability – from the traditional grip to the Stevens technique – was continued by the author of *Method of Movement* in a

series of articles that began appearing in the magazine *Modern Percussionist* six years after the first edition of the book.

The first article by Stevens to address this topic appeared in the second issue of the magazine, as part of a series of columns titled *Marimba Perspectives*. In the column *Switch Gripping*, Stevens discusses the problem of the limited potential of the marimba techniques available at the time and emphasizes the need to improve them by replacing "inferior" techniques with "superior" ones. He describes his own educational path – previously presented in his book – from the traditional grip, through the Burton grip, to the Musser grip, and cites examples of other marimbists and vibraphonists who, faced with the limitations of existing techniques, developed their own solutions.

> How many players do you know who have reached the plateau in their playing and feel the need to change grips? Personally, I started with traditional cross-stick grip, switched to Burton, then to Musser, and then to my own.[139]

> Grip switching, in an effort to improve control over the mallets, has a history almost as old as four-mallet playing itself.[140]

In the column *Switch Gripping*, Stevens does not yet address the topic of his technique's superiority over others or the improvements he introduced to the Musser grip, instead announcing a subsequent article that would discuss these issues in greater detail. The concluding paragraph suggests to the reader that the time has come to find the right technique – one that offers the full range of possibilities – and to finally focus on making music.

> This brief summary demonstrates that all of the popular methods of holding four mallets currently in use can trace their origins back to the 1920s. Mine is clearly an outgrowth of Musser's; Burton's, an outgrowth of traditional. There are a finite number of viable ways to hold four mallets, and perhaps the major methods have already been established. If so, it's time we sorted out the merits of each, stopped switch gripping, and got on to music making.[141]

A continuation of the *Switch Gripping* column is *Four-Mallet Grip Needed*, which appeared in the third issue of *Modern Percussionist*. Stevens wrote this article humorously in the form of a job advertisement, in which a marimbist is seeking a candidate – a four-mallet technique. At the beginning of the column, it is stated that there are two job

[139] L.H. Stevens, "Switch Gripping" *Modern Percussionist* 1.2 (1985), 28–29.
[140] Ibidem, 29.
[141] Ibidem.

openings (meaning a need for two different four-mallet grips) or one position available, but only for a sufficiently versatile candidate. In the remainder of the article, Stevens presents a description of the "employee's" requirements. He lists, in bullet-point form, the musical tasks and situations in which the prospective "candidate" must prove effective in order to meet the marimbist's expectations..

> Job description:
> 1. Play melodic lines with soprano mallet alone,
> 2. play melodic lines by alternating hands (for passages too fast to play with one mallet),
> 3. Play chords and melodic material both extremely loud and extremely soft,
> 4. Change intervals quickly and easily,
> 5. Play melodic lines with various combinations of mallets for tone color changes [...],
> 6. Play melodic lines with "sequential" sticking patterns (play E-flat major scale with 12341234),
> 7. Have mallet independence (play a melodic line with one mallet while sustaining three other notes with a roll),
> 8. Have dynamic independence [...],
> 9. Play extreme intervals – like a 10th in the bass register of the marimba,
> 10. Play one-handed (independent) rolls,
> 11. Have aptitude in mallet dampening..[142]

At the end of this "job offer," there is a note reading *Position Open Immediately*, along with a humorous remark that the candidate will receive their first paycheck only after a ten-year "probationary period," followed by a list of applicants for the position: Traditional crossed-stick grip, Burton Grip, Musser Grip, and Stevens Grip.

What follows is a detailed evaluation of each "candidate" in terms of their ability to meet the previously listed requirements. The first candidate is the traditional grip, which, according to Stevens, performs adequately only in points 3, 10, and 11. Interestingly, Stevens acknowledges that point 10 – playing an independent tremolo with one hand – is possible when using the traditional grip, provided that the hand is positioned **vertically**.

This serves as evidence that Stevens did allow for the possibility of playing with the traditional grip using a vertical hand position. Nevertheless, he repeatedly pointed to the flat hand position as one of the fundamental drawbacks of this technique. This raises an important question: if a vertical hand position enables the execution of such a technically demanding task as the independent tremolo, why could it not be applied to other aspects of performance as well? Furthermore, if such a possibility existed, why did no one other than

[142] L.H. Stevens, *Four-Mallet Grip Needed*…, op. cit., 30.

Stevens mention it until the publication of Milkov's textbook many years later? In the sources I have found, I have not been able to locate a definitive answer to this question.

At the end of his skill analysis, Stevens provides a summary of each "candidate." He summarizes the capabilities of the classical technique and the traditional grip as follows:

> Despite shortcomings, applicant is very popular due to simplicity of operation, ease of learning, and hordes of orchestrally oriented percussion teachers having taught it to generations of percussion students. The initial security offered by this grip often backfires on the employer several years later, when promotion places greater demands on speed, flexibility, and freedom of motion. This is recommended for simple responsibilities: easy melodic work, close-voiced chords, and the few four-mallet orchestral parts in the standard literature.[143]

In the evaluation of the "job candidates," the Burton grip receives a much higher score, as Stevens considers it well-suited for fulfilling points 1, 3, 5, and 11. Points 2, 4, 9, and 10 are deemed achievable with certain limitations, while only points 6, 7, and 8 are considered impossible to accomplish. The grip is summarized as follows:

> Something like taking traditional crossed-stick grip and adding power steering. It has some of the same basic handling characteristics, but it sure feels easier to turn the steering wheel. The Burton grip is almost as straightforward as the traditional grip in respect to initial ease of learning and simplicity of operation, but is quite a bit more relaxed and flexible "on the job." It's shortcomings are not a drawback in improvised styles, as the employer simply doesn't improvise super-fast, large interval changes, sequential stickings, and passages requiring real independence of the two mallets in hand. These limitations can be a problem in transcribed and original marimba literature that have these occupational hazards. In fact, there are already jobs to be done in the marimba repertoire that this grip finds virtually impossible.[144]

The next "candidate" is the Musser grip – the precursor to the Stevens technique – which, interestingly, receives a significantly lower score than the Burton grip. According to Stevens, it is fully suitable only for fulfilling points 7, 8, and 9. Points 2 and 4 can be achieved under certain conditions, while the remaining tasks are, in his view, unattainable. The author provides the following summary:

> For "light" classically oriented literature where a degree of finger control is desired, this is probably an improvement over crossed-stick candidates. Many players (who don't employ this grip, of course) contend that it is too weak and "floppy" for loud commercial jobs. The

[143] Ibidem.
[144] Ibidem.

> opinion of the jury is – it depends. If the inner mallet is held just with the thumb and first two fingers (without pinning the end of the palm) – guilty.[145]

The final "candidate" is, of course, the Stevens grip, which – as one might expect – receives the highest and most outstanding score. The only point where the author admits that his technique may perform less effectively than, for example, the Burton grip is point 11, concerning bar dampening with the mallets.

The summary includes a number of the previously discussed advantages of the Stevens technique, which the author also presents in his textbook. The closing sentences of the summary point out the possible initial difficulties in mastering this technique and emphasize that learning it requires a good teacher – or, as Stevens writes, "a certain thick book" on the subject (a clear reference to his own *Method of Movement*).

In the subsequent issues of the *Modern Percussionist* quarterly, six more columns from the *Marimba Perspectives* series were published, all authored by L.H. Stevens:

- "This Column Is Not About UFOs And Mummies" – a detailed discussion of the proper method for holding mallets using the Stevens grip,[146]
- "Marididdles" – a shorter article proposing several basic marimba exercises,[147]
- "Accompanying on Marimba" part 1 and 2 – focused on the topic of accompanying solo instruments on the marimba,[148]
- "Dear Leigh" – addressing the terminology used to describe different types of marimba tremolo,[149]
- "Manuscrips Discovered Techniques No Longer An Issue" – an unusual column signed by Stevens, consisting almost entirely of a publication of a patent for xylophone mallets with adjustable length.[150]

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[145] Ibidem, 31.
[146] L.H. Stevens, "This Column Is Not About UFOs…", op. cit.
[147] L.H. Stevens, "Marididdles" *Modern Percussionist* 2.2 (1986), 42–43.
[148] L.H. Stevens, "Accompanying on Marimba" *Modern Percussionist* 2.3 (1986), 40–41; L.H. Stevens, "Accompanying on Marimba Part 2" *Modern Percussionist* 2.4 (1986), 32–36.
[149] L.H. Stevens, "Dear Leigh" *Modern Percussionist* 3.2 (1987), 40–41.
[150] L.H. Stevens, "Manuscripts Discovered Techniques No Longer An Issue" *Modern Percussionist* 3.3 (1987), 38–39.

In several of these articles, Stevens promotes *Method of Movement* and advocates for his technique, arguing for its superiority over other four-mallet playing methods. However, the column *Four-Mallet Grip Needed* is undoubtedly the most explicit and straightforward presentation of the hierarchy of four-mallet techniques established by Stevens. From this text, it is clear that, according to the author of *Method of Movement*, the absolute worst choice among four-mallet techniques is the classical traditional grip, while the best is the Stevens technique.

The hierarchy of four-mallet techniques proposed by Leigh Howard Stevens was accepted in the United States (and beyond) as a true and objective assessment of the capabilities of the available four-mallet playing methods as early as the beginning of the 1980s. This is evidenced by several examples:

1. Just two years after the release of the first edition of *Method of Movement*, and even before the publication of the *Modern Percussionist* columns, Ronald A. Holloway added the following remarks about the Musser grip to the third edition of Harry R. Bartlett's *Guide to Teaching Percussion*, first published in 1964.:

   > Another method of holding three or four mallets is known as the "Musser" grip. [...] Although this method has been around for some time, its advantages rapidly are becoming more obvious as the literature for the marimba becomes more demanding.
   >
   > Independency of hands and individual mallets required by contemporary literature makes the "Musser" grip desirable. [...]
   >
   > Some of the obvious advantages of the "Musser" grip over the regular or traditional grip such as eliminating the problem of the interval of a second, providing a wider spread between two mallets of the same hand, and individualization of each mallet justify utilizing this grip when attempting the more difficult literature.[151]

   Pomimo że chwyt Mussera istniał kilkadziesiąt lat przed ukazaniem się pierwszego wydania *Guide to Teaching Percussion*, jego autor wówczas o nim nie wspomniał. Wydaje się więc, że dodanie tej wzmianki w trzecim wydaniu było wynikiem rosnącej popularności L.H. Stevensa oraz *Method of Movement* już w pierwszych latach po jego publikacji.

[151] Harry R. Bartlett, Ronald A. Holloway, *Guide to Teaching Percussion*, ed. 3 (Dubuque, IA: Wm. C. Brown Company Publishers, 1981), 93.

2. In the same year as the third edition of *Guide to Teaching Percussion*, an article titled "Beginning Four-Mallet Playing" by Mario A. Gaetano, Jr. was published in *The Instrumentalist* magazine, presenting a continuation of the idea of the hierarchy of four-mallet techniques:

> The cross-stick grip is the most popular because of its simplicity in mallet manipulation. The disadvantage of this grip is that individual mallet independence is not at a maximum because both mallets are touching each other; when one moves, the other also moves in the opposite direction. It will take the student long hours of practice to develop both parts of the hand working independently, but experts agree that in the long run this grip offers a maximum amount of independence and control.[152]

Additionally, the article includes photographs illustrating the various types of mallet grips, and in the case of the Musser grip, the image already shows its version modified by L.H. Stevens. The author also lists *Method of Movement* among the recommended resources for learning four-mallet technique.

Both this article and the note on the Musser grip in the third edition of *Guide to Teaching Percussion* suggest that, in the first years following the publication of *Method of Movement*, authors referring to Stevens's technique still called it the "Musser grip." It was only later that the terms "Stevens technique" and "Stevens grip" became widely adopted.

3. Gary D. Cook expresses the following view of the traditional grip in his 1988 textbook *Teaching Percussion*:

> The traditional cross-grip is probably the quickest to learn and a good grip for playing block chords. It is, however, slightly weaker in comparison with the other two grips in that the added mallet is rather weakly gripped and controlled. Changing intervals from open to close in one hand is relatively slow. It is a good grip for the beginner who must learn a multiple-mallet grip quickly, and works particularly well on vibes, xylophone, and bells.[153]
>
> The Burton grip, made popular by the great jazz vibraphonist Gary Burton similar to the traditional grip but allows for much stronger control of the outside mallets, numbers 4 and 1.[154]

[152] Mario A Gaetano Jr, "Beginning Four Mallet Playing", op. cit., 622.
[153] Gary D. Cook, *Teaching Percussion*…, op. cit., s. 158.
[154] Ibidem, s. 166.

4. Mitchell Peters, renowned worldwide for his percussion pedagogy, offers the following assessment of the Musser–Stevens, Burton, and traditional grips in his 1995 textbook *Fundamental Method for Mallets*:

> The Musser-Stevens grip is preferred by most classically oriented marimbists. For the mallet performer dealing with marimba solo literature, this grip offers the most potential…
>
> This grip [Burton] is very popular with vibe players, as well as most performers of jazz and rock. Developed by vibraphonist Gary Burton, it is a variation of the old-fashioned cross-grip…
>
> This grip [traditional cross-grip] was the original four-mallet grip, and is probably the easiest to learn, but it has the least technical potential and the most problems of the four-mallet grips, and is therefore not recommended.[155]

5. The authors of the entry "marimba" in the *Oxford Dictionary of Music*, which—in addition to outlining the instrument's history – includes a brief overview of the available four-mallet grips/techniques, describe the traditional grip as one that has "given way" to the other three methods, clearly implying its inferiority to the more modern techniques:

> The original four-mallet technique for bar percussion instruments was designed to facilitate the playing of chords. The 'traditional grip', as it is known, has the shafts of the mallets crossed in the palm of the hand, with the outside shaft under the inside and between the first and second fingers, and the inside mallet under the thumb, and the thumb and first finger controlling the interval that is played. The 'traditional grip' has given way to: (1) the 'Burton grip' […]; (2) the 'Musser' grip […]; and (3) a variant of the latter developed by the marimba virtuoso Leigh Howard Stevens, which he describes as a 'child of Musser grip'.[156]

Based on the examples above, it is easy to see how authoritative a figure Leigh Howard Stevens became in American marimba pedagogy during the last two decades of the 20th century. It is also worth noting that in the sixteen-year period between 1979 and 1995 (that is, from the first edition of *Method of Movement* to the publication of Mitchell Peters's *Fundamental Method for Mallets*), in addition to the aforementioned textbooks and articles, five other sources concerning the teaching of four-mallet technique were published that I have been able to identify:

- Garwood Whaley: *Primary Handbook for Mallets* (1980), with the continuation titled *4 Mallet Exercises* published in 1994,

[155] Mitchell Peters, *Fundamental Method for Mallets*…, op. cit., 114–116.
[156] Gerhard Kubik, James Blades, James Holland, „Marimba", *Grove Music Online*…, op. cit.

- Lionel Hampton, Jean Claude Forester: *The New Vibraphone Method* (1981),
- David Samuels: *A Musical Approach to Four Mallet Technique for Vibraphone* (1982),
- Mario A. Gaetano: article *Teaching the Vibraphone* (1982),
- Jerry Leake: *Mallets, Meters & Multiple Percussion* (1993),

The works by Hampton, Samuels, and Gaetano focus exclusively on vibraphone performance, while the remaining two publications consist mainly of notated exercises and discuss four-mallet technique only in a very superficial manner.

It therefore appears that in the first sixteen years following the publication of *Method of Movement*, the topic of marimba technique in American literature was largely monopolized by L.H. Stevens. During this period, four-mallet pedagogy divided into two main paths:

- Authors who continued Stevens's narrative, expanding on his approach to marimba technique.
- Authors of vibraphone textbooks, who contributed to the further popularization of the Burton grip.

A turning point can be considered the publication of Nancy Zeltsman's article "Traditional Four-Mallet Grip" in *Percussive Notes* in 1995. This was the first source I have found that favored the traditional grip and was published in the United States after *Method of Movement*. Zeltsman later expanded this article into a full textbook on classical traditional grip technique, *Four-Mallet Marimba Playing: A Musical Approach for All Levels* (2003), which I have already referenced in Chapter 2.

Since the publication of *Traditional Four-Mallet Grip*, most of the sources I have found concerning the teaching of four-mallet techniques have sought to maintain neutrality in evaluating their potential. In publications that favor a particular technique, it is now common to find a note emphasizing that the choice of method depends on the performer's personal preference and that each technique has its own advantages and disadvantages.

Of the sources I have found published after Nancy Zeltsman's textbook, only two explicitly describe the Stevens technique as "the most versatile":

- *Four-Mallet Independence for Marimba* (2006) – Johnny Lee Lane & Samuel A. Floyd,
- *Marimba for Four* (2019) – David Steinquest.[157]

3.2 Experiment 1 – Speed Test No. 1

3.2.1 Research Questions and Hypotheses

1. Do L.H. Stevens's claims about the superiority of his technique over the classical technique find confirmation in the execution of exercises composed by him? As stated in the chapter *The Four-Mallet Grip* and in thematic articles by L.H. Stevens, the classical technique and the traditional grip used within it are not recommended by Stevens. According to him, their use is justified only in the case of "simple melodic lines, close-position chords, and four-mallet orchestral parts in the standard repertoire."[158] Accepting these theses, I assume that the practical exercises from the *Method of Movement* book – composed for both beginner and advanced marimba soloists who wish to reach the highest levels of technical mastery on the instrument – should in most cases be unplayable using the classical technique with the traditional grip at or near maximum tempo.

2. What is the state of my skills in using the Stevens technique at the beginning of the research? My experience with the classical technique and the traditional grip extends over twenty years of performance practice, during which I have repeatedly performed some of the most technically demanding works in the marimba literature. After completing my undergraduate studies, I used the Stevens technique less frequently, so at the time of beginning this experiment, my skills in that area may be somewhat more limited. Nevertheless, both techniques share certain similarities (see Chapter 2), which allows for faster and more efficient mastery of the second technique when one is already highly proficient in the first. Additionally, since deciding to engage in the subject of this research,

[157] Johnny Lee Lane, Samuel A. Floyd, Jr., *Four-Mallet Independence for Marimba*…, op. cit., 6; David Steinquest, *Marimba For Four*…, op. cit., 2.
[158] L.H. Stevens, "Four-Mallet Grip Needed", op. cit., 30.

I have been working regularly on improving my playing with the Stevens technique, using the Stevens grip, and during this period I began to use it more often than the traditional grip. My goal is to further develop these skills over three years of doctoral research, supported by successive experiments conducted throughout that period. However, to draw proper and objective scientific conclusions, it seems necessary to examine my current level of proficiency in the Stevens technique and compare it with my proficiency in the classical technique.

3. In which specific exercises from *Method of Movement* will the Stevens technique unquestionably prove superior to the classical technique? Due to my greater proficiency with the traditional grip, I assume that using it I will be able to perform exercises from *Method of Movement* at faster maximum tempos than when playing with the Stevens grip. However, if the thesis of the Stevens technique's superiority is correct – whether in general or only in certain technical situations – I should notice that by using it (despite having less experience with the grip), I gain greater performance freedom compared to the classical technique, or perhaps even the ability to exceed the maximum tempo achievable with the classical technique. I also assume that there will be exercises for which I will reach a similar tempo limit with both techniques. Under the assumption of Stevens's superiority, however, one must consider that this limit may have two different causes: in the case of the classical technique, it may stem from its natural, objective limitations, while in the case of the Stevens technique, it may result from my own insufficient experience. The experiment will allow me to determine whether such relationships exist and, if so, in which specific cases.

4. Are there any technical problems in *Method of Movement* for which the classical technique would prove more effective than the Stevens technique?

3.2.2 Research Methods

For the experiment, I used a five-octave marimba made by Adams and Malletech MB 8 mallets, a model bearing the signature of Michael Burritt (version from around 2010). The Malletech MB 8 mallets are medium-hard, versatile mallets designed for general use across all registers of the instrument and in various repertory contexts. My choice of this

particular model is justified precisely by its versatility in terms of both the hardness of the produced sound and its moderate weight. These are factors that make these mallets frequently chosen by both beginners and advanced marimbists for technical study and general use. A second argument that influenced my decision is the signature of the mallets. They were designed with Michael Burritt in mind – a marimbist who uses the Stevens technique and is actively involved in its promotion and teaching. Therefore, the weight and length of these mallets are adapted to the Stevens technique and allow for greater performance freedom when using this technique, in contrast to mallets designed for marimbists who prefer the classical technique and traditional grip, which are often heavier, longer, and bulkier.

The duration of the experiment was two months, between December 22, 2022, and February 23, 2023. During this period, I played through all 590 exercises from *Method of Movement* using both the Stevens technique with the Stevens grip and the classical technique with the traditional grip, practicing 3–4 times per week in sessions lasting between 30 and 80 minutes. Before each session, I warmed up for approximately 15 minutes to ensure that the mobility of my joints remained at a similar level before each subsequent experiment session.

All exercises from *Method of Movement* were played for the first time in my life during the experiment, as I had not used this book for my own technical development prior to undertaking the research. Each exercise was first played using the Stevens technique, with a metronome set to the maximum tempo indicated by the author for that particular exercise (or, more often, for a group of similar exercises). I repeated each exercise several times to verify whether my technical skills allowed me to perform at least eight repetitions fluently and accurately. If I experienced resistance in the form of hand stiffness or if performing eight repetitions without mistakes proved impossible, I reduced the metronome tempo until I reached a speed that allowed for relaxed and precise playing. I then repeated the entire process using the classical technique..

In this experiment, I played only in the base key of C major, without performing the transpositions recommended by L.H. Stevens as part of the practice model for his book. The purpose of Experiment 1 was to determine the maximum tempi of each exercise in the

base key, while the issues related to the motor mechanics of transposing the exercises will be analyzed in the next experiment ("Test on Movement Efficiency").

3.2.3 Results

The maximum tempos at which I was able to play each exercise are listed in Table 1, which in its first column contains the maximum tempo indicated by L.H. Stevens, in the second column the maximum tempo I achieved using the Stevens technique, and in the third column the maximum tempo achieved using the classical technique. The rhythmic values of the tempos are marked with the following letters: q for a quarter note, h for a half note, and e for an eighth note. The table is divided into sections reflecting five types of exercises, corresponding to four types of strokes: *Single Independent Strokes*, *Single Alternating Strokes*, *Double Vertical Strokes*, *Double Lateral Strokes*, and *Mixed Strokes*. Instances in which the Stevens technique (at my current level of proficiency) produced a faster tempo than the classical technique are marked in red, while those in which the classical technique reached its limit due to its natural constraints are marked in orange.

In Table 2 (see p. 131), I compiled the statistical percentage values of performance tempos for all exercises, beginning with the maximum tempo, followed by tempo ranges representing 90–99%, 80–89%, 70–79%, 60–69%, 50–59%, and below 50% of the maximum value. In subsequent tables (Tables 3, 4, 5, 6, and 7), I presented the statistical percentage values of tempos divided according to the individual types of exercises.

Ex. Number	**Maximum tempo proposed by L.H. Stevens**	**The maximum tempo I reached with Stevens technique**	**The maximum tempo I reached with classical technique**
Single Independent Strokes			
1	q=100	q=100	q=100
2	q=100	q=100	q=100
3	q=100	q=100	q=100
4	q=80	q=70	q=70
5	q=88	q=75	q=80
6	q=144	q=130	q=144
7	q=144	q=130	q=144
8	q=144	q=144	q=144
9	q=144	q=135	q=144
10	q=144	q=135	q=135
11	q=144	q=135	q=144
12	q=144	q=115	q=120

13	q=144	q=110	q=115
14	q=144	q=110	q=120
15	q=144	q=105	q=110
16	q=144	q=110	q=115
17	q=144	q=130	q=144
18	q=144	q=125	q=140
19	q=152	q= 152	q=152
20	q=152	q=120	q=120
21	q=152	q=110	q=110
22	q=152	q=130	q=130
23	q=144	q=110	q=110
24	q=144	q=110	q=120
25	e=160	e=140	e=150
26	e=160	e=140	e=150
27	q=116	q=116	q=116
28	q=116	q=116	q=116
29	q=104	q=85	q=85
30	q=104	q=85	q=85
31	q=168	q=140	q=140
32	q=96	q=80	q=80
33	q=96	q=80	q=80
34	q=96	q=80	q=80
35	q=96	q=80	q=80
36	q=96	q=75	q=75
37	q=96	q=75	q=75
38	q=96	q=75	q=80
39	q=96	q=75	q=80
40	q=96	q=70	q=75
41	q=96	q=70	q=75
42	q=96	q=70	q=75
43	q=96	q=70	**q=70**
44	q=96	q=70	q=75
45	q=96	q=70	**q=70**
46	q=72	q=50	q=50
47	q=72	q=50	q=50
48	q=72	q=50	q=50
49	q=72	q=50	q=50
Single Alternating Strokes			
50	q=208	q=208	q=208
51	q=208	q=208	q=208
52	q=208	q=208	q=208
53	q=208	q=208	q=208
54	q=208	q=208	q=208
55	q=208	q=208	q=208
56	q=208	q=190	q=200
57	q=208	q=190	q=190
58	q=208	q=150	q=200
59	q=208	q= 145	q=180
60	q=208	q=160	q=200

61	q=208	q=160	q=200
62	q=208	q=160	q=200
63	q=208	q=160	q=200
64	q=208	q=160	q=200
65	q=208	q=160	q=200
66	q=208	q=160	q=200
67	q=208	q=160	q=200
68	q.=58	q.=50	q.=58
69	q.=58	q.=50	q.=58
70	q=176	q=150	q=150
71	q=176	q=150	q=150
72	q=176	q=150	q=150
73	q=176	q=150	q=150
74	q=176	q=150	q=150
75	q=176	q=150	q=150
76	q=176	q=150	q=150
77	q=176	q=150	q=150
78	q=176	q=130	q=130
79	q=176	q=130	q=130
80	q=176	q=130	q=130
81	q=176	q=130	q=130
82	q=176	q=130	q=130
83	q=176	q=130	q=130
84	q=176	q=130	q=130
85	q=176	q=130	q=130
86	q=152	q=110	q=110
87	q=152	q=110	q=110
88	q=152	q=110	q=110
89	q=152	q=110	q=110
90	q=152	q=110	q=110
91	q=152	q=110	q=110
92	q=152	q=110	q=110
93	q=152	q=110	q=110
94	q=152	q=80	q=80
95	q=152	q=80	q=80
96	q=152	q=80	q=80
97	q=152	q=80	q=80
98	q=152	q=80	q=80
99	q=152	q=80	q=80
100	q=152	q=80	q=80
101	q=152	q=80	q=80
102	q=152	q=130	q=130
103	q=152	q=130	q=130
104	q=152	q=130	q=130
105	q=152	q=130	q=130
106	q=152	q=130	q=130
107	q=152	q=130	q=130
108	q=152	q=130	q=130
109	q=152	q=130	q=130

110	q=152	q=110	q=110
111	q=152	q=110	q=110
112	q=152	q=110	q=110
113	q=152	q=110	q=110
114	q=152	q=110	q=110
115	q=152	q=110	q=110
116	q=152	q=110	q=110
117	q=152	q=110	q=110
118	q=152	q=110	q=110
119	q=152	q=110	q=110
120	q=152	q=110	q=110
121	q=152	q=110	q=110
122	q=152	q=110	q=110
123	q=152	q=110	q=110
124	q=152	q=110	q=110
125	q=152	q=110	q=110
126	q=144	q=110	q=110
127	q=144	q=110	q=110
128	q=144	q=110	q=110
129	q=144	q=110	q=110
130	q=144	q=110	q=110
131	q=144	q=110	q=110
132	q=144	q=110	q=110
133	q=144	q=110	q=110
134	h=108	h=108	h=108
135	h=108	h=108	h=108
136	h=108	h=95	h=95
137	h=108	h=95	h=95
138	h=108	h=100	h=100
139	h=108	h=95	h=95
140	h=108	h=95	h=95
141	h=108	h=95	h=95
142	h=108	h=95	h=95
143	h=108	h=90	h=90
144	h=108	h=95	h=95
145	h=108	h=95	h=95
146	h=108	h=95	h=95
147	h=108	h=95	h=95
148	h=108	h=90	h=90
149	h=108	h=90	h=90
150	h=108	h=90	h=90
151	h=108	h=90	h=90
152	q=108	q=75	q=90
153	q=108	q=75	q=90
154	q=108	q=75	q=90
155	q=108	q=75	q=90
156	q=108	q=75	q=90
157	q=108	q=75	q=90
158	q=108	q=75	q=90

159	q=108	q=75	q=90
160	q=108	q=75	q=90
161	q=108	q=75	q=90
		Double Vertical Strokes	
162	h=132	h=132	h=132
163	h=132	h=132	h=132
164	h=132	h=132	h=132
165	h=132	h=132	**h=125**
166	h=132	h=100	h=100
167	h=132	h=60	**h=80**
168	h=132	h=120	h=132
169	h=132	h=110	h=132
170	h=132	h=50	h=100
171	h=112	h=112	h=112
172	h=112	h=112	h=112
173	h=112	h=112	h=112
174	h=112	h=112	h=112
175	h=112	h=112	h=112
176	h=112	h=100	h=100
177	h=112	h=75	h=85
178	h=112	h=65	h=75
179	h=112	h=70	h=80
180	h=112	h=65	h=75
181	h=112	h=100	h=112
182	h=112	h=70	h=100
183	h=112	h=70	h=70
184	h=112	h=70	h=70
185	h=112	h=112	h=112
186	h=112	h=112	h=112
187	h=112	h=90	h=90
188	h=112	h=90	h=90
189	h=112	h=80	h=80
190	h=112	h=112	h=112
191	h=112	h=80	h=80
192	h=112	h=70	h=80
193	q=72	q=60	q=60
194	q=160	q=90	q=90
195	q=160	q=90	q=90
196	q=160	q=90	q=90
197	q=160	q=90	q=90
198	q=160	q=80	q=80
199	q=160	q=80	q=80
200	q=160	q=70	q=70
201	q=160	q=70	q=70
202	q=72	q=65	q=65
203	q=68	q=60	q=60
204	q=68	q=50	q=50
205	q=68	q=68	q=68
206	q=68	q=55	q=55

207	h=126	h=126	h=126
208	h=126	h=126	h=126
209	h=126	h=95	h=110
210	h=126	h=85	h=110
211	q=72	q=60	q=60
212	q=72	q=60	q=60
213	q=72	q=60	q=60
214	q=72	q=72	q=72
215	q=72	q=45	q=45
216	q=72	q=50	q=55
217	q=72	q=45	q=50
218	q=80	q=70	q=70
219	q=96	q=70	q=80
220	e=178	e=140	e=140
221	e=178	e=120	e=120
222	e=178	e=90	e=90
223	e=178	e=90	e=90
224	e=178	e=90	e=90
225	q=108	q=70	q=80
226	q=108	q=70	q=80
227	q=108	q=60	q=70
228	q=108	q=60	q=70
229	q=92	q=50	q=75
230	q=92	q=45	q=70
231	q=92	q=45	q=60
232	q=92	q=40	q=50
233	q=72	q=50	q=65
234	q=72	q=50	q=65
235	q=72	q=45	q=55
236	q=72	q=45	q=55
237	q=72	q=45	q=55
238	q=72	q=45	q=55
239	q=72	q=45	**q=40**
240	q=72	q=45	**q=40**
241	e=116	e=65	e=70
242	e=116	e=65	e=70
243	q=70	q=40	**q=30**
244	q=70	q=40	**q=30**
245	q=70	q=40	**q=30**
246	q=70	q=40	**q=20**
247	q=70	q=40	**q=20**
248	q=70	q=40	**q=20**
249	e=116	e=70	**e=60**
250	e=116	e=60	**e=60**
251	e=116	e=70	**e=60**
252	e=116	e=60	**e=60**
253	e=126	e=126	e=126
254	e=126	e=126	e=126
255	e=160	e=130	**e=120**

256	e=160	e=120	**e=120**
257	e=152	e=152	e=152
258	e=152	e=152	e=152
259	e=152	e=120	e=152
260	e=152	e=120	e=152
261	e=152	e=140	e=152
262	e=152	e=120	e=152
263	q=152	q=152	q=152
264	q=152	q=152	q=152
265	q=152	q=152	q=152
266	q=152	q=152	q=152
267	q=104	q=80	q=80
268	q=104	q=80	q=80
269	q=104	q=80	q=80
270	q=104	q=80	q=80
271	e=112	e=100	e=100
272	q=152	q=152	q=152
273	q=92	q=92	q=92
274	q=92	q=92	q=92
275	q=92	q=80	q=92
276	q=92	q=92	q=92
277	e=176	e=120	e=140
278	e=176	e= 120	e=140
		Double Lateral Strokes	
279	h=120	h=90	h=90
280	h=120	h=90	h=90
281	h=120	h=110	h=110
282	h=120	h=110	h=110
283	h=120	h=90	h=90
284	h=120	h=110	h=110
285	q=120	q=90	q=90
286	q=120	q=100	q=100
287	q=120	q=90	q=90
288	q=120	q=100	q=100
289	q=120	q=90	q=90
290	q=120	q=100	q=100
291	q=120	q=90	q=90
292	q=120	q=100	q=100
293	q=120	q=90	q=90
294	q=120	q=100	q=100
295	q=208	q=190	**q=170**
296	q=208	q=208	q=208
297	q=208	q=180	**q=170**
298	q=208	q=180	q=180
299	q=208	q=155	q=170
300	q=208	q=145	q=160
301	q=208	q=145	q=160
302	q=208	q=145	q=160
303	q=208	q=165	q=165

304	q=208	q=165	q=165
305	q=208	q=165	q=165
306	q=208	q=165	q=165
307	q=208	q=165	q=180
308	q=208	q=165	q=180
309	q=208	q=165	q=180
310	q=208	q=165	q=180
311	q=208	q=150	q=170
312	q=208	q=150	q=170
313	q=208	q=160	q=170
314	q=208	q=160	q=170
315	q=208	q=200	**q=190**
316	q=208	q=200	q=208
317	q=208	q=180	q=180
318	q=208	q=180	q=180
319	q=208	q=170	q=180
320	q=208	q=170	q=180
321	q=208	q=180	q=180
322	q=208	q=180	q=180
323	q=208	q=208	q=208
324	q=208	q=190	**q=180**
325	q=208	q=180	**q=180**
326	q=208	q=180	**q=180**
327	q=168	q=168	q=168
328	q=168	q=168	q=168
329	q=168	q=168	q=168
330	q=168	q=168	q=168
331	q=168	q=168	q=168
332	q=168	q=168	q=168
333	q=168	q=168	q=168
334	q=168	q=168	q=168
335	q=168	q=168	q=168
336	q=168	q=168	q=168
337	q=168	q=168	q=168
338	q=168	q=168	q=168
339	q=168	q=168	q=168
340	q=168	q=168	q=168
341	q=168	q=168	q=168
342	q=168	q=168	q=168
343	q=168	q=168	q=168
344	q=168	q=168	q=168
345	q=168	q=168	q=168
346	q=168	q=168	q=168
347	q=168	q=168	q=168
348	q=168	q=168	q=168
349	q=168	q=168	q=168
350	q=168	q=168	q=168
351	q=168	q=130	q=130
352	q=168	q=130	q=130

353	q=168	q=130	q=130
354	q=168	q=130	q=130
355	q=168	q=130	q=130
356	q=168	q=130	q=130
357	q=168	q=130	q=130
358	q=168	q=120	q=120
359	q=168	q=168	q=168
360	q=168	q=168	q=168
361	q=168	q=168	q=168
362	q=168	q=168	q=168
363	q=168	q=168	q=168
364	q=168	q=168	q=168
365	q=168	q=168	q=168
366	q=168	q=168	q=168
367	q=168	q=168	q=168
368	q=168	q=168	q=168
369	q=168	q=168	q=168
370	q=168	q=168	q=168
371	q=168	q=168	q=168
372	q=168	q=168	q=168
373	q=168	q=168	q=168
374	q=168	q=168	q=168
375	q=168	q=155	q=155
376	q=168	q=155	q=155
377	q=168	q=155	q=155
378	q=168	q=155	q=155
379	q=168	q=155	q=155
380	q=168	q=155	q=155
381	q=168	q=155	q=155
382	q=168	q=155	q=155
383	q=144	q=144	q=144
384	q=144	q=144	q=144
385	q=144	q=144	q=144
386	q=144	q=144	q=144
387	q=144	q=144	q=144
388	q=144	q=144	q=144
389	q=144	q=144	q=144
390	q=144	q=144	q=144
391	q=144	q=144	q=144
392	q=144	q=144	q=144
393	q=144	q=144	q=144
394	q=144	q=144	q=144
395	q=144	q=144	q=144
396	q=144	q=144	q=144
397	q=144	q=144	q=144
398	q=144	q=144	q=144
399	q=144	q=144	q=144
400	q=144	q=144	q=144
401	q=144	q=144	q=144

402	q=144	q=144	q=144
403	q=144	q=130	q=144
404	q=144	q=130	q=144
405	q=144	q=130	q=144
406	q=144	q=130	q=144
407	q=144	q=130	q=144
408	q=144	q=130	q=144
409	q=144	q=130	q=144
410	q=144	q=130	q=144
411	q=184	q=184	q=184
412	q=184	q=184	q=184
413	q=184	q=184	q=184
414	q=184	q=184	q=184
Mixed Strokes			
415	e=208	e=208	e=208
416	e=208	e=208	e=208
417	e=208	e=208	e=208
418	e=208	e=208	e=208
419	q=116	q=116	q=116
420	q=116	q=116	q=116
421	q=116	q=116	q=116
422	q=116	q=116	q=116
423	q=116	q=116	q=116
424	q=116	q=116	q=116
425	q=104	q=104	q=104
426	q=104	q=104	q=104
427	q=104	q=104	q=104
428	q=120	q=110	q=110
429	q=104	q=80	q=80
430	q=104	q=104	q=104
431	q=120	q=120	q=120
432	q=184	q=160	q=160
433	q=184	q=160	q=160
434	q=184	q=160	q=160
435	q=184	q=160	q=160
436	q=184	q=160	q=160
437	q=184	q=140	q=160
438	q=184	q=140	q=160
439	q=184	q=140	q=160
440	q=184	q=120	q=150
441	q=184	q=120	q=150
442	q=184	q=120	q=150
443	q=184	q=120	q=150
444	q=184	q=120	q=150
445	q=184	q=120	q=150
446	q=184	q=120	q=150
447	q=184	q=120	q=150
448	q=184	q=120	q=150
449	q=184	q=120	q=150

450	q=184	q=120	q=150
451	q=184	q=120	q=150
452	q=184	q=120	q=150
453	q=184	q=120	q=150
454	q=184	q=120	q=150
455	q=184	q=120	q=150
456	q=144	q=144	q=144
457	q=144	q=144	q=144
458	q=144	q=144	q=144
459	q=144	q=144	q=144
460	q=144	q=144	q=144
461	q=144	q=144	q=144
462	q=168	q=130	q=160
463	q=168	q=130	q=160
464	q=168	q=110	q=110
465	q=168	q=120	q=120
466	q=168	q=110	q=110
467	q=168	q=120	q=130
468	q=168	q=150	q=150
469	q=168	q=160	q=160
470	q=168	q=150	q=150
471	q=168	q=130	q=130
472	q=168	q=110	q=110
473	q=168	q=110	q=110
474	q=168	q=110	q=110
475	q=168	q=110	q=110
476	q=168	q=150	q=150
477	q=168	q=150	q=150
478	e=168	e=168	e=168
479	e=168	e=168	e=168
480	e=168	e=168	e=168
481	e=168	e=168	e=168
482	e=168	e=140	e=140
483	e=168	e=140	e=140
484	e=168	e=140	e=140
485	e=168	e=140	e=140
486	e.=138	e.=100	e.=110
487	e.=138	e.=100	e.=110
488	e.=138	e.=100	e.=110
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490	e.=138	e.=100	e.=110
491	e.=138	e.=100	e.=110
492	e.=138	e.=100	e.=110
493	e.=138	e.=100	e.=110
494	e.=138	e.=100	e.=110
495	e.=138	e.=100	e.=110
496	e.=138	e.=100	e.=110
497	e.=138	e.=100	e.=110
498	e.=138	e.=100	e.=110

499	e.=138	e.=100	e.=110
500	e.=138	e.=100	e.=110
501	e.=138	e.=100	e.=110
502	q=120	q=120	q=120
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514	q=120	q=105	q=105
515	q=120	q=105	q=105
516	q=120	q=80	q=80
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518	q=132	q=120	q=120
519	q=132	q=120	q=120
520	q=132	q=110	q=110
521	q=132	q=100	q=100
522	q=132	q=120	q=120
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541	q=132	q=90	q=90
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543	q=132	q=80	q=80
544	q=132	q=100	q=100
545	q=132	q=90	q=90
546	q=132	q=110	q=110

547	q=132	q=110	q=110
548	q=132	q=110	q=110
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569	q=88	q=70	q=70
570	q=88	q=70	q=70
571	q=88	q=70	q=70
572	e=208	e=190	**e=190**
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574	e=208	e=190	**e=190**
575	e=208	e=190	**e=190**
576	e=208	e=160	**e=190**
577	e=208	e=160	**e=190**
578	e=208	e=160	**e=190**
579	e=208	e=160	**e=190**
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581	q.=78	q.=78	q.=78
582	q=84	q=84	q=84
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585	q=92	q=92	q=92
586	q=104	q=104	q=104
587	q=104	q=104	q=104
588	q=92	q=92	q=92
589	q=92	q=92	q=92
590	q=92	q=92	q=92

Table 1. List of maximum performance tempos of all *Method of Movement* exercises obtained using the Stevens technique and the classical technique

All exercises	**Stevens technique**	**Classical technique**
Maximum tempo	154 ex. = **26%**	176 ex. = **30%**
90 – 99% of the max. tempo	49 = **8%**	55 = **9%**
80 – 89%	104 = **18%**	161 = **27%**
70 – 79%	157 = **27%**	117 = **20%**
60 – 69%	87 = **15%**	49 = **8%**
50 – 59%	32 = **5%**	24 = **4%**
under 50%	7 = **1%**	8 = **1%**

Table 2. Percentage list of performance tempos of all *Method of Movement* exercises

Single Independent Strokes	**Stevens technique**	**Classical technique**
Maximum tempo	7 ex. = **14%**	12 ex. = **24%**
90 – 99% of the max. tempo	6 = **12%**	5 = **10%**
80 – 89%	14 = **28%**	15 = **31%**
70 – 79%	18 = **37%**	12 = **24%**
60 – 69%	4 = **8%**	4 = **8%**
50 – 59%	0	0
under 50%	0	0

Table 3. Percentage list of performance tempos of the exercises from the subsection *Single Independent Strokes*

Single Alternating Strokes	**Stevens technique**	**Classical technique**
Maximum tempo	8 ex. = **7%**	10 ex. = **9%**
90 – 99% of the max. tempo	3 = **3%**	12 = **11%**
80 – 89%	33 = **29%**	42 = **37%**
70 – 79%	50 = **45%**	40 = **36%**
60 – 69%	10 = **9%**	0
50 – 59%	8 = **7%**	8 = **7%**
under 50%	0	0

Table 4. Percentage list of performance tempos of the exercises from the subsection *Single Alternating Strokes*

Double Vertical Strokes	**Stevens technique**	**Classical technique**
Maximum tempo	29 ex. = **25%**	35 ex. = **30%**
90 – 99% of the max. tempo	3 = **2%**	6 = **5%**
80 – 89%	15 = **13%**	16 = **14%**
70 – 79%	14 = **12%**	24 = **20%**
60 – 69%	25 = **21%**	13 = **11%**
50 – 59%	24 = **20%**	16 = **14%**
under 50%	7 = **6%**	8 = **7%**

Table 5. Percentage list of performance tempos of the exercises from the subsection *Double Vertical Strokes*

Double Lateral Strokes	**Stevens technique**	**Classical technique**
Maximum tempo	66 ex. = **48%**	75 ex. = **55%**
90 – 99% of the max. tempo	23 = **17%**	12 = **9%**
80 – 89%	15 = **11%**	26 = **19%**
70 – 79%	32 = **23%**	23 = **17%**
60 – 69%	0	0
50 – 59%	0	0
under 50%	0	0

Table 6. Percentage list of performance tempos of the exercises from the subsection *Double Lateral Strokes*

Mixed Strokes	**Stevens technique**	**Classical technique**
Maximum tempo	44 ex. = **25%**	44 ex. = **25%**
90 – 99% of the max. tempo	14 = **8%**	20 = **11%**
80 – 89%	27 = **15%**	62 = **35%**
70 – 79%	43 = **24%**	18 = **10%**
60 – 69%	48 = **27%**	32 = **18%**
50 – 59%	0	0
under 50%	0	0

Table 7. Percentage list of performance tempos of the exercises from the subsection *Mixed Strokes*

3.2.4 Conclusions

1. Do L.H. Stevens's claims about the superiority of his technique over the classical technique find confirmation in the execution of exercises composed by him?

The hypothesis suggesting the overall, universal superiority of the Stevens technique over the classical technique did not find clear confirmation in the results of Experiment 1. This is evidenced by the statistics of performance tempos for exercises played using the classical technique. Without prior preparation, I was able to play 30% of the exercises at the maximum tempo and another 36% at a tempo close to the maximum – at least 80% of it – giving a total of 66% of the exercises performed with the classical technique at or near the maximum tempo. In the group played at a medium tempo (50–79% of the maximum tempo), there were another 32% of exercises, and only eight exercises – 1% of the entire book – could not be performed at a medium tempo. If L.H. Stevens's radical claims about the superiority of his technique over the classical one were true, there would be many more

examples in the category of exercises performed below medium tempo. The experiment results thus confirm that the classical technique works well for performing the exercises contained in Method of Movement and therefore cannot be regarded as clearly and objectively inferior to the Stevens technique. However, this does not mean that the Stevens technique does not yield better results in a number of cases, which I will describe below.

2. What is the state of my skills in using the Stevens technique at the beginning of the research?

As shown by Experiment 1, my ability to play using the Stevens technique (during the period from December 22, 2022, to February 23, 2023) was overall 14% lower than my ability using the classical technique. The difference between the two techniques in the 80–100% maximum tempo range was 14% in favor of the classical technique. Those 14% of exercises played with the Stevens technique fell into the medium tempo range (50–80%). The results for tempos below medium were very similar for both techniques; interestingly, I played one more exercise below medium tempo using the classical technique than with the Stevens technique. This suggests that in the experiment there are individual examples of exercises in which the Stevens technique (given my current level of skill) works better than the classical one.

One of the main problems that prevented me from achieving the classical technique's tempo using the Stevens technique was the difficulty of accurately hitting the correct notes. With the Stevens technique, it is hard to sense, by touch alone, the exact positioning of the mallets in the hands without looking at them. In contrast, in the classical grip, the span of the mallets is easily felt through the distance between the thumb and the index finger. In the Stevens technique, the mallet shafts are felt in different parts of the hand depending on the span, which means that without long-term experience it is difficult to sense precisely which interval one is about to play. I believe this factor can be added to the list of reasons why it is easier to learn to play using the classical technique than the Stevens technique.

3. In which specific exercises from Method of Movement will the Stevens technique unquestionably prove superior to the classical technique?

As shown in Table 1, the experiment included sixteen exercises (3% of the total) that, at my current skill level, I play faster using the Stevens technique than the classical technique (marked in red in Table 1). There were also examples of exercises where the Stevens technique – although performed at a slower or equal tempo compared to the classical technique – offered greater freedom of execution and a clear potential for increasing speed as my skills improve (marked in orange in Table 1). Below, I will discuss specific examples

Exercises from the "Single Independent Strokes" subsection:

Overall, the exercises in the "Single Independent Strokes" subsection do not present significant difficulties, regardless of the chosen technique. The difference in tempo in favor of the classical technique is 11% (see Table 3). Nevertheless, both techniques have their specific characteristics, which affect the comfort of performing the exercises in different ways.

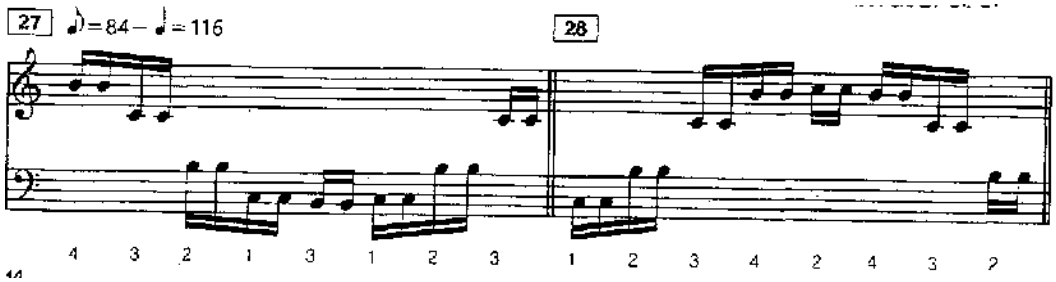
In the case of the Stevens grip, the mallets are held at the very ends of the shafts, which makes them heavier for the hands than mallets held with the traditional grip. Therefore, frequent repetitions of single notes with the outer mallets can be challenging for marimbists using the Stevens technique (especially in the early stages of learning it). In the Stevens grip, the outer mallet is held at the very end of the shaft by the weaker fingers of the hand (the ring and little fingers), so until the muscles of those fingers are sufficiently trained, the weight of the mallet can significantly limit the speed of note repetitions. In the traditional grip, by contrast, the outer mallet is held by a larger portion of the hand, and its shorter length makes repetitions less straining for the wrist.

When it comes to repetitions with the inner mallet, the relationship is reversed. In the Stevens grip, the inner mallet is held by the stronger fingers (the thumb, index, and middle fingers) and comfortably rests on the inner part of the palm. As a result, repeating

notes with the inner mallet is comfortable, and the increased mallet weight does not strain the hand. In the traditional grip, however, the inner mallet is held by pressing it against the wrist with the outer mallet, which makes repetitions less comfortable. The mallet must be pressed relatively firmly against the wrist to minimize the risk of destabilizing the grip. This pressure stiffens the hand, making repetitions more difficult than when using the Stevens grip. As a result of these differences, fast repetitions of single notes with the outer mallets are easier to perform using the classical technique with the traditional grip, while repetitions with the inner mallets are easier to execute using the Stevens technique (vid. 10).

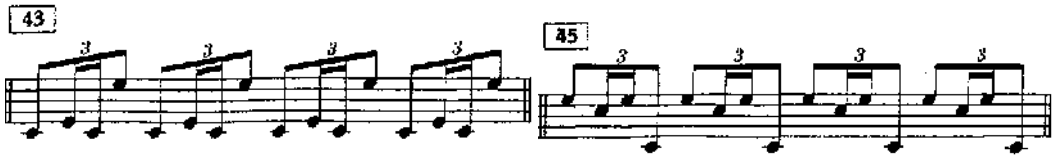
Video 10. Fast repetitions of Single Independent strokes using the Stevens and classical techniques

Exercises 27 and 28 (Example 4): performed at maximum tempo with both techniques, but the Stevens technique proved more effective, providing greater freedom of execution through increased hand relaxation. The independence of the mallets in the Stevens grip makes fast double-stroke patterns on layouts such as 44-33-22-11 and similar configurations easier to perform using the Stevens technique, which naturally ensures independence between the mallets in one hand.



Example 4. Exercises 27 and 28 from *Method of Movement*

Exercises 43 and 45 (Example 5): I achieved the same maximum tempo using both techniques (see Table 1). However, in the case of the Stevens technique, the upper tempo limit was likely due to my technical shortcomings, while for the classical technique it resulted from the shortened length of the mallets in the grip. The leap of a tenth immediately following the sixteenth notes in exercises 43 and 45 is easier to execute when using the wider mallet span allowed by the Stevens technique, since the tenth can be set in the initial position, making the horizontal hand movement from one note to the other – which slows down execution – unnecessary (vid. 11).

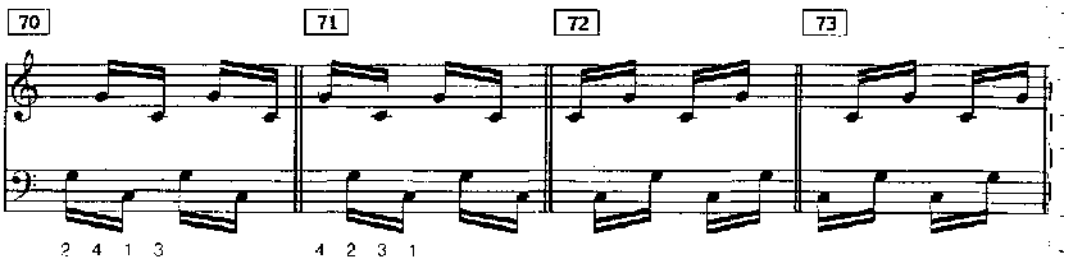


Example 5. Exercises 43 and 45 from *Method of Movement*

Video 11. Exercise 43 performed using the Stevens and classical techniques

Exercises from the "Single Alternating Strokes" subsection

The exercises in this subsection did not reveal any significant differences between the two techniques. The tempos of most exercises ranged between 70% and 90% of the maximum tempo, with an 18% advantage in favor of the classical technique (see Table 4). In some exercises (such as 70–133), the difficulty in reaching maximum tempo was caused by factors unrelated to the motor characteristics of either technique – for example, the inability to execute accents beyond a threshold tempo at which the brain can barely keep up with the hands, even though the hands still have room for faster movement. It can be assumed that performing this type of exercise at maximum tempo would be possible after a longer period of practice.



Example 6. The first four exercises from section 70–133 of the Single Alternating Strokes subsection – in each mallet permutation, one note is accented and shifted every four repetitions until all possibilities are exhausted

Exercises from the "Double Vertical Strokes" subsection

The exercises in the *Double Vertical Strokes* subsection – based on performing a given interval with both mallets of one hand simultaneously – represent a movement that is most natural for the traditional grip, in which both mallets are largely dependent on each other. Unexpectedly, however, it was precisely in this subsection that the largest number of exercises appeared in which I achieved a faster tempo using the Stevens technique than with the classical technique. Overall, the exercises in this subsection showed a 9% advantage in favor of the classical technique (see Table 5).

Exercises 165, 167, and 168 (Example 7) are the first to illustrate a significant limitation of the classical technique: the difficulty in achieving fast transitions from narrow to wide intervals and vice versa. This problem has been described many times by L.H. Stevens as one of the undeniable proofs of the superiority of his technique over the classical one.[159] In addition to the issue of slowed interval changes in the classical technique, there is also the problem of grip destabilization caused by frequent and rapid repetitions involving constant interval changes. The issue is most evident when the change is made with the outer mallet.

The beginnings of this problem can already be seen in Exercise 165, where the change occurs only between a fifth and a third, and back, using the outer mallet. When practicing Exercise 165 at fast tempos using the classical technique, the grip becomes destabilized at the crossing point, causing one of the mallets to start slipping, which may

[159] L.H. Stevens, *Method of Movement*, op. cit., 8.

eventually lead to dropping them. The only ways to avoid this are to adjust the grip during the exercise (which is nearly impossible at high speed when playing continuously) or to grip the mallets more tightly, which stiffens the entire hand and makes playing at faster tempos very difficult or impossible. This issue of grip stiffness in the classical technique is one that Stevens describes in *Method of Movement* as one of the main arguments for the superiority of his method.[160] In the Stevens technique, the mallets do not cross, so grip stability during fast and frequent interval changes is independent of the force with which the mallets are held. As a result, there is no problem of hand stiffness or the need to readjust the grip while playing.

Exercise 167 provides an even clearer example of this issue, as it involves moving from an octave to a third. In this case, however, the classical technique allowed me to reach a higher tempo due to my greater proficiency with the traditional grip. Nevertheless, the tempo of h=80 achieved with the classical technique represented my upper limit, while the h=60 tempo obtained with the Stevens technique should increase as my proficiency with the Stevens grip improves (which should be confirmed in Experiment 3). The problem of rapid interval changes is much less pronounced when they occur using only the inner mallet, as in Exercise 168.

Example 7. Exercises 165, 167, and 168 from *Method of Movement*

Exercises 239, 240, 243–252, 255, and others within the range of 225–256 (Example 8): all these exercises involve fast and continuous interval changes using the outer mallet, the inner mallet, or both simultaneously. I performed exercises 239, 240, 243–249, 251, and 255 at a faster tempo using the Stevens technique, while exercises 250, 252, and 256 were performed at the same tempo with both techniques – though reaching the upper limit with the classical technique resulted from its natural limitations.

[160] Ibidem, 8–9.

Among the exercises performed faster with the Stevens technique, five involved interval changes with the outer mallet, four with both mallets, and only two with the inner mallet. This confirms the conclusion drawn from exercises 165, 167, and 168: that the greatest difficulty with fast interval changes using the classical technique occurs when the outer mallet is involved.

Exercises 250, 252, and 256 involve interval changes made with the inner mallet; therefore, the tempo could be slightly faster using the classical technique, approaching that of the Stevens technique.

In exercises 241–256, the interval span increases up to a tenth, which must be played with both mallets of one hand simultaneously. L.H. Stevens claims that, when using the traditional grip, the octave is already an extreme interval for one-hand simultaneous performance. However, this is not entirely true, as for an advanced player even a ninth interval on a diatonic keyboard can be executed this way without major difficulty and in any register.[161] The tenth interval, on the other hand, presents a challenge for marimbists using the traditional grip – especially in the lower registers (starting approximately from C in the small octave as the lower note of the interval) – and in many cases is indeed impossible to play (and on instruments with wide bars, entirely unplayable). Performing such extreme intervals using the traditional grip requires adapting the grip by extending the inner mallet beyond the thumb area and resting it on the abductor and short flexor muscles, as well as shifting the grip toward the ends of the mallet shafts (see Fig. 26). Unfortunately, such adjustments reduce the performer's motor efficiency, and some pieces – particularly those written with the Stevens technique in mind – may therefore become impossible to perform (vid. 12).

[161] These possibilities depend on the model of the instrument, as the width of the marimba bars varies depending on the manufacturer. Nevertheless, the only instruments I am aware of with bars so wide that playing an octave in the lower register using the traditional grip is nearly impossible are the "wide bar" models produced by Malletech, designed by the company's founder, L.H. Stevens.

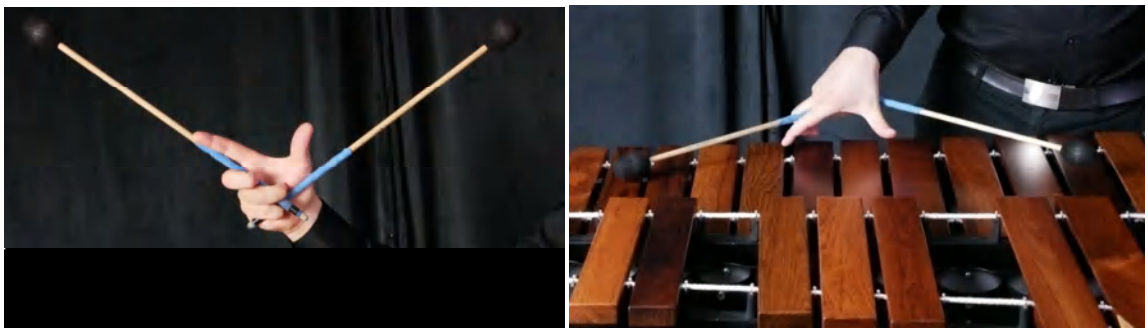
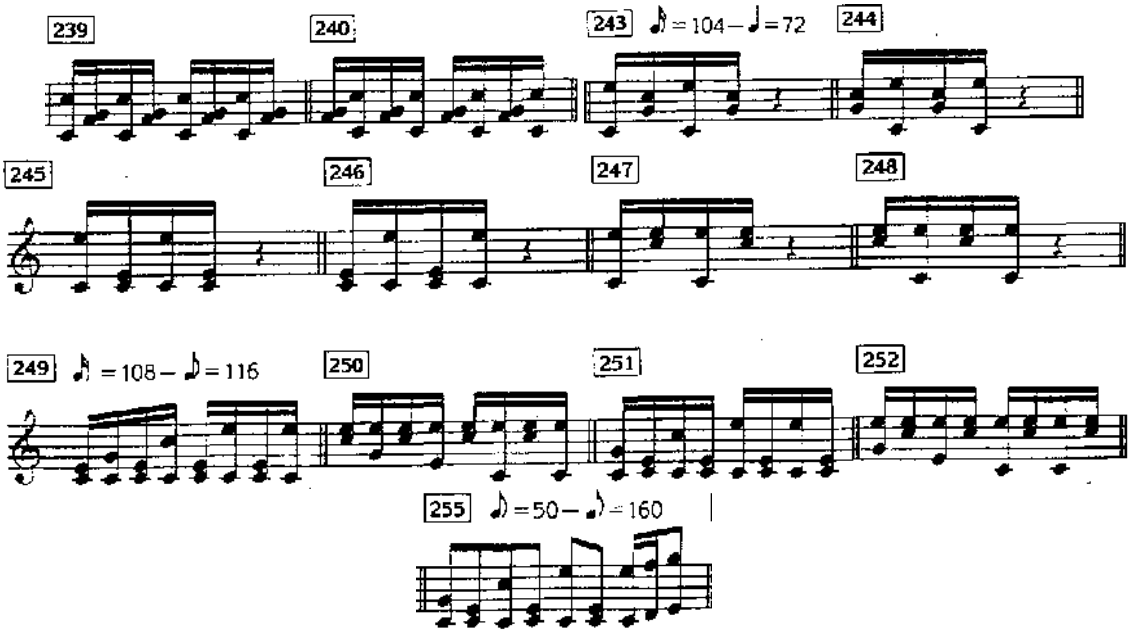


Figure 26. Adaptation of the traditional grip for performing wide intervals



Example 8. Exercises 239, 240, 243–252, and 255 from *Method of Movement*

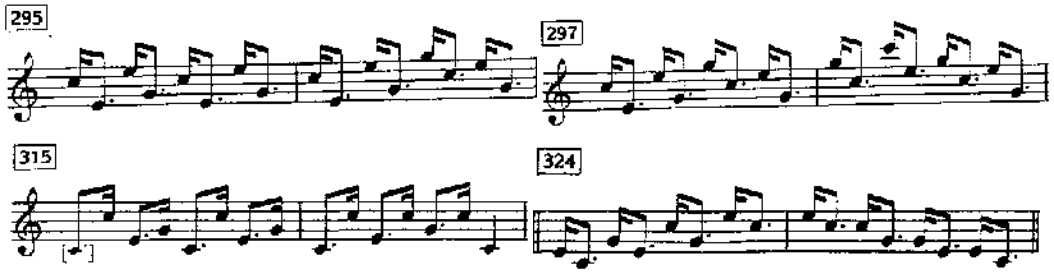
Video 12. Exercise 245 performed using the classical and Stevens techniques

Exercises from the "Double Lateral Strokes" subsection

Similarly to *Single Alternating Strokes*, *Double Lateral Strokes* employ a type of movement that is most natural for the Stevens technique, as it largely depends on the independence of both mallets. However, in this subsection, the difference in tempos between the Stevens and classical techniques is the smallest – only 7% (see Table 6).

Exercises 295, 297, 315, and 324 (Example 9) are examples based on an outward motion (from the upper note to the lower one). Both these specific exercises (in which the Stevens technique allowed for faster execution) and others involving outward motion yield better results in terms of speed and agility when performed with the Stevens technique. This correlation becomes even stronger when the exercises are played with the left hand, especially over wider interval spans.

In the exercises from the *Double Lateral Strokes* subsection, the independence of the two mallets is crucial. In my version of the traditional grip, the independence of the right-hand mallets is increased by resting the outer mallet on the proximal phalanx of the index finger. However, this comes at the expense of the ability and ease of playing wider intervals (which occur less frequently in the higher register, where the right hand most often operates). In the left hand, however, I hold the mallets in the standard way (with the outer mallet resting on the middle or distal phalanx of the index finger) to maintain the ability to cover wide intervals. Consequently, the mallets lose some independence, making the outward motion of the left hand when performing Double Lateral Strokes more difficult than when using the Stevens grip (where mallet independence is the same in both hands).

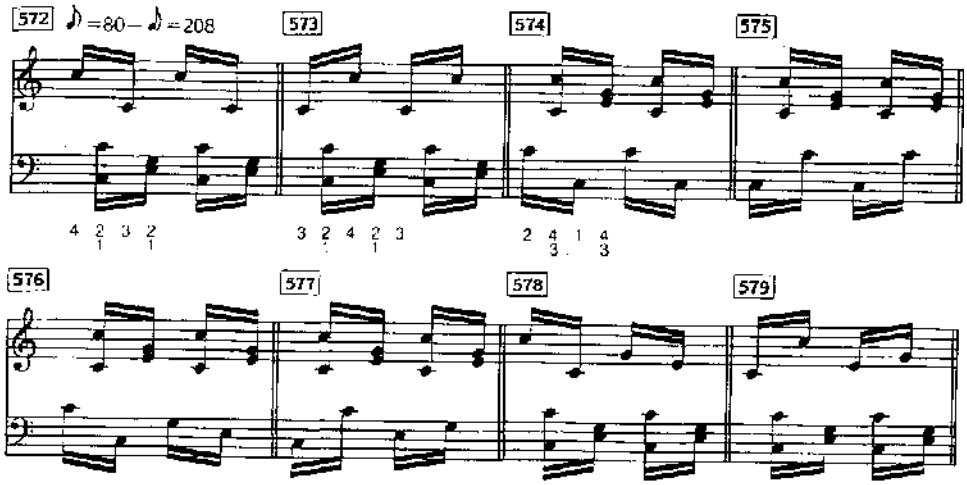


Example 9. Exercises 295, 297, 315, and 324 from *Method of Movement*

Exercises from the "Mixed Strokes" subsection

The exercises in this subsection showed the greatest disparity between the two techniques – amounting to as much as 23% (see Table 7). *Mixed Strokes* serve as a kind of summary of the technical challenges presented throughout *Method of Movement* and form the most diverse section of the book. The technical difficulties that give an advantage to the Stevens technique here are similar to those discussed in earlier examples.

Exercises 572–579 (Example 10): when played using the classical technique, I reached my upper tempo limit. The tempo at which I performed the exercises reached e=190, but even at e=180 my hands began to stiffen. The difficulty here is analogous to that encountered in previously described exercises based on the rapid alternation of large and small harmonic intervals. This is, without doubt, yet another example demonstrating the superiority of the Stevens technique over the classical technique.

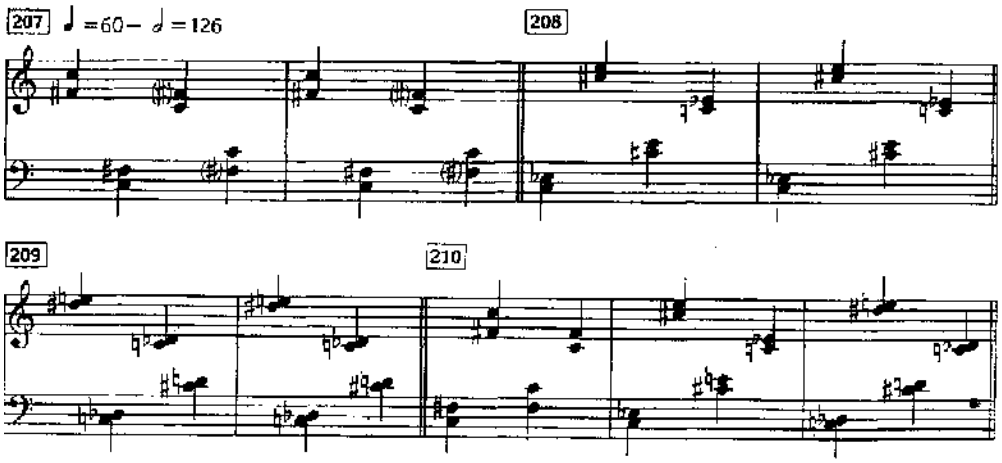


Example 10. Exercises 572–579 from *Method of Movement*

4. Are there any technical problems in Method of Movement for which the classical technique would prove more effective than the Stevens technique?

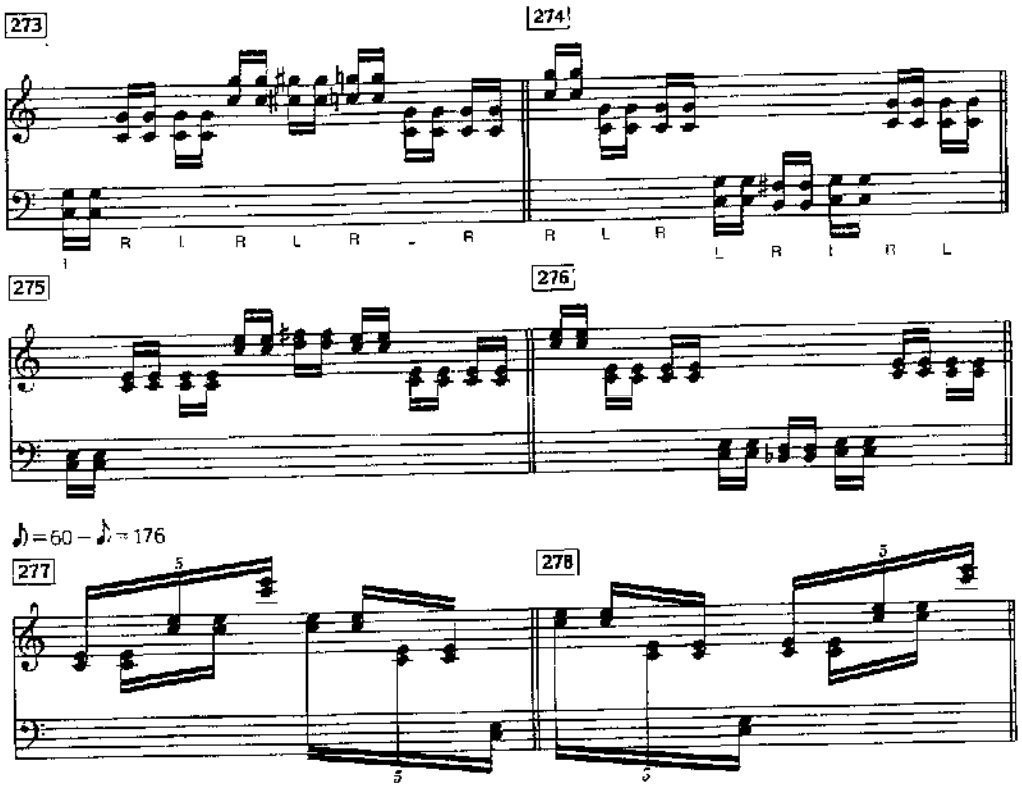
As indicated in my notes taken during the experiment, several examples can be identified where the classical technique proved more effective than the Stevens technique, regardless of the advantage resulting from my current skill level.

Exercises 207–210 (Example 11), *Double Vertical Strokes*: these exercises include interval configurations that mix the diatonic and chromatic parts of the keyboard. Since the key of all *Method of Movement* exercises is C major, the vast majority of exercises played without transposition (as in Experiment 1) are limited to the diatonic keyboard. The challenges associated with mixed keyboards will be discussed in more detail in the next experiment, but already in exercises 207–210 one can formulate the principle that, for small intervals using both keyboards, the classical technique performs better due to the traditional grip, in which the mallets are held further from the ends of the shafts. This shortening of the mallets provides greater wrist flexibility without requiring elbow movement, which significantly slows down execution. The advantage of the Stevens technique – frequently cited by L.H. Stevens in his writings – lies in its ability to facilitate the playing of wide intervals more easily than the classical technique. However, this advantage is a kind of trade-off: the marimbist using the Stevens technique must contend with certain difficulties when performing smaller intervals. This thesis is confirmed in exercises 207, 210, and many others that I will describe later in this study, yet it was never explicitly stated by the author of *Method of Movement*.



Example 11. Exercises 207–210 from *Method of Movement*

Exercises 273–278 (Example 12) provide further confirmation of the thesis that the exercises from the *Double Vertical Strokes* subsection (i.e., harmonic intervals played simultaneously with one hand) are easier to perform using the classical technique due to the interdependence of the two mallets. This conclusion is supported by the mechanics of the traditional grip, which allows the performer to strike two notes simultaneously with one hand effortlessly. The interdependence between the mallets means that little effort is required to coordinate them so that they strike the instrument at exactly the same time. Additionally, in exercises 275 and 276, the issue of mixed interval layouts (spanning both the diatonic and chromatic keyboards simultaneously) appears again. As mentioned earlier, such configurations are handled more effectively when performed using the traditional grip.



Example 12. Exercises 273–278 from *Method of Movement*

3.3 Experiment 2 – Movement Efficiency Test

3.3.1 Research Questions and Hypotheses

The purpose of Experiment 2 is to determine to what extent it is possible to minimize movement while playing the marimba by performing *Method of Movement* exercises in transpositions. Is it always possible to apply the principle of movement efficiency emphasized by Leigh Howard Stevens in his method book?

Unlike Experiment 1, which aimed to achieve the highest possible tempo when performing the exercises in the base key (C major), Experiment 2 focuses on analyzing hand and mallet configurations while performing the same exercises in various transpositions. According to the recommendations of the *Method of Movement* author, every student of this technique should practice the exercises in all twelve keys. Therefore, examining the issue of body movement at the instrument when playing in keys other than C major appears essential.

In many cases, performing exercises in transpositions requires alternating between the diatonic and chromatic keyboards, often resulting in situations where the two mallets in one hand are positioned simultaneously on both keyboards. Such configurations frequently force the performer to bend the wrist or extend the elbow outward (see Fig. 27). According to L.H. Stevens's principle of movement efficiency, when playing the marimba, we should favor smaller and faster wrist movements over slower and broader elbow movements. Experiment 2 aims to determine to what extent it is possible to perform the transposed exercises according to this principle using each technique.

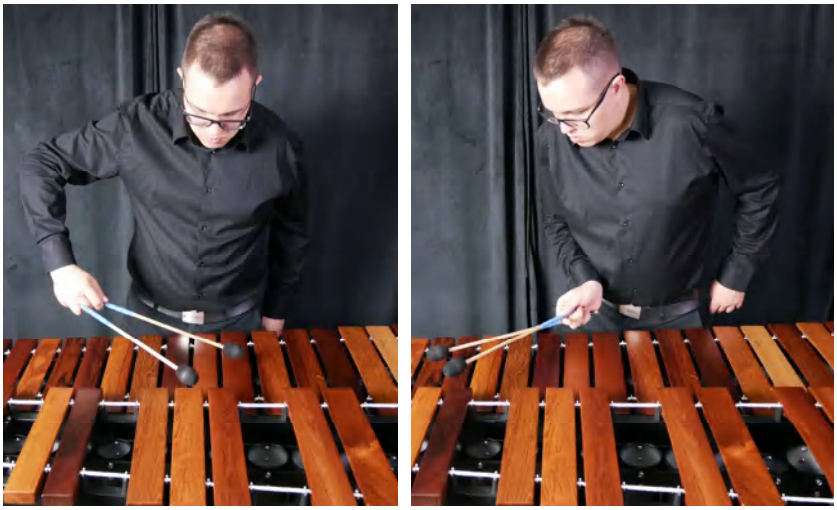


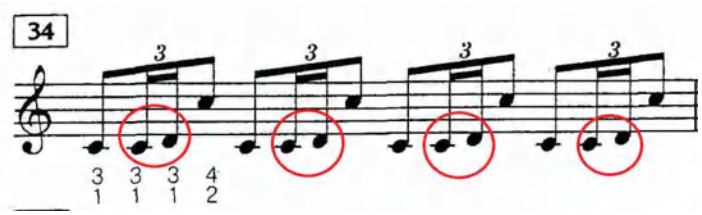
Figure 27. Interval configurations combining the chromatic and diatonic keyboards

3.3.2 Research Methods

For the execution of Experiment 2, I used the same model of marimba and the same mallets as in Experiment 1. The experimental process lasted approximately two months, between February and May 2024. The exercises were not practiced at regular time intervals, as this had no impact on the final results. Each exercise was performed in all twelve transpositions, with careful observation of hand movements. Each session of the experiment lasted between 20 and 40 minutes. The exercises were performed at various tempos, usually without the use of a metronome. Unlike in Experiment 1, the achieved tempos were not recorded, as execution speed was not a key factor in this study.

3.3.3 Results and Conclusions

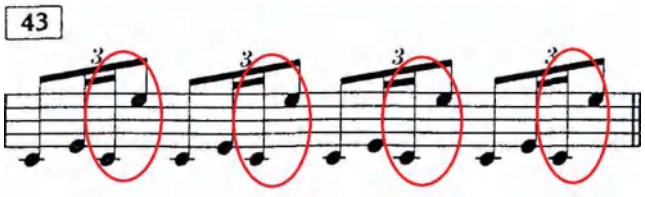
1. Exercises 34–42 (Single Independent Strokes) (Example 13): at fast tempos, difficulties occurred when moving mallet no. 3 between the diatonic and chromatic keyboards. The problem appeared regardless of which technique was being used at the time (vid. 13).



Example 13. Exercise 34 from *Method of Movement*

Video 13. Exercise 34 performed using the Stevens and classical techniques

2. Exercises 43 and 45 (Single Independent Strokes) (Example 14): the leap of a tenth between the chromatic and diatonic keyboards highlighted even more clearly the advantage of the Stevens technique in performing this exercise. The distance of a tenth between notes located on the chromatic and diatonic keyboards is greater than the equivalent transposition found entirely on the diatonic keyboard, as in the version performed in the key of C major. For this reason, the ability to achieve a wide mallet span within one hand – made possible by the Stevens grip – proves even more useful here than when performing the exercise in the base key (vid. 14).



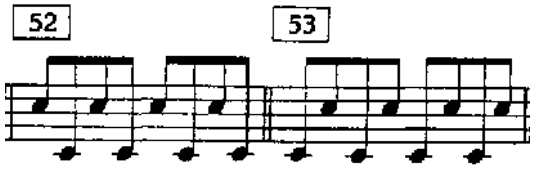
Example 14. Exercise 43 from *Method of Movement*

Video 14. Exercise 43 performed using the classical and Stevens techniques

3. Exercises 52 and 53 (Single Alternating Strokes) (Example 15): octaves played in alternation between the mallets of one hand proved to be much easier to perform using the Stevens technique when transposed. In Experiment 1, this difference was not noticeable, since at that time there was no need to move the hand between the diatonic and chromatic keyboards.

In the transposed versions of these exercises, where rapid vertical movement of the hand between the diatonic and chromatic keyboards (and vice versa) is required, the Stevens technique proves more efficient. It allows the performer to maintain a relaxed wrist while keeping a wide mallet span, ensuring smooth execution of the exercise without excessive muscle tension.

When performing the same exercise with the classical technique, the marimbist encounters difficulties caused by wrist stiffness or an unstable grip if they try to position the mallets in such a way as to span an octave. Although reducing the mallet span to less than an octave allows for a more stable grip and a more relaxed wrist, it requires an additional horizontal hand movement. This movement consumes time and energy, contradicts the principle of movement efficiency, and makes the exercise more difficult – or even impossible – to perform at fast tempos (vid. 15).



Example 15. Exercises 52 and 53 from *Method of Movement*

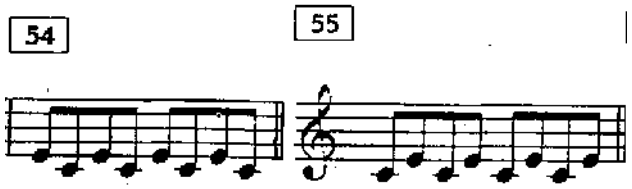
Video 15. Exercise 53 performed using the classical and Stevens techniques

4. Exercises 54 and 55 (Single Alternating Strokes) (Example 16): exercises involving the alternation of small intervals in transpositions (in this case, the interval of a third) also proved easier to perform using the Stevens technique.

When using the traditional grip, in order to maintain wrist rotation – which provides mallet independence – it is necessary to keep the hand in a vertical position and to loosen the grip. However, when playing small intervals, the grip in a vertically positioned hand becomes less stable, increasing the risk of the inner mallet slipping out. This issue can be eliminated by tightening the grip, but doing so causes the hand to stiffen, resulting in restricted movement.

An alternative solution in the classical technique is to position the hand horizontally (flat), which eliminates the problem of grip instability. Unfortunately, this position almost completely prevents wrist rotation and, consequently, mallet independence.

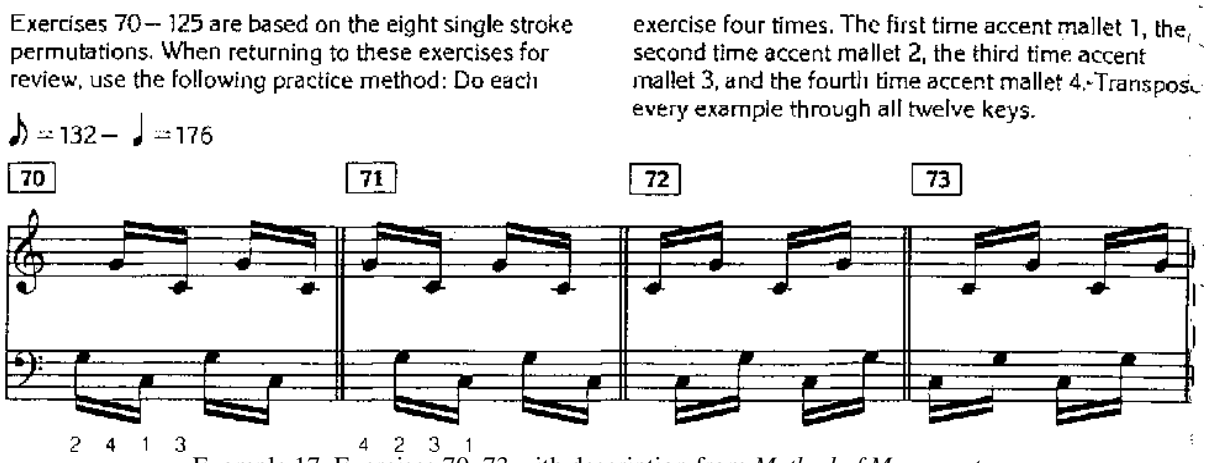
The Stevens technique, on the other hand, allows for free wrist rotation, ensuring independent mallet movement. At the same time, it provides a stable grip with minimal risk of the mallets slipping out of the hands, which greatly facilitates the execution of exercises involving the alternation of small intervals (vid. 16).



Example 16. Exercises 54 and 55 from *Method of Movement*

Video 16. Exercise 55 performed using the classical and Stevens techniques

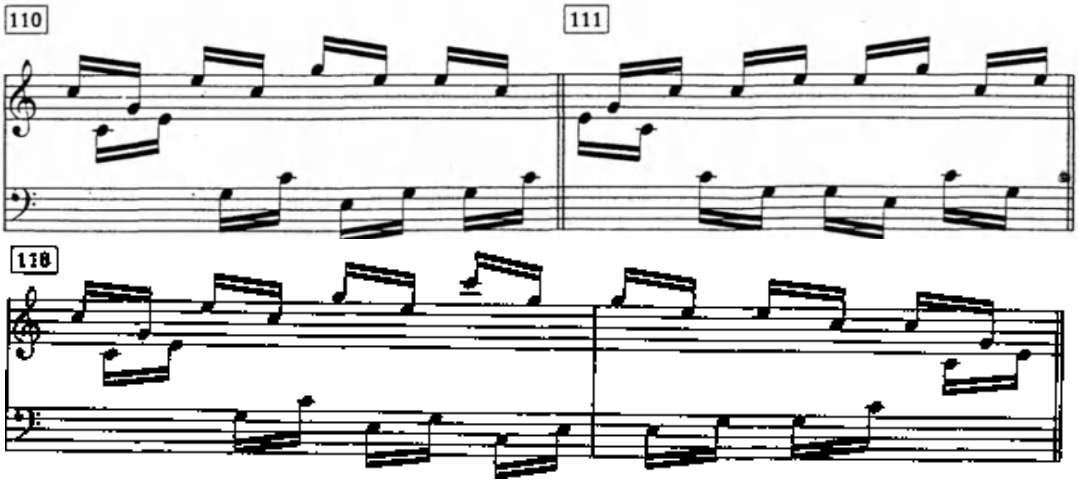
5. Exercises 70–133 (Single Alternating Strokes) (Example 17): while performing these exercises, I noticed that the Stevens technique significantly facilitates the execution of accents due to the greater independence of mallet movement. This freedom of motion allows for better control over both the dynamics and articulation of individual mallets, which in turn enables more precise and expressive accenting.



Example 17. Exercises 70–73 with description from *Method of Movement*

6. Exercises 110–125 (Single Alternating Strokes) (Example 18): starting from exercise no. 110, the distance between the lowest note (played with the left hand) and the highest note (played with the right hand) increases to two octaves and a third, and from exercise no. 118 – to three octaves. In this case, the increased mallet length resulting from holding them at the very ends of the shafts in the Stevens grip, as well as the positioning of the outer mallet between the middle and ring fingers, begins to hinder smooth execution of the exercise. When a wide hand span is required while keeping the hands perpendicular to the keyboard, the longer mallets can limit movement precision and playing comfort.

The outer mallet held between the index and middle fingers in the traditional grip allows for greater wrist maneuverability in extreme positions, especially when the hands are widely spaced. Additionally, shortening the effective mallet length by holding them closer to the head slightly reduces the hands' distance from the keyboard. This makes it easier to maintain the wrist in a perpendicular position relative to the keyboard surface – an essential factor in performing Single Alternating Strokes. This example confirms the advantage of the classical technique in such extreme wrist positions (Vid. 17). Naturally, this issue is less pronounced for performers with exceptionally long arms.

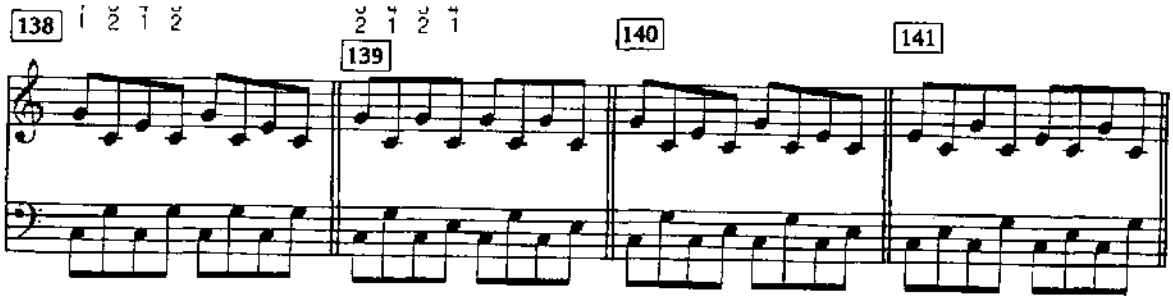


Example 18. Exercises 110, 111, and 118 from *Method of Movement*

Video 17. Exercise 110 performed using the Stevens and classical techniques

7. Exercises 138–151 (Single Alternating Strokes) (Example 19): performing these exercises in keys that require rapid changes between the chromatic and diatonic keyboards (D-flat, D, E-flat, E, A-flat, and A) is easier when using the traditional grip with shortened mallets. When playing with the Stevens grip and holding the mallets at the ends of the shafts, larger elbow movements are required to shift the hand between the keyboards in third-based configurations. This reduces movement efficiency and makes continuous

repetitions of alternating fifth and third intervals – requiring frequent elbow motion – physically tiring. In contrast, when using the traditional grip, elbow movement can be minimized, relying almost entirely on wrist motion instead (vid. 18).



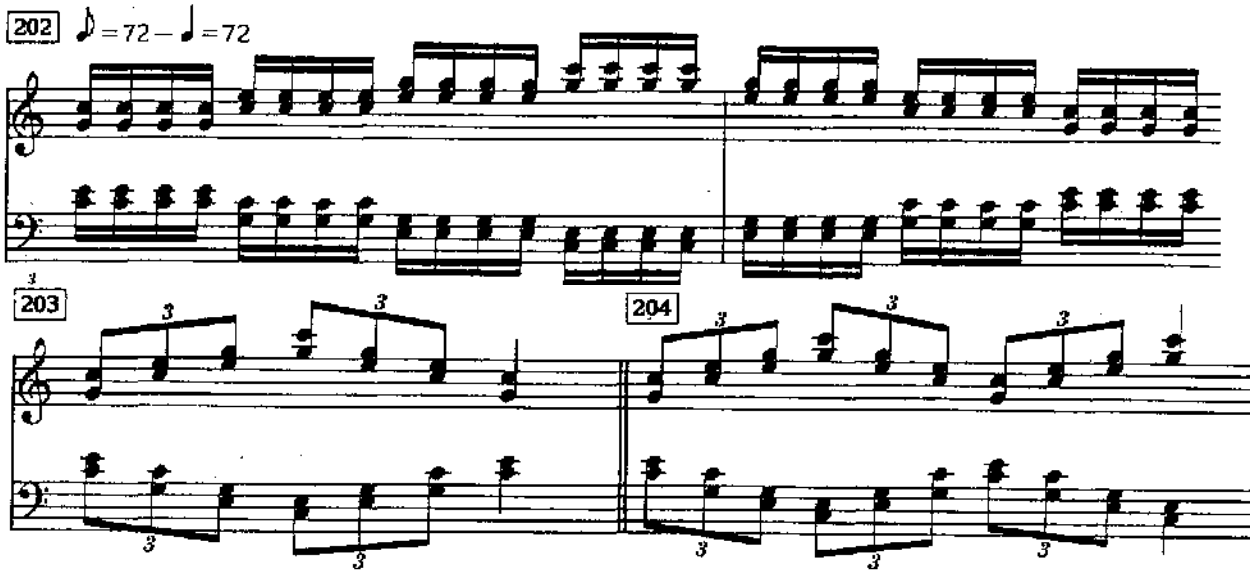
Example 19. Exercises 138–141 from *Method of Movement*

Video 18. Exercise 138 performed using the Stevens and classical techniques

8. Exercises 200–206 (Double Vertical Strokes) (Example 20): these exercises presented a problem similar to the one described earlier in Section 6. The increased distance between the notes (in some cases exceeding three octaves), combined with the requirement to strike all notes simultaneously or in rapid alternation between the hands, poses a significant challenge when playing with the Stevens technique. As mentioned in Section 6, a similar difficulty had already appeared in exercises from the Single Alternating Strokes subsection.

In the case of Single Alternating strokes, it was possible to partially adjust the position of the wrist relative to the marimba keyboard by horizontally shifting the hand from one note to another. However, with simultaneous strokes (Double Vertical Strokes), such adjustment is impossible – the correct wrist alignment with respect to the keyboard must be set before striking.

An additional difficulty arises from the increased mallet length in the Stevens grip, which positions the hands farther from the keyboard, as well as from the limited wrist mobility caused by the position of the outer mallet held tightly by the ring and little fingers. These factors make performing exercises 200–206 in the key of B-flat major particularly demanding when using the Stevens technique (vid. 19).



Example 20. Exercises 202–204 from *Method of Movement*

Video 19. Exercise 202 performed using the classical and Stevens techniques

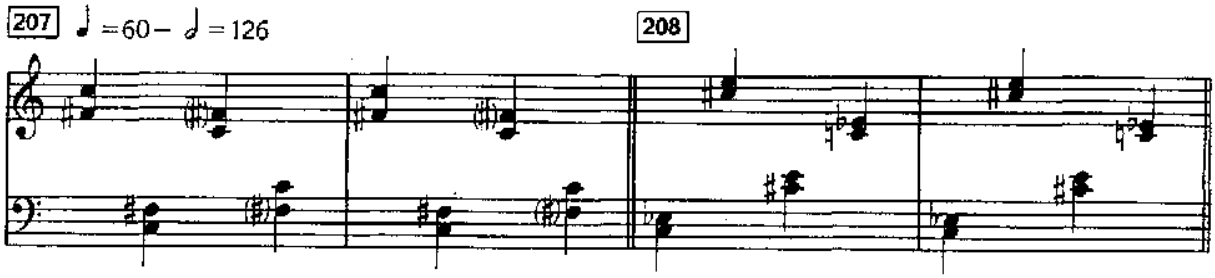
9. Exercises 207–210 (Double Vertical Strokes) (Example 21): due to the increased mallet length in the Stevens grip, larger movements are required to adjust the position of the hands between dyad configurations that span both sections of the keyboard.

When playing a dyad with one hand, if the outer mallet strikes a note on the chromatic keyboard and the inner mallet strikes a note on the diatonic keyboard, the wrist or elbow (or both simultaneously) must bend outward. Conversely, when the inner mallet

strikes a note on the chromatic keyboard and the outer mallet on the diatonic keyboard, the wrist and elbow must bend inward.

Rapid changes between such configurations – as in exercises 207–210 – require dynamic elbow and wrist movements over a relatively large range. Because the Stevens grip involves longer mallets held near the shaft ends, these movements must cover a greater distance and take more time to execute than when using the traditional grip, where the mallets are held closer to the center of the shafts.

As a result, all dyad configurations in which the mallets of one hand are positioned on both keyboards in close proximity are easier to play using the traditional grip. This issue is especially noticeable with small intervals in the higher registers, where the narrower spacing between the marimba bars demands even greater elbow bending (vid. 20).

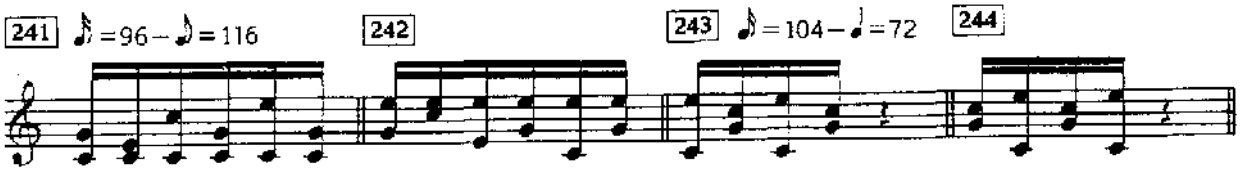


Example 21. Exercises 207 and 208 from *Method of Movement*

Video 20. Exercise 207 performed using the Stevens and classical techniques

10. Exercises 225–262 (Double Vertical Strokes) (Example 22): these exercises require very rapid changes from small to large intervals played with one hand. The key to their execution lies in the dynamic adjustment of the mallet spread – from narrow to wide. In such cases, the Stevens technique clearly outperforms the classical technique, as I had already confirmed in the previous experiment.

Exercises 241–256, performed in various transpositions, proved extremely difficult to execute with the traditional grip in certain keys – especially in the lower registers. Attempting to play a tenth interval with one hand using the Double Vertical Stroke and with both mallets positioned on separate keyboards was nearly impossible to achieve with the standard mallet length I used. In this case, the Stevens technique proved far more effective, allowing for the comfortable execution of wide intervals and offering greater flexibility in performance (vid. 21).



Example 22. Exercises 241–244 from *Method of Movement*

Video 21. Exercise 241 performed using the Stevens and classical techniques

11. In the exercises from the Double Lateral Strokes subsection, the same issue I described in Section 4 and in Experiment 1 reappeared – all exercises involving small intervals performed with Double Lateral strokes are easier to execute using the Stevens technique. The problems discussed in Section 4 become even more apparent in the case of Double Lateral strokes.

3.4 Experiment 3 – Speed Test no. 2

3.4.1 Research Questions and Hypothesis

1. Are my skills with the Stevens technique, after two years of focused practice, now comparable to my skills with the classical technique? Over the two years following the beginning of my research and the execution of Experiment 1, I have been intensively

developing the Stevens technique, applying it to the performance of most of my marimba repertoire. I assume that my current proficiency in this technique is significantly higher than it was during Experiment 1, the initial speed test. Based on my subjective assessment, I can state that my skills in both techniques are now at a comparable level. Therefore, the performance tempos achieved using each technique should also be similar. Any remaining differences in execution tempo between the Stevens and classical techniques should now more accurately reflect the actual superiority or limitations of each technique, compared to Experiment 1, when my mastery of the classical technique was clearly greater.

2. Does the development of skill in the Stevens technique contribute to an improvement in proficiency with the classical technique? An affirmative answer to this question would serve as evidence of a deep kinship between the two techniques.

3. Which examples might demonstrate the superiority of the Stevens technique over the classical technique, assuming that my proficiency in both techniques is now balanced, and will these examples differ from those identified in Experiment 1? I assume that if my abilities with both techniques have indeed become comparable, Experiment 3 should reveal a greater number of exercises performed at a faster tempo using the Stevens technique. Consequently, the elements demonstrating the advantages of this technique over the classical one should be identified with greater precision than was possible in Experiment 1.

4. Are there technical problems in *Method of Movement* where – despite my balanced proficiency in both techniques – the classical technique still proves more effective than the Stevens technique? If we assume that my skill level with both techniques has truly equalized, then any exercises that I continue to perform faster using the classical technique would serve as strong evidence of its superiority in specific technical aspects.

3.4.2 Research Methods

For this study, I used the same mallets and a marimba with identical bar dimensions as in Experiment 1, in order to ensure that the conditions of Experiment 3 were as similar as possible to those of its previous version conducted at the turn of 2022 and 2023. The research lasted one month – from April 22 to May 22, 2025. During this period, as in

Experiment 1, I practiced several times a week in sessions lasting from approximately 30 to 80 minutes.

I performed all 590 exercises from *Method of Movement*, except for those in which I had already reached the maximum tempo with both techniques during Experiment 1. All remaining exercises were performed using the Stevens technique, with the goal of matching or surpassing the highest tempos achieved in Experiment 1, though I never exceeded the maximum tempo suggested by the author of the method book.

After completing all exercises using the Stevens technique, I compared the recorded tempos with those obtained using the classical technique during Experiment 1. In cases where the tempo achieved with the Stevens technique exceeded that reached with the classical technique, I repeated the exercise using the classical technique. The purpose of this was to determine whether the higher tempo achieved with the Stevens technique in Experiment 3, compared to the classical technique in Experiment 1, resulted from the inherent advantages of the Stevens technique or from other factors. As in Experiment 1, all exercises were performed exclusively in the key of C major.

3.4.3 Results

As in Experiment 1, the maximum tempos of the exercises were compiled in tables. Table 8 contains a list of the maximum tempos for all exercises, while the remaining tables – analogous to those in Experiment 1 – present statistical summaries, both for all exercises combined and for each individual chapter of the manual. The notation of cases follows the same system used in the tables from Experiment 1.

Additionally, I highlighted instances of increased performance tempo compared to Experiment 1 – these values are marked in green, preceded by a “+” sign. In red, I marked the maximum tempos achieved with the classical technique that are lower than those achieved with the Stevens technique. In blue, I marked the cases in which, despite the passage of two years, the tempo achieved with the classical technique still surpasses that achieved with the Stevens technique.

Ex. number	Maximum tempo proposed by L.H. Stevens	Maximum tempo reached with Stevens Technique	Maximum tempo reached with classical technique
		Single Independent Strokes	
1	q=100	q=100	q=100
2	q=100	q=100	q=100
3	q=100	q=100	q=100
4	q=80	q=70	q=70
5	q=88	q=80 (+5)	q=80
6	q=144	q=144 (+14)	q=144
7	q=144	q=144 (+14)	q=144
8	q=144	q=144	q=144
9	q=144	q=144 (+9)	q=144
10	q=144	q=144 (+9)	**q=135**
11	q=144	q=140 (+15)	**q=144**
12	q=144	q=120 (+5)	q=120
13	q=144	q=120 (+10)	**q=115**
14	q=144	q=115 (+5)	**q=120**
15	q=144	q=110 (+5)	q=110
16	q=144	q=115 (+5)	q=115
17	q=144	q=144 (+14)	q=144
18	q=144	q=144 (+19)	q=144 (+4)
19	q=152	q=152	q=152
20	q=152	q=152 (+32)	q=152 (+32)
21	q=152	q=110	q=110
22	q=152	q=130	q=130
23	q=144	q=110	q=110
24	q=144	q=120 (+10)	q=120
25	e=160	e=150 (+10)	e=150
26	e=160	e=150 (+10)	e=150
27	q=116	q=116	q=116
28	q=116	q=116	q=116
29	q=104	q=85	q=85
30	q=104	q=85	q=85
31	q=168	q=140	q=140
32	q=96	q=85 (+5)	q=85 (+5)
33	q=96	q=85 (+5)	q=85 (+5)
34	q=96	q=85 (+5)	q=85 (+5)
35	q=96	q=85 (+5)	q=85 (+5)
36	q=96	q=85 (+10)	q=85 (+10)
37	q=96	q=85 (+10)	q=85 (+10)
38	q=96	q=80 (+5)	q=80
39	q=96	q=80 (+5)	q=80
40	q=96	q=75 (+5)	q=75
41	q=96	q=75 (+5)	q=75
42	q=96	q=75 (+5)	q=75
43	q=96	q=75 (+5)	**q=70**
44	q=96	q=75 (+5)	q=75
45	q=96	q=75 (+5)	**q=70**

46	q=72	q=60 (+10)	q=60 (+10)
47	q=72	q=60 (+10)	q=60 (+10)
48	q=72	q=60 (+10)	q=60 (+10)
49	q=72	q=60 (+10)	q=60 (+10)
Single Alternating Strokes			
50	q=208	q=208	q=208
51	q=208	q=208	q=208
52	q=208	q=208	q=208
53	q=208	q=208	q=208
54	q=208	q=208	q=208
55	q=208	q=208	q=208
56	q=208	q=208 (+18)	q=208 (+8)
57	q=208	q=208 (+18)	q=208 (+8)
58	q=208	q=200 (+50)	q=200
59	q=208	q=190 (+45)	q=190 (+10)
60	q=208	q=208 (+48)	q=208 (+8)
61	q=208	q=208 (+48)	q=208 (+8)
62	q=208	q=208 (+48)	q=208 (+8)
63	q=208	q=208 (+48)	q=208 (+8)
64	q=208	q=208 (+48)	q=208 (+8)
65	q=208	q=208 (+48)	q=208 (+8)
66	q=208	q=208 (+48)	q=208 (+8)
67	q=208	q=208 (+48)	q=208 (+8)
68	q.=58	q.=58 (+8)	q.=58
69	q.=58	q.=58 (+8)	q.=58
70	q=176	q=150	q=150
71	q=176	q=150	q=150
72	q=176	q=150	q=150
73	q=176	q=150	q=150
74	q=176	q=150	q=150
75	q=176	q=150	q=150
76	q=176	q=150	q=150
77	q=176	q=150	q=150
78	q=176	q=130	q=130
79	q=176	q=130	q=130
80	q=176	q=130	q=130
81	q=176	q=130	q=130
82	q=176	q=130	q=130
83	q=176	q=130	q=130
84	q=176	q=130	q=130
85	q=176	q=130	q=130
86	q=152	q=110	q=110
87	q=152	q=110	q=110
88	q=152	q=110	q=110
89	q=152	q=110	q=110
90	q=152	q=110	q=110
91	q=152	q=110	q=110
92	q=152	q=110	q=110
93	q=152	q=110	q=110

94	q=152	q=80	q=80
95	q=152	q=80	q=80
96	q=152	q=80	q=80
97	q=152	q=80	q=80
98	q=152	q=80	q=80
99	q=152	q=80	q=80
100	q=152	q=80	q=80
101	q=152	q=80	q=80
102	q=152	q=130	q=130
103	q=152	q=130	q=130
104	q=152	q=130	q=130
105	q=152	q=130	q=130
106	q=152	q=130	q=130
107	q=152	q=130	q=130
108	q=152	q=130	q=130
109	q=152	q=130	q=130
110	q=152	q=110	q=110
111	q=152	q=110	q=110
112	q=152	q=110	q=110
113	q=152	q=110	q=110
114	q=152	q=110	q=110
115	q=152	q=110	q=110
116	q=152	q=110	q=110
117	q=152	q=110	q=110
118	q=152	q=110	q=110
119	q=152	q=110	q=110
120	q=152	q=110	q=110
121	q=152	q=110	q=110
122	q=152	q=110	q=110
123	q=152	q=110	q=110
124	q=152	q=110	q=110
125	q=152	q=110	q=110
126	q=144	q=110	q=110
127	q=144	q=110	q=110
128	q=144	q=110	q=110
129	q=144	q=110	q=110
130	q=144	q=110	q=110
131	q=144	q=110	q=110
132	q=144	q=110	q=110
133	q=144	q=110	q=110
134	h=108	h=108	h=108
135	h=108	h=108	h=108
136	h=108	h=95	h=95
137	h=108	h=95	h=95
138	h=108	h=108 (+8)	h=108 (+8)
139	h=108	h=108 (+13)	h=108 (+13)
140	h=108	h=108 (+13)	h=108 (+13)
141	h=108	h=108 (+13)	h=108 (+13)
142	h=108	h=108 (+13)	h=108 (+13)

143	h=108	h=108 (+18)	h=108 (+18)
144	h=108	h=100 (+5)	h=100 (+5)
145	h=108	h=100 (+5)	h=100 (+5)
146	h=108	h=100 (+5)	h=100 (+5)
147	h=108	h=100 (+5)	h=100 (+5)
148	h=108	h=100 (+10)	h=100 (+10)
149	h=108	h=100 (+10)	h=100 (+10)
150	h=108	h=100 (+10)	h=100 (+10)
151	h=108	h=100 (+10)	h=100 (+10)
152	q=108	q=95 (+20)	q=95 (+5)
153	q=108	q=90 (+15)	q=90
154	q=108	q=90 (+15)	q=90
155	q=108	q=95 (+20)	q=95 (+5)
156	q=108	q=90 (+15)	q=90
157	q=108	q=90 (+15)	q=90
158	q=108	q=90 (+15)	q=90
159	q=108	q=90 (+15)	q=90
160	q=108	q=90 (+15)	q=90
161	q=108	q=90 (+15)	q=90
Double Vertical Strokes			
162	h=132	h=132	h=132
163	h=132	h=132	h=132
164	h=132	h=132	h=132
165	h=132	h=132	h=132 (+7)
166	h=132	h=120 (+10)	h=120 (+10)
167	h=132	h=110 (+50)	h=110 (+30)
168	h=132	h=132 (+12)	h=132
169	h=132	h=132 (+22)	h=132
170	h=132	h=120 (+70)	h=120 (+10)
171	h=112	h=112	h=112
172	h=112	h=112	h=112
173	h=112	h=112	h=112
174	h=112	h=112	h=112
175	h=112	h=112	h=112
176	h=112	h=112 (+12)	h=112 (+12)
177	h=112	h=112 (+37)	h=112 (+27)
178	h=112	h=90 (+25)	**h=112** (+37)
179	h=112	h=90 (+20)	h=90 (+10)
180	h=112	h=65	**h=75**
181	h=112	h=112 (+12)	h=112
182	h=112	h=90 (+20)	**h=100**
183	h=112	h=112 (+42)	h=112 (+42)
184	h=112	h=112 (+42)	h=112 (+42)
185	h=112	h=112	h=112
186	h=112	h=112	h=112
187	h=112	h=90	h=90
188	h=112	h=90	h=90
189	h=112	h=80	h=80
190	h=112	h=112	h=112

191	h=112	h=80	h=80
192	h=112	h=80 (+10)	h=80
193	q=72	q=60	q=60
194	q=160	q=90	q=90
195	q=160	q=90	q=90
196	q=160	q=90	q=90
197	q=160	q=90	q=90
198	q=160	q=80	q=80
199	q=160	q=80	q=80
200	q=160	q=70	q=70
201	q=160	q=70	q=70
202	q=72	q=72 (+7)	q=72 (+7)
203	q=68	q=60	q=60
204	q=68	q=50	q=50
205	q=68	q=68	q=68
206	q=68	q=55	q=55
207	h=126	h=126	h=126
208	h=126	h=126	h=126
209	h=126	h=120 (+25)	h=120 (+10)
210	h=126	h=110 (+25)	h=110
211	q=72	q=72 (+12)	q=72 (+12)
212	q=72	q=72 (+12)	q=72 (+12)
213	q=72	q=72 (+12)	q=72 (+12)
214	q=72	q=72	q=72
215	q=72	q=45	q=45
216	q=72	q=50	**q=55**
217	q=72	q=45	**q=50**
218	q=80	q=70	q=70
219	q=96	q=70	**q=80**
220	e=178	e=140	e=140
221	e=178	e=140 (+20)	e=140 (+20)
222	e=178	e=90	e=90
223	e=178	e=90	e=90
224	e=178	e=90	e=90
225	q=108	q=90 (+20)	q=90 (+10)
226	q=108	q=90 (+20)	q=90 (+10)
227	q=108	q=70 (+10)	q=70
228	q=108	q=75 (+15)	q=75 (+5)
229	q=92	q=70 (+20)	**q=75**
230	q=92	q=70 (+25)	q=70
231	q=92	q=60 (+15)	q=60
232	q=92	q=60 (+20)	**q=50**
233	q=72	q=65 (+15)	q=65
234	q=72	q=65 (+15)	q=65
235	q=72	q=55 (+10)	q=55
236	q=72	q=55 (+10)	q=55
237	q=72	q=50 (+5)	**q=55**
238	q=72	q=50 (+5)	**q=55**
239	q=72	q=55 (+10)	**q=40**

240	q=72	q=50 (+5)	**q=40**
241	e=116	e=80 (+15)	**e=70**
242	e=116	e=80 (+15)	**e=70**
243	q=70	q=45 (+5)	**q=30**
244	q=70	q=45 (+5)	**q=30**
245	q=70	q=40	**q=30**
246	q=70	q=40	**q=20**
247	q=70	q=40	**q=20**
248	q=70	q=40	**q=20**
249	e=116	e=70	**e=60**
250	e=116	e=70 (+10)	**e=60**
251	e=116	e=70	**e=60**
252	e=116	e=70 (+10)	**e=60**
253	e=126	e=126	e=126
254	e=126	e=126	e=126
255	e=160	e=140 (+10)	**e=120**
256	e=160	e=130 (+10)	**e=120**
257	e=152	e=152	e=152
258	e=152	e=152	e=152
259	e=152	e=140 (+20)	**e=152**
260	e=152	e=140 (+20)	**e=152**
261	e=152	e=140	**e=152**
262	e=152	e=140 (+20)	**e=152**
263	q=152	q=152	q=152
264	q=152	q=152	q=152
265	q=152	q=152	q=152
266	q=152	q=152	q=152
267	q=104	q=80	q=80
268	q=104	q=80	q=80
269	q=104	q=80	q=80
270	q=104	q=80	q=80
271	e=112	e=100	e=100
272	q=152	q=152	q=152
273	q=92	q=92	q=92
274	q=92	q=92	q=92
275	q=92	q=92 (+12)	q=92
276	q=92	q=92	q=92
277	e=176	e=140 (+20)	e=140
278	e=176	e= 140 (+20)	e=140
Double Lateral Strokes			
279	h=120	h=100 (+10)	h=100 (+10)
280	h=120	h=100 (+10)	h=100 (+10)
281	h=120	h=120 (+10)	h=120 (+10)
282	h=120	h=120 (+10)	h=120 (+10)
283	h=120	h=100 (+10)	h=100 (+10)
284	h=120	h=120 (+10)	h=120 (+10)
285	q=120	q=100 (+10)	q=100 (+10)
286	q=120	q=110 (+10)	q=110 (+10)
287	q=120	q=100 (+10)	q=100 (+10)

288	q=120	q=110 (+10)	q=110 (+10)
289	q=120	q=100 (+10)	q=100 (+10)
290	q=120	q=110 (+10)	q=110 (+10)
291	q=120	q=100 (+10)	q=100 (+10)
292	q=120	q=110 (+10)	q=110 (+10)
293	q=120	q=100 (+10)	q=100 (+10)
294	q=120	q=110 (+10)	q=110 (+10)
295	q=208	q=200 (+10)	q=200 (+30)
296	q=208	q=208	q=208
297	q=208	q=200	q=200 (+30)
298	q=208	q=190 (+10)	q=190 (+10)
299	q=208	q=180 (+25)	q=180 (+10)
300	q=208	q=170 (+25)	q=170 (+10)
301	q=208	q=170 (+25)	q=170 (+10)
302	q=208	q=170 (+25)	q=170 (+10)
303	q=208	q=180 (+15)	q=180 (+15)
304	q=208	q=180 (+15)	q=180 (+15)
305	q=208	q=180 (+15)	q=180 (+15)
306	q=208	q=180 (+15)	q=180 (+15)
307	q=208	q=180 (+15)	q=180
308	q=208	q=180 (+15)	q=180
309	q=208	q=200 (+35)	q=200 (+20)
310	q=208	q=190 (+25)	q=190 (+10)
311	q=208	q=180 (+30)	q=180 (+10)
312	q=208	q=180 (+30)	q=180 (+10)
313	q=208	q=180 (+20)	q=180 (+10)
314	q=208	q=190 (+30)	q=190 (+20)
315	q=208	q=200	q=200 (+20)
316	q=208	q=208 (+8)	q=208
317	q=208	q=190 (+10)	q=190 (+10)
318	q=208	q=190 (+10)	q=190 (+10)
319	q=208	q=180 (+10)	q=180
320	q=208	q=180 (+10)	q=180
321	q=208	q=180	q=180
322	q=208	q=180	q=180
323	q=208	q=208	q=208
324	q=208	q=200 (+10)	**q=190** (+10)
325	q=208	q=190 (+10)	**q=180**
326	q=208	q=190 (+10)	**q=180**
327	q=168	q=168	q=168
328	q=168	q=168	q=168
329	q=168	q=168	q=168
330	q=168	q=168	q=168
331	q=168	q=168	q=168
332	q=168	q=168	q=168
333	q=168	q=168	q=168
334	q=168	q=168	q=168
335	q=168	q=168	q=168
336	q=168	q=168	q=168

337	q=168	q=168	q=168
338	q=168	q=168	q=168
339	q=168	q=168	q=168
340	q=168	q=168	q=168
341	q=168	q=168	q=168
342	q=168	q=168	q=168
343	q=168	q=168	q=168
344	q=168	q=168	q=168
345	q=168	q=168	q=168
346	q=168	q=168	q=168
347	q=168	q=168	q=168
348	q=168	q=168	q=168
349	q=168	q=168	q=168
350	q=168	q=168	q=168
351	q=168	q=130	q=130
352	q=168	q=130	q=130
353	q=168	q=130	q=130
354	q=168	q=130	q=130
355	q=168	q=130	q=130
356	q=168	q=130	q=130
357	q=168	q=130	q=130
358	q=168	q=120	q=120
359	q=168	q=168	q=168
360	q=168	q=168	q=168
361	q=168	q=168	q=168
362	q=168	q=168	q=168
363	q=168	q=168	q=168
364	q=168	q=168	q=168
365	q=168	q=168	q=168
366	q=168	q=168	q=168
367	q=168	q=168	q=168
368	q=168	q=168	q=168
369	q=168	q=168	q=168
370	q=168	q=168	q=168
371	q=168	q=168	q=168
372	q=168	q=168	q=168
373	q=168	q=168	q=168
374	q=168	q=168	q=168
375	q=168	q=155	q=155
376	q=168	q=155	q=155
377	q=168	q=155	q=155
378	q=168	q=155	q=155
379	q=168	q=155	q=155
380	q=168	q=155	q=155
381	q=168	q=155	q=155
382	q=168	q=155	q=155
383	q=144	q=144	q=144
384	q=144	q=144	q=144
385	q=144	q=144	q=144

386	q=144	q=144	q=144
387	q=144	q=144	q=144
388	q=144	q=144	q=144
389	q=144	q=144	q=144
390	q=144	q=144	q=144
391	q=144	q=144	q=144
392	q=144	q=144	q=144
393	q=144	q=144	q=144
394	q=144	q=144	q=144
395	q=144	q=144	q=144
396	q=144	q=144	q=144
397	q=144	q=144	q=144
398	q=144	q=144	q=144
399	q=144	q=144	q=144
400	q=144	q=144	q=144
401	q=144	q=144	q=144
402	q=144	q=144	q=144
403	q=144	q=144 (+14)	q=144
404	q=144	q=144 (+14)	q=144
405	q=144	q=144 (+14)	q=144
406	q=144	q=144 (+14)	q=144
407	q=144	q=144 (+14)	q=144
408	q=144	q=144 (+14)	q=144
409	q=144	q=144 (+14)	q=144
410	q=144	q=144 (+14)	q=144
411	q=184	q=184	q=184
412	q=184	q=184	q=184
413	q=184	q=184	q=184
414	q=184	q=184	q=184
Mixed Strokes			
415	e=208	e=208	e=208
416	e=208	e=208	e=208
417	e=208	e=208	e=208
418	e=208	e=208	e=208
419	q=116	q=116	q=116
420	q=116	q=116	q=116
421	q=116	q=116	q=116
422	q=116	q=116	q=116
423	q=116	q=116	q=116
424	q=116	q=116	q=116
425	q=104	q=104	q=104
426	q=104	q=104	q=104
427	q=104	q=104	q=104
428	q=120	q=110	q=110
429	q=104	q=80	q=80
430	q=104	q=104	q=104
431	q=120	q=120	q=120
432	q=184	q=184 (+24)	**q=170** (+10)
433	q=184	q=184 (+24)	**q=170** (+10)

434	q=184	q=184 (+24)	**q=170** (+10)
435	q=184	q=170 (+10)	q=170 (+10)
436	q=184	q=184 (+24)	**q=170** (+10)
437	q=184	q=170 (+30)	q=170 (+10)
438	q=184	q=160 (+20)	q=160
439	q=184	q=150 (+10)	**q=160**
440	q=184	q=150 (+30)	q=150
441	q=184	q=140 (+20)	**q=150**
442	q=184	q=150 (+30)	q=150
443	q=184	q=150 (+30)	q=150
444	q=184	q=150 (+30)	q=150
445	q=184	q=150 (+30)	q=150
446	q=184	q=140 (+20)	**q=150**
447	q=184	q=150 (+30)	q=150
448	q=184	q=140 (+20)	**q=150**
449	q=184	q=140 (+20)	**q=150**
450	q=184	q=140 (+20)	**q=150**
451	q=184	q=140 (+20)	**q=150**
452	q=184	q=140 (+20)	**q=150**
453	q=184	q=140 (+20)	**q=150**
454	q=184	q=140 (+20)	**q=150**
455	q=184	q=140 (+20)	**q=150**
456	q=144	q=144	q=144
457	q=144	q=144	q=144
458	q=144	q=144	q=144
459	q=144	q=144	q=144
460	q=144	q=144	q=144
461	q=144	q=144	q=144
462	q=168	q=160 (+30)	q=160
463	q=168	q=160 (+30)	q=160
464	q=168	q=110	q=110
465	q=168	q=120	q=120
466	q=168	q=110	q=110
467	q=168	q=130 (+10)	q=130
468	q=168	q=150	q=150
469	q=168	q=160	q=160
470	q=168	q=150	q=150
471	q=168	q=130	q=130
472	q=168	q=110	q=110
473	q=168	q=110	q=110
474	q=168	q=110	q=110
475	q=168	q=110	q=110
476	q=168	q=150	q=150
477	q=168	q=150	q=150
478	e=168	e=168	e=168
479	e=168	e=168	e=168
480	e=168	e=168	e=168
481	e=168	e=168	e=168
482	e=168	e=140	e=140

483	e=168	e=140	e=140
484	e=168	e=140	e=140
485	e=168	e=140	e=140
486	e.=138	e.=110 (+10)	e.=110
487	e.=138	e.= 110 (+10)	e.=110
488	e.=138	e.= 110 (+10)	e.=110
489	e.=138	e.= 110 (+10)	e.=110
490	e.=138	e.= 110 (+10)	e.=110
491	e.=138	e.= 110 (+10)	e.=110
492	e.=138	e.= 110 (+10)	e.=110
493	e.=138	e.= 110 (+10)	e.=110
494	e.=138	e.= 110 (+10)	e.=110
495	e.=138	e.= 110 (+10)	e.=110
496	e.=138	e.= 110 (+10)	e.=110
497	e.=138	e.= 110 (+10)	e.=110
498	e.=138	e.= 110 (+10)	e.=110
499	e.=138	e.= 110 (+10)	e.=110
500	e.=138	e.= 110 (+10)	e.=110
501	e.=138	e.= 110 (+10)	e.=110
502	q=120	q=120	q=120
503	q=120	q=120	q=120
504	q=120	q=110 (+10)	q=110 (+10)
505	q=120	q=120	q=120
506	q=120	q=120	q=120
507	q=120	q=120	q=120
508	q=120	q=110 (+10)	q=110 (+10)
509	q=120	q=120	q=120
510	q=120	q=110 (+5)	q=110 (+5)
511	q=120	q=110 (+5)	q=110 (+5)
512	q=120	q=80	q=80
513	q=120	q=80	q=80
514	q=120	q=110 (+5)	q=110 (+5)
515	q=120	q=110 (+5)	q=110 (+5)
516	q=120	q=80	q=80
517	q=120	q=80	q=80
518	q=132	q=120	q=120
519	q=132	q=120	q=120
520	q=132	q=110	q=110
521	q=132	q=100	q=100
522	q=132	q=120	q=120
523	q=132	q=100	q=100
524	q=132	q=100	q=100
525	q=132	q=80	q=80
526	q=132	q=120	q=120
527	q=132	q=120	q=120
528	q=132	q=100	q=100
529	q=132	q=80	q=80
530	q=132	q=120	q=120
531	q=132	q=100	q=100

532	q=132	q=120	q=120
533	q=132	q=120	q=120
534	q=132	q=100	q=100
535	q=132	q=80	q=80
536	q=132	q=100	q=100
537	q=132	q=80	q=80
538	q=132	q=110	q=110
539	q=132	q=110	q=110
540	q=132	q=110	q=110
541	q=132	q=90	q=90
542	q=132	q=100	q=100
543	q=132	q=80	q=80
544	q=132	q=100	q=100
545	q=132	q=90	q=90
546	q=132	q=110	q=110
547	q=132	q=110	q=110
548	q=132	q=110	q=110
549	q=132	q=90	q=90
550	q=132	q=110	q=110
551	q=132	q=90	q=90
552	q=132	q=100	q=100
553	q=132	q=90	q=90
554	q=132	q=80	q=80
555	q=132	q=80	q=80
556	q=132	q=80	q=80
557	q=132	q=80	q=80
558	q=132	q=80	q=80
559	q=132	q=80	q=80
560	q=132	q=80	q=80
561	q=132	q=80	q=80
562	q=132	q=80	q=80
563	q=132	q=80	q=80
564	q=132	q=80	q=80
565	q=132	q=80	q=80
566	q=96	q=96	q=96
567	q=96	q=96	q=96
568	q=88	q=70	q=70
569	q=88	q=70	q=70
570	q=88	q=70	q=70
571	q=88	q=70	q=70
572	e=208	e=200 (+10)	**e=**200 (+10)
573	e=208	e=200 (+10)	**e=**200 (+10)
574	e=208	e=200 (+10)	**e=**200 (+10)
575	e=208	e=200 (+10)	**e=**200 (+10)
576	e=208	e=200 (+40)	**e=**200 (+10)
577	e=208	e=200 (+40)	**e=**200 (+10)
578	e=208	e=190 (+30)	e=190
579	e=208	e=180 (+20)	**e=190**

580	q=112	q=112	q=112
581	q.=78	q.=78	q.=78
582	q=84	q=84	q=84
583	q=84	q=84	q=84
584	q=92	q=92	q=92
585	q=92	q=92	q=92
586	q=104	q=104	q=104
587	q=104	q=104	q=104
588	q=92	q=92	q=92
589	q=92	q=92	q=92
590	q=92	q=92	q=92

Table 8. List of maximum performance tempos for all *Method of Movement* exercises achieved using the Stevens and classical techniques, with indications of tempo increases relative to Experiment 1

All exercises	**Stevens Technique**	**Classical Technique**
Maximum tempo	206 ex. = **35%**	207 ex. = **35%**
90 – 99% of the max. tempo	75 = **13%**	74 = **12%**
80 – 89%	132 = **22%**	142 = **24%**
70 – 79%	103 = **17%**	95 = **16%**
60 – 69%	50 = **8%**	40 = **7%**
50 – 59%	22 = **4%**	24 = **4%**
under 50%	2 **= 1%**	8 = **2%**

Table 9. Percentage summary of performance tempos for all *Method of Movement* exercises

Single Independent Strokes	**Stevens Technique**	**Classical Technique**
Maximum tempo	14 ex. = **29%**	14 ex. = **29%**
90 – 99% of the max. tempo	4 = **8%**	4 = **8%**
80 – 89%	22 = **45%**	22 = **45%**
70 – 79%	9 = **18%**	9 = **18%**
60 – 69%	0	0
50 – 59%	0	0
under 50%	0	0

Table 10. Percentage summary of performance tempos for exercises from the Single Independent Stroke subsection

Single Alternating Strokes	**Stevens Technique**	**Classical Technique**
Maximum tempo	26 ex. = **23%**	26 ex. = **23%**
90 – 99% of the max. tempo	10 = **9%**	10 = **9%**
80 – 89%	28 = **25%**	28 = **25%**
70 – 79%	40 = **36%**	40 = **36%**
60 – 69%	0	0
50 – 59%	8 = **7%**	8 = **7%**
under 50%	0	0

Table 11. Percentage summary of performance tempos for exercises from the Single Alternating Strokes subsection

Double Vertical Strokes	**Stevens Technique**	**Classical Technique**
Maximum tempo	40 ex. = **34%**	45 ex. = **38%**
90 – 99% of the max. tempo	9 = **8%**	5 = **4%**
80 – 89%	16 = **14%**	15 = **13%**
70 – 79%	18 = **15%**	20 = **17%**
60 – 69%	18 = **15%**	8 = **7%**
50 – 59%	14 = **12%**	16 = **14%**
under 50%	2 = **2%**	8 = **7%**

Table 12. Percentage summary of performance tempos for exercises from the Double Vertical Strokes subsection

Double Lateral Strokes	**Stevens Technique**	**Classical Technique**
Maximum tempo	78 ex. = **58%**	78 ex. = **58%**
90 – 99% of the max. tempo	25 = **18%**	23 = **17%**
80 – 89%	25 = **18%**	27 = **19%**
70 – 79%	8 = **6%**	8 = **6%**
60 – 69%	0	0
50 – 59%	0	0
under 50%	0	0

Table 13. Percentage summary of performance tempos for exercises from the Double Lateral Strokes subsection

Mixed Strokes	**Stevens Technique**	**Classical Technique**
Maximum tempo	48 ex. = **27%**	44 ex. = **25%**
90 – 99% of the max. tempo	27 = **16%**	32 = **18%**
80 – 89%	41 = **23%**	50 = **29%**
70 – 79%	28 = **16%**	18 = **10%**
60 – 69%	32 = **18%**	32 = **18%**
50 – 59%	0	0
under 50%	0	0

Table 14. Percentage summary of performance tempos for exercises from the Mixed Strokes subsection

3.4.4 Conclusions

1. Are my skills with the Stevens technique, after two years of focused practice, now comparable to my skills with the classical technique?

As shown in Tables 8 and 9, the answer to the research question is affirmative. The differences between the achieved tempos – regardless of tempo range – do not exceed 2%, which allows them to be considered marginal. Based on the statistical data concerning the execution of exercises from the entire *Method of Movement* book (Table 9), it can be concluded that, as of today, my proficiency in playing using the Stevens and classical techniques is balanced. Compared to Experiment 1, conducted in 2022/23, I recorded an 18% increase in the performance tempo of exercises played with the Stevens technique within the fast tempo range (80–100% of the maximum tempo suggested by the author). This means that in 2022/23, I performed 52% of the exercises within this tempo range, whereas in 2025, the figure rose to 70%.

2. Does the development of skill in the Stevens technique contribute to an improvement in proficiency with the classical technique?

The experiment revealed certain correlations between the improvement of my skills with the Stevens technique and a parallel improvement in my proficiency with the classical technique. As shown in Table 2 from Experiment 1 and Table 9 from Experiment 3, in

Experiment 1 I achieved tempos exceeding 80% of the maximum values using the classical technique in 66% of cases, whereas in Experiment 3 this figure increased to 71%. This represents a 5% rise in maximum performance tempos achieved with the classical technique compared to the results obtained two years earlier.

This outcome was unexpected. I had assumed that the maximum tempos achieved with the classical technique in Experiment 3 would not differ from those recorded in Experiment 1, as I believed my classical technique skills in 2025 remained at roughly the same level as in 2023. The observed increase may result from one or more of the following factors:

1. **Increased familiarity with the *Method of Movement* exercise material –** I consider this factor highly probable, though its overall impact on the result is limited. It should be noted that between the completion of Experiment 1 and Experiment 3, I did not use *Method of Movement* as part of my regular technical practice. This means that any increased familiarity with the exercises resulted solely from their previous performance during Experiments 1 and 2, rather than from additional practice in the intervening period.
2. **Overly conservative recording of maximum tempos in Experiment 1 –** it is possible that, in some cases, the performance tempos recorded at that time were understated. I assume that my technical abilities at the time might have allowed me to perform certain exercises at higher tempos; however, I noted more comfortable and secure tempos, which may have contributed to the observed difference in results.
3. **Skill transfer between techniques –** it is possible that the improvement of my proficiency with the Stevens technique had a positive influence on my performance level when using the classical technique.

Among the factors listed, the third one – the assumption that the improvement of my proficiency with the Stevens technique influenced the enhancement of my results with the classical technique – appears to be the most interesting and noteworthy. This hypothesis provides potential evidence of a significant kinship between the two techniques and aligns

with my subjective impression that mastering one of them has a beneficial effect on the development of the other.

Confirmation of this hypothesis could also have important didactic implications. It could help resolve a common dilemma among young percussion students in Poland, who often question the value of learning the Stevens technique once they have already mastered the classical one. A frequently voiced concern is that beginning to study an alternative technique at the university level might not provide enough time to master it at an advanced level. This, in turn, raises the question of whether it is worth investing substantial time and effort in such training without guaranteed tangible benefits.

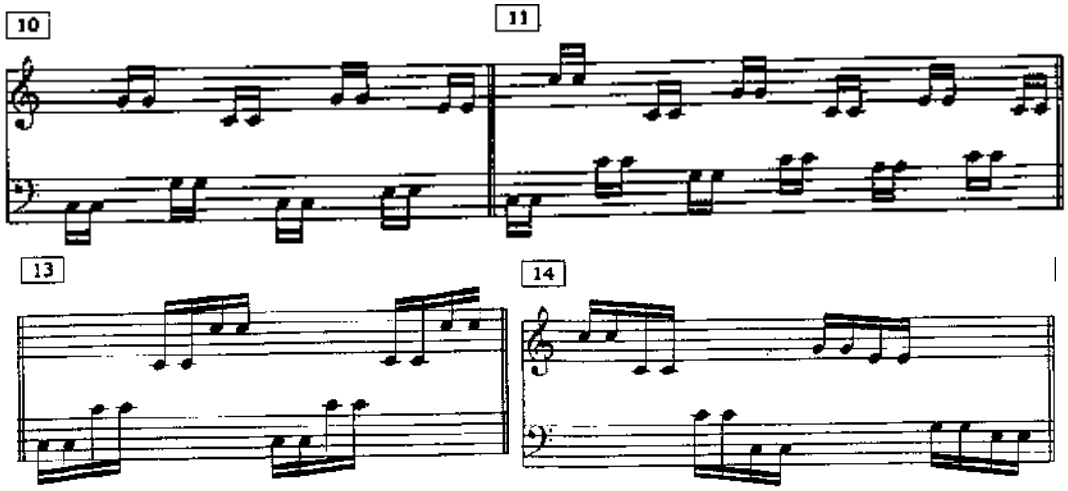
In light of the results of Experiment 3, which suggest a positive influence of mastering the Stevens technique on the effectiveness of performing exercises using the classical technique, it seems reasonable to consider conducting further, more in-depth research on this subject. Such studies could make a meaningful contribution to the development of modern pedagogical approaches to marimba technique instruction in Poland. Undoubtedly, this is a fascinating and pedagogically valuable area of inquiry. The experiment I conducted can be regarded as a starting point for further analysis. However, in order to confirm the hypothesis regarding the kinship of the two techniques with certainty, it would be necessary to eliminate the influence of the factors identified as causes no. 1 and 2 (increased familiarity with the material and overly conservative tempo recording in Experiment 1) on the observed improvement in performance tempos achieved with the classical technique. Unfortunately, this is not possible without employing more detailed observational and experimental methods, which extend beyond the scope of the present study.

3. Which examples might demonstrate the superiority of the Stevens technique over the classical technique, assuming that my proficiency in both techniques is now balanced, and will these examples differ from those identified in Experiment 1?

Exercises from the "Single Independent Strokes" subsection

After equalizing my proficiency in both techniques, the exercises in the Single Independent Strokes subsection showed statistically identical performance tempo results for both techniques (Table 10). However, several noteworthy exceptions were observed.

Interesting examples include exercises 10, 11, 13, and 14 (Example 23). Exercises 10 and 11 combine Single Independent strokes with alternating wide and narrow mallet-spread angles within one hand, whereas 13 and 14 are based on fast note repetitions while maintaining an octave interval between the mallets held in one hand – that is, with a wide mallet-spread angle. In my experience, exercises 13 and 14 were easier to perform using the Stevens technique, while 10 and 11 were more comfortable with the classical technique. This confirms the general principle that the Stevens technique provides greater wrist mobility for wide intervals, whereas the classical technique is better suited for performing rapid single-note repetitions requiring a narrow mallet-spread angle, typical of small intervals.



Example 23. Exercises 10, 11, 13, and 14 from *Method of Movement*

Exercises 43 and 45 (Example 24) once again confirm the hypothesis of the superiority of the Stevens technique, first proposed in Experiment 1 and Experiment 2. In the case of a rapid leap spanning a tenth between the mallets of one hand, I achieved a slightly higher tempo using the Stevens technique (Table 8). The wide mallet span made possible by the Stevens grip eliminates the need for horizontal hand movement across the keyboard, which is unavoidable when using the classical technique (vid. 14).

Example 24. Exercises 43 and 45 from *Method of Movement*

Exercises from the "Single Alternating Strokes" subsection

As in Experiment 1, the exercises in this subsection did not reveal any significant differences between the two techniques. The statistical values of the achieved tempos were identical for both playing methods. Therefore, it can be concluded that exercises based on Single Alternating Strokes highlight the advantage of the Stevens technique only when performed in transpositions, as described in Experiment 2.

Exercises from the "Double Vertical Strokes" subsection:

The exercises in this subsection revealed clear differences in performance tempo between the two techniques (Table 12). As mentioned earlier, Double Vertical Strokes are most natural when using the traditional grip of the classical technique. However, the exercises composed by L.H. Stevens in this subsection also include many examples based on wide intervals played with one hand. In such cases, a wide mallet-spread angle is much easier to achieve with the Stevens grip, which offers greater flexibility in this regard than the traditional grip. Therefore, although the nature of Double Vertical Strokes initially suggests the advantage of the classical technique, many examples in this subsection – due to the use of wide intervals – allowed me to achieve higher tempos using the Stevens technique. Conversely, exercises that did not require such a wide mallet span were easier to perform using the classical technique.

Exercises 165, 167, and 168 (Example 7) were previously identified in Experiment 1 as demonstrating the superiority of the Stevens technique. However, this conclusion was not confirmed in Experiment 3 (Tables 1 and 8). During Experiment 3, I recorded a significant increase in the performance tempo of these exercises using the Stevens technique – sometimes exceeding the tempos previously achieved with the classical technique in Experiment 1. Nonetheless, repeating the same exercises with the classical technique also resulted in a tempo increase, which ultimately equaled the results obtained with the Stevens technique. Consequently, I believe that the performance tempos recorded for the classical technique in Experiment 1 may have been too conservative, or that the significant improvement in my Stevens technique indirectly contributed to an easier execution of these exercises using the classical technique as well.

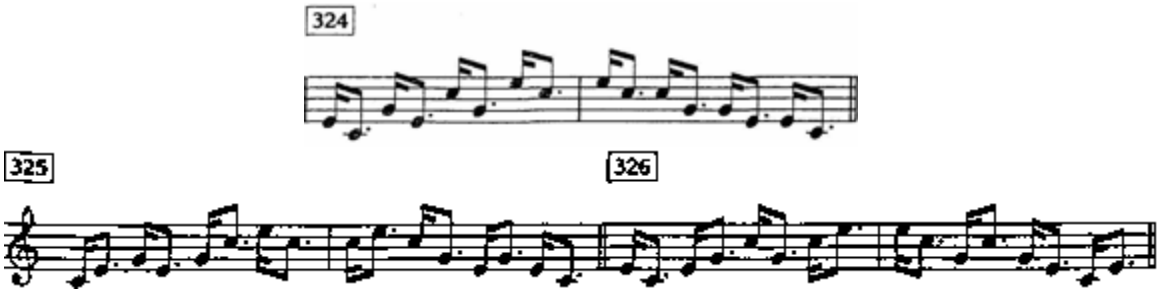
Exercises 232, 239–252, and 255 (Example 8) serve as examples of material where the primary challenge lies in the rapid change of mallet-spread angles within one hand, resulting from the dynamic alternation between small and large intervals played simultaneously by both mallets of the same hand. Some of these exercises were already discussed in Experiments 1 and 2, and Experiment 3 confirms the earlier findings supporting the superiority of the Stevens technique in such contexts.

It is worth emphasizing, however, that this represents a more complex case in which two key technical challenges compete: on one hand, the wide intervals, which are easier to manage using the Stevens technique; and on the other, the synchronization of Double Vertical strokes, which is generally easier to achieve with the traditional grip. Nevertheless, in exercises requiring rapid interval changes – such as from a third to a tenth (as in exercise 251, Example 8) – the Stevens technique proves undeniably more efficient.

Exercises from the "Double Lateral Strokes" subsection:

As in Experiment 1, the exercises in this subsection did not show any significant differences between the two techniques (Table 13). However, a few isolated cases can be identified that confirm the conclusions drawn in Experiments 1 and 2 regarding the superiority of the Stevens technique in performing small intervals alternated between the two mallets of one hand – a motion corresponding to Single Alternating and Double

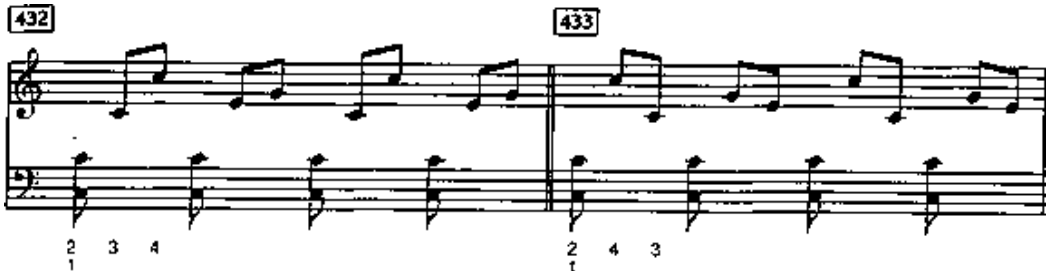
Lateral strokes. An example of this can be found in exercises 324–326, in which I achieved faster performance tempos using the Stevens technique (even despite an increase in tempo achieved with the classical technique for exercise 324) (Example 25).



Example 25. Exercises 324–326 from *Method of Movement*

Exercises from the "Mixed Strokes" subsection:

Within the Mixed Strokes subsection, there are several isolated examples in which I achieved faster tempos using the Stevens technique – specifically exercises 432–434 and 436 (Example 26). All four of these examples feature a third interval executed with a motion corresponding to Single Alternating strokes, which, as previously established, is easier to perform using the Stevens technique.



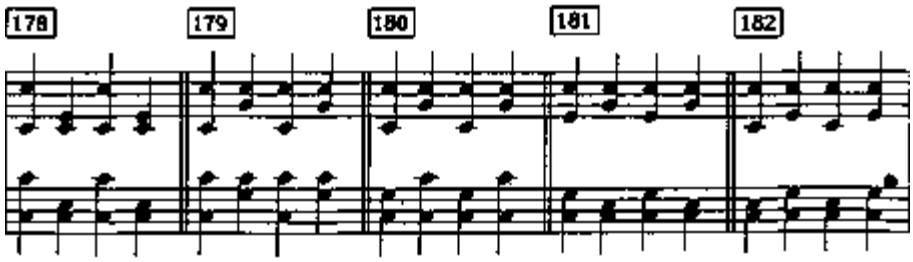
Example 26. Exercises 432 and 433 from *Method of Movement*

4. Are there technical problems in Method of Movement where—despite my balanced proficiency in both techniques—the classical technique still proves more effective than the Stevens technique?

In Experiment 3, several examples emerged in which – despite my now balanced proficiency in both techniques – I achieved faster tempos using the classical technique. This provides further evidence that the Stevens technique is not a universal solution and does not necessarily perform better in every case.

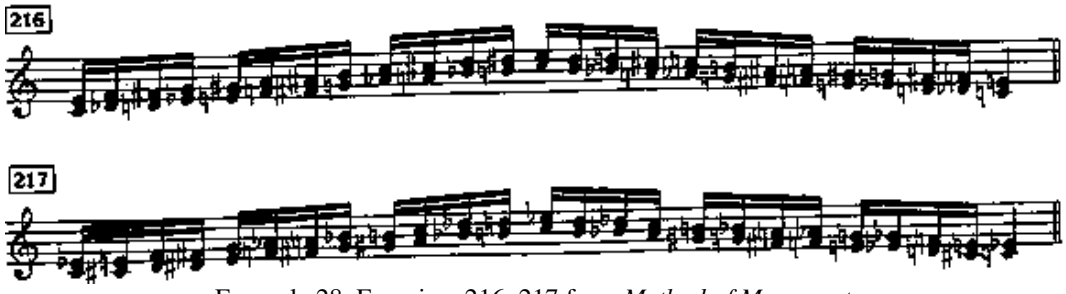
Exercises 10 and 11 (Example 23), as previously mentioned, involve note repetitions executed with Single Independent strokes while maintaining a narrow mallet-spread angle within one hand. In this case, their execution proved slightly easier using the traditional grip of the classical technique. However, it should be emphasized that these are isolated and marginal examples.

Exercises 178, 180, and 182 (Double Vertical Strokes) (Example 27) illustrate the greater ease of performing Double Vertical strokes using the traditional grip. The effect of both mallets striking simultaneously is easier to achieve when they are in physical contact and mutually dependent—a characteristic feature of the traditional grip.



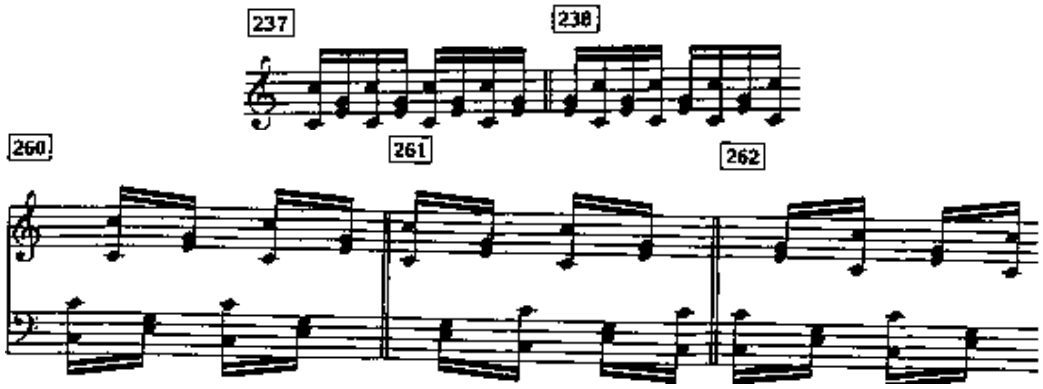
Example 27. Exercises 187–182 from *Method of Movement*

Exercises 216, 217, and 219 (Double Vertical Strokes) (Example 28): despite the improvement in my proficiency with the Stevens technique, the performance tempos of these exercises remained the same as in Experiment 1, with the classical technique still allowing for higher tempos. These exercises illustrate a technical issue I already discussed in the conclusions of Experiment 2 – the longer mallets held at the ends of the shafts in the Stevens grip require increased elbow movement when executing third-based patterns simultaneously on the diatonic and chromatic keyboards. In this case, it is once again confirmed that this problem is easier to overcome when using shorter mallets held with the traditional grip.



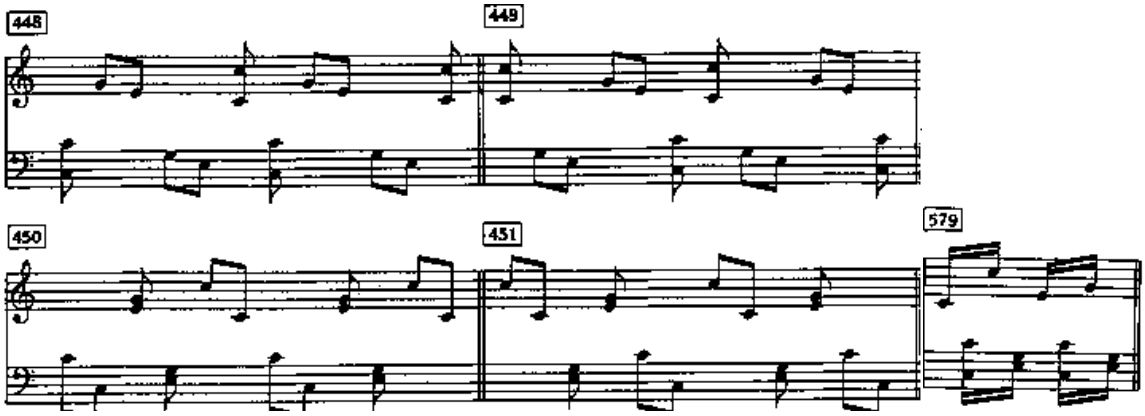
Example 28. Exercises 216–217 from *Method of Movement*

Exercises 229, 237, 238, and 259–262 (Double Vertical Strokes) (Example 29): within this segment, which involves rapid alternations between small and large intervals, there are many exercises confirming the superiority of the Stevens technique (e.g., exercises 240–252). However, in cases where the intervals range from a third to an octave, there are examples in which the classical technique proves more effective. This results from the reduced issue of mallet synchronization in Double Vertical strokes, which I mentioned earlier.



Example 29. Exercises 237, 238, and 260–262 from *Method of Movement*

Further examples supporting this conclusion are exercises 439, 441, 446, 448–455, and 579 from the Mixed Strokes subsection (Example 30). Despite the previously discussed precedent of exercises 432–434 and 436, in which the Stevens technique allowed for higher performance tempos, this segment contains a greater number of cases where I achieved faster tempos using the classical technique.



Example 30. Exercises 448–451 and 579 from *Method of Movement*

3.5 Methods of Sound Production on Keyboard Percussion Instruments – Discussion of Sources

In order to introduce the chapter devoted to experiments with sound spectrum, I will discuss in this part of the work several issues related to the methods of producing sound from keyboard percussion instruments, reaching back to the earliest educational publications. An analysis of the development of this topic makes it possible to observe the evolution of successive generations of percussionists' awareness regarding the factors that influence the quality and tone color of the produced sound.

The earliest percussion method books treated the subject of sound production on keyboard percussion instruments rather superficially, focusing mainly on the correct mechanics of hand movement while playing. An example is Harry A. Bower's The Harry A. Bower System for Drums, Bells, Xylophone, Timpani, published in 1912. The only information regarding xylophone sound production contained in this publication is the note: "strike notes in the center."[162]

However, as early as the beginning of the 1920s, George Hamilton Green recommended striking the edges of the bars on the upper keyboard of the xylophone in order to achieve greater facility when playing at fast tempos and, moreover, to use this technique in all situations. His pedagogical writings also include notes concerning the appropriate types of mallets.

> When striking the bars containing the sharps and flats, always strike them on the extreme end of the bar nearest you. This will enable you to develop greater speed and accuracy. You will find that the tone is just as clear at the end of the bar as in the middle.", Avoid wooden or extremely hard rubber balls, as they not only ruin the instrument by pounding it full of dents, but the tone they produce is harsh and displeasing to the ear.[163]

In *Home Study Course in Vibracussion* from 1917, there are also annotations concerning mallets, while in the section *Special Lesson on Four Mallet Playing* from 1922, one finds guidelines regarding the proper striking point on the bar, encompassing both its center and its edge. In this case, however, the author introduces an evaluation of the sound

[162] Harry A. Bower, *The Harry A. Bower System…*, op. cit., 10.
[163] G.H. Green, *Instruction Course for Xylophone*…, op. cit., 3.

quality, considering the center of the bar as the primary striking point and the edge as secondary.

> While it is a fact that the best tone is secured by striking the bars squarely in the center, it is, nevertheless, true that a good tone can also be secured by striking them on the extreme ends [...].[164]

Starting from the 1920s, two methods of sound production on keyboard percussion instruments were proposed in pedagogical literature: striking the center and striking the edge of the bar. Yet, as seen in the examples of Green and the author of *Home Study Course in Vibracussion*, we can already observe differing opinions on this matter. Green regarded both striking points as equivalent, whereas the author of the latter publication evaluated the quality of the resulting sound, treating the edge of the bar as a "second-rate" source of tone.

The topic of two correct striking points on the bar continues to be discussed to this day, and differing views on the matter still remain a point of contention among percussionists. In publications issued before the appearance of *Method of Movement*, one can find numerous inconsistencies regarding the correct place to strike on the edge of the bar. Many sources do not clearly specify whether the "edge" of the bar actually refers to its very rim, or rather to the area between the nodal point (that is, where the cord passes through the bar) and the rim itself. Moreover, some authors often use the term extreme edge, while the illustrations included in these publications indicate a striking point closer to the center – between the nodal point and the rim. This detail, however, is crucial for the overtone structure of the produced sound, which in turn affects its timbre and quality.

Examples illustrating these inconsistencies in the pedagogy of striking point placement can also be observed in other titles discussed in Chapter 1. For instance, Harry C. Thompson, in his *Elementary Instructor for Vibraphone and Vibra-Celeste* (1931), suggests that, as a general rule, one should play in the center of the bars. However, in cases

[164] National School of Vibracussion, *Home Study Course in Vibracussion*, *Special Lesson on Four Mallet Playing*…, op. cit., 3.

where this is not possible, he recommends playing on the chromatic keyboard "at or near the end of the bar."[165]

In his *Marimba Method* (1937), Howard A. Greene includes the note: "The sharp bars may be struck at the end, near the natural keys."[166] The illustrations accompanying the chapter on four-mallet technique, authored by Clair Omar Musser, already reveal certain inconsistencies. In one of the photographs, a mallet is clearly shown striking the very end of the bar, while in another it is positioned closer to the area between the edge and the nodal point (fig. 28).

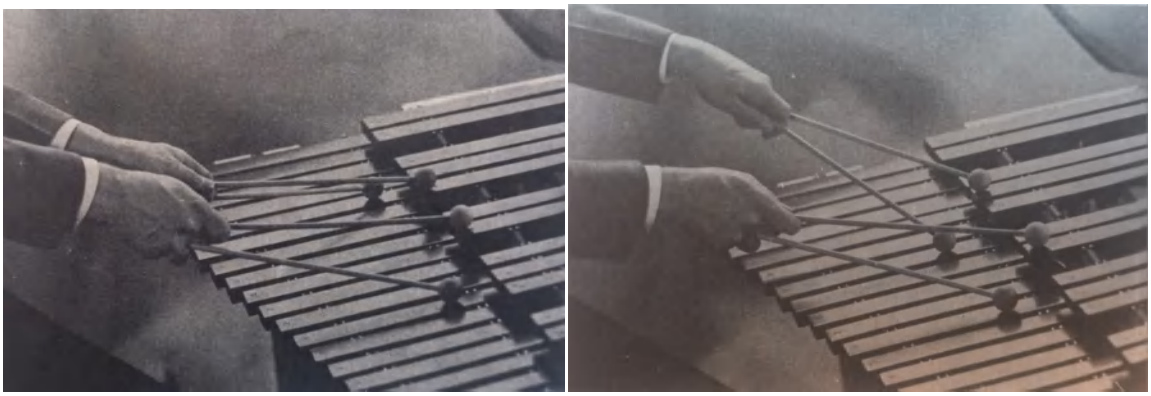


Figure 28. Photographs illustrating edge playing from Howard A. Greene's *Marimba Method* – on the left, striking the edge; on the right, striking closer to the center, between the edge and the nodal point

Similar inaccuracies can be observed in Phil Kraus's *Modern Mallet Method*, published more than twenty years later. The position of the inner mallets is difficult to determine precisely from the photograph – they may indeed be placed on the edges of the bars of the chromatic keyboard. However, the position of the outer mallets raises some doubts: the outer mallet in the right hand appears to strike the nodal point, while the left-hand outer mallet is positioned between the nodal point and the edge of the bar (fig. 29).

[165] Harry C. Thompson, *Elementary Instructor for Vibraphone and Vibra-Celeste*…, op. cit., 4.
[166] Howard A. Greene, *Marimba Method*, op. cit., 18.

Figure 29. Hand position when playing a chord connecting the diatonic and chromatic keyboards, from Phil Kraus's *Modern Mallet Method*, vol. 3

Jacques Delécluse's *Méthode Complète de Vibraphone* (1963) also raises questions regarding the exact striking point on the edges of the bars. The illustrations included in this work are rather imprecise and do not appear to indicate the actual edge of the bar (fig. 30).

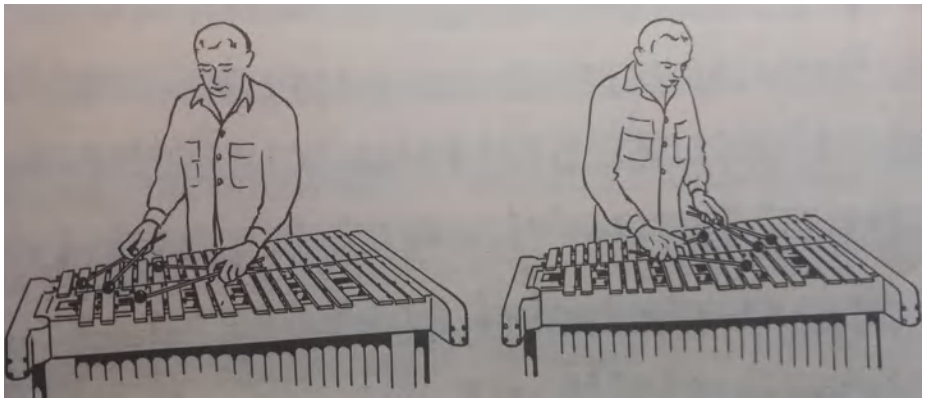


Figure 30. Drawings illustrating edge playing from Jacques Delécluse's *Méthode Complète de Vibraphone*

In many pedagogical publications devoted to vibraphone performance – such as *Méthode Complète de Vibraphone* and earlier works like *Elementary Instructor for Vibraphone and Vibra-Celeste* or Lionel Hampton's *Method for Vibraharp* – one can find recommendations to play on the edges of the bars in order to facilitate the execution of certain chordal patterns. However, in James Blades's *Percussion Technique*, published in 1962 (a year before *Méthode Complète de Vibraphone*), the author warns against using this technique when playing the vibraphone. Unfortunately, Blades does not provide any explanation for his opinion.

> As with two-hammer playing, the ends of the back row of notes can be used to help a quick change, and a rapid turn of the wrist can help to reduce or augment an interval without altering the span of the beaters (this technique is not recommended for the vibraphone).[167]

Another interesting example of inconsistency in the pedagogy concerning the striking point is Harry R. Bartlett's *Guide to Teaching Percussion* (1963). The author describes in great detail that, in addition to the standard practice of striking the center of the bar, the correct alternative striking point is not actually the edge of the bars on the chromatic keyboard, but rather the area between the edge and the nodal point (fig. 31).

> Half way between the nodal points and the ends of each bar are located resonant spots which are useful playing spots.[168]

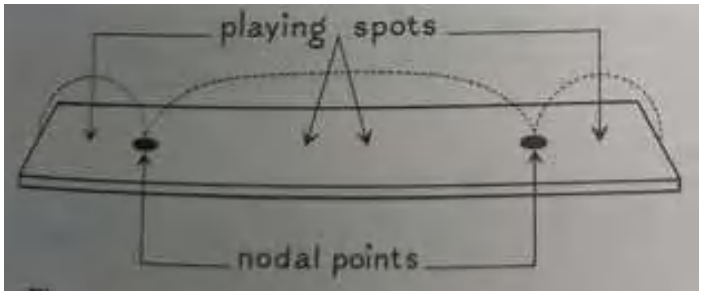


Figure 31. Diagram illustrating the nodal points and correct striking areas on the bars of the instrument, from Harry R. Bartlett's *Guide to Teaching Percussion*

Three years after the publication of *Guide to Teaching Percussion*, a comprehensive article by James L. Moore titled "The Mysticism of the Marimba" appeared in *Percussive Notes*. In this text, the author discusses in detail the acoustic properties of marimba and xylophone bars, comparing them with traditional instruments produced in Africa and Guatemala.

In addition to topics related to the history and cultural significance of the marimba, Moore devotes a substantial part of the article to the details of bar tuning and addresses issues concerning the tonal properties of the marimba keyboard – factors that may play a significant role in developing marimbists' awareness of sound production. The author also examines the vibration characteristics of a marimba bar according to its first two transverse vibration frequencies, corresponding to the fundamental tone and the first tuned overtone,

[167] James Blades, *Orchestral Percussion Technique* (London: Oxford University Press, 1961), 80.
[168] Harry R. Bartlett, *Guide to Teaching Percussion*, ed. 1…, op. cit., 80.

located two octaves above the fundamental. Moore further illustrates the points of greatest and smallest amplitude for the first transverse vibration frequency of the bar and identifies the corresponding areas of greatest resonance for sound production. Thus, only three years after the publication of Guide to Teaching Percussion, Moore's article presents a contrasting view on the precise striking point on the edge of the bar – one that is now supported by acoustic research and references to specialized journals devoted to the acoustics of musical instruments.

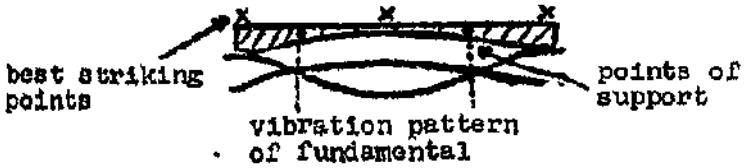


Figure 32. Illustration of a marimba bar showing the vibration pattern, nodal points, and optimal striking areas, from James L. Moore's article "The Mysticism of the Marimba"

The 1970s can be regarded as a breakthrough period in the development of knowledge about sound production on keyboard percussion instruments. During this time, educators and authors of scientific and pedagogical publications began to incorporate knowledge from the field of acoustics into their teaching practice. An example of this is Linda Pimentel's article "The Marimba Bar," published in *Percussive Notes* in 1974. In her text, Pimentel mentions the technique of playing on the edges of the bars of the chromatic keyboard and balancing this sound by striking the bars of the diatonic keyboard at a point between the center and the nodal point..

> If, during the fast scale and chromatic-type passages, the student strikes the tips of the upper bars, he should, to balance the sound, strike the lower bar between the center and the node.[169]

Pimentel also writes about balancing the sound of chords by striking each component of the chord at a different point on the bar.

> Most bar percussion instruments tend to ring more at the lower pitch register of the instrument and less at the top end. Thus I often perform open-voiced chords so that the top voice is struck directly in the center of the bar, with each remaining voice placed a little further from the center so that the bottom voice is almost on the node.[170]

[169] Linda Pimentel, "The Marimba Bar" *Percussive Notes* 12.2 (1974), 46.
[170] Ibidem, 47.

Linda Pimentel's views indicate a more advanced approach to the issue of sound production on the marimba – one that abandons the traditional evaluation of tone as "better" or "worse," based on whether the bar is struck in the "right" or "wrong" place. Instead, every striking point is regarded as having its own unique function and timbral quality, derived from the specific acoustic properties of the marimba bars. These views are supported by acoustic research, which further underscores their scientific validity.

According to current sources on the acoustic properties of marimba bars, modern marimbas are tuned in accordance with the natural sound of the three most audible transverse vibration frequencies of the bar. The first of these frequencies is tuned to the fundamental pitch of the bar, and the cord on which the bar rests passes through the nodal points of this frequency. The second transverse vibration frequency is tuned to the fourth partial of the harmonic series, corresponding to a pitch two octaves above the fundamental. The third frequency is tuned to the tenth partial, corresponding to a pitch three octaves and a major third above the fundamental.[171]

The nodal points of the second transverse vibration frequency fall exactly in the middle of the bar, coinciding with the antinodal points of the first and third frequencies. As a result, striking the bar in the middle produces maximum excitation of the fundamental tone and the tenth partial, while minimizing excitation of the fourth partial. Striking the bar at a point between the center and the nodal point of the fundamental (i.e., between the middle of the bar and the point where the cord passes) weakens the presence of the fundamental tone but significantly enhances the presence of the fourth partial, whose antinode is located in that region. Striking near the edge of the bar – where none of these three transverse vibration frequencies have nodal points – produces a sound more similar to that of striking between the center and the nodal point of the fundamental than to striking directly in the center. For this reason, Linda Pimentel and many other marimba pedagogues recommend that students treat the area between the center of the bar and the nodal point of the fundamental tone as the optimal striking zone when combining playing on the diatonic keyboard with playing on the edges of the chromatic keyboard. Some authors of

[171] Neville H. Fletcher, Thomas D. Rossing, *The Physics of Musical Instruments*, wyd. 2, Springer Science+Business Media, New York, NY 1998, s. 626–633.

pedagogical publications – such as Gary Cook in *Teaching Total Percussion*, Julia Gaines in *Sequential Studies for Four-Mallet Marimba*, and Juan Alamo in *Four Mallet Music for the Modern Marimba Player* – even suggest that the area between the center and the nodal point of the fundamental on the diatonic keyboard should be regarded as the primary striking area on the bar.[172]

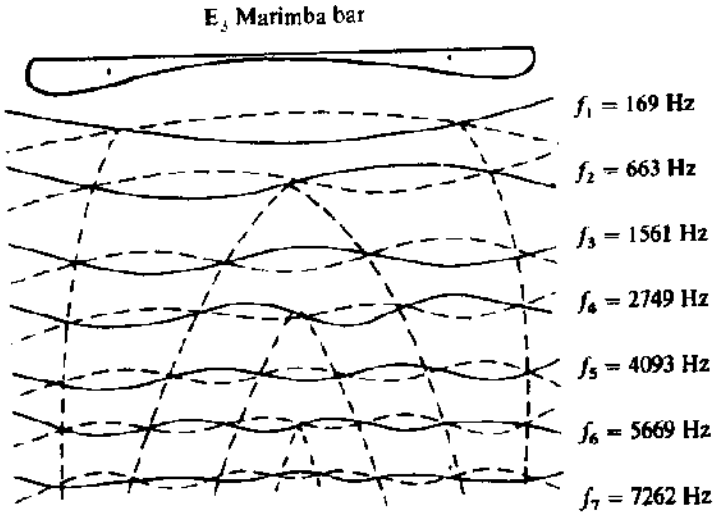


Figure 33. The seven transverse vibration frequencies of a marimba bar, with points of maximum and minimum amplitude, from *The Physics of Musical Instruments*

The issue of performance practice related to varying the striking points on marimba bars is also discussed in L.H. Stevens's pedagogy, specifically in Chapter XI of Method of Movement. The author presents an objective approach to choosing the appropriate striking area, without assigning value judgments to sound quality. Similar to Pimentel, Stevens describes different striking locations as a means of achieving tonal color variation. He identifies four primary striking points (excluding the edges of the chromatic keyboard bars) that offer distinct combinations of overtones. Striking the center of the bar produces a tone with a strong presence of the fundamental, resulting in greater resonance and a "darker color." As the striking point moves closer to the nodal point of the fundamental vibration frequency, the presence of upper overtones increases. Striking directly at the nodal point produces a tone with minimal presence of the fundamental. Stevens also mentions the possibility of varying striking points within a single four-note chord, where each note may

[172] Gary D. Cook, *Teaching Percussion*…, op. cit., s. 135–136; Julia Gaines, *Sequential Studies*…, op. cit., s. 10; Juan Alamo, *Four Mallet Music*…, op. cit., s. 5.

be struck at a different location on its respective bar, further enriching the overall sound (fig. 34).

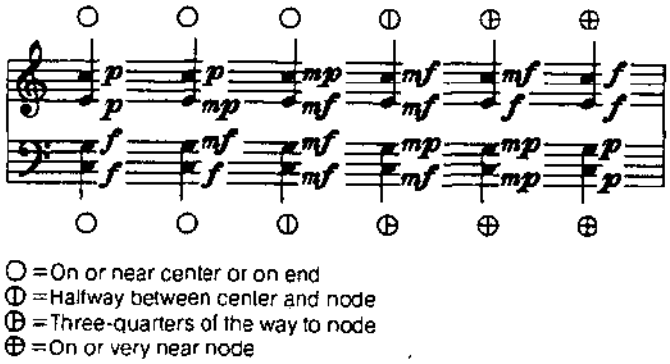


Figure 34. Chords with varied striking points on the bar, as illustrated in *Method of Movement*

Stevens also addresses the topic of the correct striking point on the edge of the bar. In this case, he identifies a single proper striking point, which – similar to Moore's approach – is located exactly on the edge of the bar, rather than between the edge and the nodal point:

> There are three popular misconceptions which obscure the issue of tone production on marimba:
> 1. "The second-best striking area for accidentals is between the node and the end of the bar". **False**. Significantly more solidity of tone is achieved by directing the stroke into **the upper edge** of the end of the bar.[173]

As shown by numerous examples from instructional materials on mallet percussion instruments, the striking point on the bar is one of the key issues discussed by authors as a factor that significantly affects the timbre of the sound produced on the marimba.

The second important element, emphasized by nearly every author, is the type of mallets used. As mentioned earlier with reference to G.H. Green and other early authors of instructional manuals for melodic percussion instruments, this aspect plays a crucial role. There is general agreement among authors that harder mallets produce a "brighter" sound, while softer ones yield a "darker" and more "velvety" tone, often described in English-language sources with the adjective *mellow*.

In the context of the acoustic properties of the bar, terms such as "bright" or "glassy" can be interpreted as sounds characterized by a greater presence of upper partials

[173] L.H. Stevens, *Method of Movement*..., op. cit., s. 22.

relative to the fundamental tone. This phenomenon is most noticeable in the first few hundredths of a second after the strike – that is, at the moment when the noise resulting from the mallet's impact on the bar material occurs, before the bar begins to vibrate at its characteristic frequencies and produce a pitched sound. This issue was discussed, among others, by Charles A. Culver in his 1956 book *Musical Acoustics*.

> […] the timbre of a musical sound may undergo a decided change within a small fraction of a second after the vibrating element of the instrument has been excited. This is particularly true in those cases where the sound is initiated by a percussive stroke, as in the case of the piano, the kettledrum, and xylophone. […]immediately after the stroke, the upper partials in general are found to be relatively strong. […]these partials tend to decrease rapidly in amplitude, the most pronounced change occurring in less than 1/I0 of a second after the initiation of the sound.[174]

Another factor influencing the produced sound, discussed by Stevens and other pedagogical authors such as Nancy Zeltsman, is the angle at which the mallet strikes the bar[175]. Marimba mallets, which are typically wrapped with soft yarn, often have a greater concentration of this material on the upper part of the mallet head (fig. 35). At the center of the head – the area most commonly used for striking – the yarn layer is usually flattened due to extensive use. As a result, the hard plastic or rubber core of the mallet comes into closer contact with the bar. Consequently, a sound produced by striking with the central part of the mallet head will contain more of the percussive attack noise than a sound produced with the upper part of the head, which retains a greater amount of soft material (Vid. 22).

Video 22. Strokes performed with varying mallet angles

The effect of changing the striking angle on the bar can therefore be compared to the effect produced when playing with harder or softer mallets. In the first few hundredths

[174] Charles A. Culver, *Musical Acoustics* (New York, NY: McGraw-Hill Book Company, 1956), 107.
[175] L.H. Stevens, *Method of Movement*…, op. cit., 23; Nancy Zeltsman, *Four-Mallet Marimba Playing*…, op. cit., 58

of a second after the strike, the amount of upper partials will be greater when using the central part of the mallet head with flattened yarn, and smaller when striking with the upper, softer part of the head.

The final factor influencing the produced sound, as discussed by Stevens, is dynamics – that is, the force with which the mallet strikes the bar, in accordance with the formula for kinetic energy.[176] This has a significant impact both on the duration of the bar's resonance and on the clarity with which all components of tone color, as discussed above, are perceived.

In summary, there are four key aspects that affect the tonal color of the sound produced on the marimba, widely recognized by authors of pedagogical publications:

- type of mallets – determining the amount and intensity of upper partials, particularly within the first few hundredths of a second after the strike,
- striking point on the bar – influencing the balance between the main partials in the marimba's tone, namely the fundamental, the fourth, and the tenth harmonic,
- striking angle – producing an effect similar to that of changing the mallet type,
- striking force – affecting both the duration of resonance and the clarity of individual elements of tone color.

In addition to these aspects, authors of scientific and pedagogical publications identify several other factors that, in their view, influence the quality of sound produced on the marimba.

In the chapter Basic Strokes and Tone Production of her book Four Mallet Marimba Playing, Nancy Zeltsman writes:

> The main factors that contribute to your tone are:
> 1. how tightly or loosely you hold the mallet;
> 2. the height from which you strike the bar;
> 3. how you come off the bar after making contact;
> 4. the speed of your downstroke;
> 5. the speed of your upstroke.[177]

[176] L.H. Stevens, *Method of Movement*…, op. cit., s. 22.
[177] Oryg.: „", Nancy Zeltsman, *Four-Mallet Marimba Playing*…, op. cit., s. 10.

The first of these points stands in direct contradiction to the pedagogical approach of L.H. Stevens:

> […]I can assure you in advance that when the volume, playing spot and angle of the stroke are identical, it doesn't matter if the stick is tight or loose, or whether you use fingers, wrist, arm or foot: the sound heard by the ear of a conservatory-trained musician is identical. […].[178]

In his article "Crossing Grip Extensions," Ney Rosauro discusses the influence of marimba mallet shafts on the produced sound and recommends carefully selecting the thickness of the rattan shaft so that it is not too thick, as this can result in the sound being "dry."

> I use longer mallets on the marimba, and I personally prefer rattan handles, because I think that the rattan's swing gives a much warmer sound on mallet instruments. Another import ant point is that the rattan should neither be too thin, which can cause the mallets to swing too much, nor too thick, which causes a dry sound like wooden handles.[179]

The final aspect that may influence sound production is the technique and manner of holding the mallets. This topic is discussed by Dr. Ludwig Albert – a world-renowned marimba soloist and professor at the Royal Academy of Fine Arts in Antwerp – in an interview for *Percussive Notes*.

> **Shaw**: Briefly explain what you see as the advantages to the Stevens grip, and its disadvantages.
> **Albert**: I notice mainly that students using the Stevens grip place more weight on the inside mallets. Also, the arms are more vertical and straight. This produces a thin sound. The Stevens grip is able to reach a high technical velocity, which is one of its great assets. To reach this velocity light mallets are usually required. However, it is my opinion that the sound of the marimba should be more rich, abundant, and embracing. Also, most quickly-moving "up" strokes create the opposite of a deep sound. With the Stevens grip, it is necessary to guide students to control these elements, together with a refined touch of the bars in order to reach a more qualitative sound.[180]

The manner of holding the mallets as a factor influencing sound production is also discussed by Linda Pimentel in her previously cited article *The Marimba Bar*:

> The amount of time necessary to switch from one grip to another, any version of either, is less than that which the singer or wind instrumentalist uses to catch a breath at the end of a phrase.

[178] L.H. Stevens, *Method of Movement…*, op. cit., 22.
[179] Ney Rosauro, *Crossing Grip Extensions…*, op. cit., 35.
[180] Alison Shaw, *Exploring "The Ultimate Sound" with Ludwig Albert*, „Percussive Notes", tom 42 nr 5/2004, 47–48.

> Thus I switch to whatever combination suits a particular problem or that best produces a sound which I want to obtain.[181]

3.6 Experiment 4 – Spectral Analysis Study

3.6.1 Research Question

Does the type of four-mallet grip affect the sound produced on the marimba, and if so, to what extent? As previously mentioned, the pedagogical literature on mallet percussion instruments reveals differing opinions regarding the factors that influence the marimba's tone quality. For this reason, it seems appropriate to attempt to answer the question of whether playing technique – and in particular, the type of four-mallet grip – has a direct impact on the sound produced by the instrument.

3.6.2 Research Methods

Instrument

For the purpose of the experiment, I used a Malletech MJB marimba – an instrument manufactured by the company owned by Leigh Howard Stevens. It appears to be the most suitable model for conducting sound spectrum analysis in the context of tone production using the Stevens technique.

Bar choice

The sound samples were recorded using the marimba bar corresponding to the note F in the low octave. The acoustic properties of the marimba are particularly pronounced in the bass octave, which – as mentioned earlier – is tuned to the third partial resulting from the bar's three primary transverse vibrations. According to the Fletcher–Munson equal-loudness contours, the human ear perceives higher frequencies as louder than lower ones. For this reason, the bars in the marimba's bass octave are made wider, allowing them to generate sounds with greater energy compared to the bars in the higher registers.[182]

[181] L. Pimentel, *The Marimba Bar…*, op. cit., 46.
[182] Jeffrey La Favre, *Tuning the Marimba Bar and Resonator*, [https://www.lafavre.us/tuning-marimba.htm, access: 06.27.2025].

The size of the bars and the length of resonance in the bass octave make any changes in tone color more perceptible to the ear than in the higher registers. Nevertheless, for the analysis I selected the low F bar, located in the middle of the bass octave, rather than the instrument's lowest possible note. This decision was based on the principle described by Fletcher and Munson: the low F, with a frequency of approximately 88 Hz, should be slightly more audible to the human ear than the note C (around 66 Hz) due to greater auditory sensitivity within that frequency range. This, in turn, helps to better perceive potential differences between the sound samples.

Selection of mallets

For the sound samples, I used four types of Malletech mallets – soft and hard models endorsed by Leigh Howard Stevens (LS5 and LS15) and soft and hard models endorsed by Marta Klimasara (MK6 and MK16).

I chose the Stevens models because they are used by the creator of the Stevens technique himself. It can therefore be assumed that their weight and design have been optimally adjusted for performers employing this technique. In contrast, Marta Klimasara performs using the traditional grip, so her signature mallets are noticeably heavier than the Stevens models. This added weight compensates for the reduced tactile sense of mass in the hand characteristic of the traditional grip (a detailed discussion of this issue is provided in Chapter 2 and in Experiments 1 and 2).

The heads of the LS and MK models differ both in the type of yarn used and in the method of wrapping. The LS mallet heads (Leigh Howard Stevens) are wrapped loosely with soft yarn, causing the core – plastic or rubber – to become more or less audible depending on the striking force. Such mallets are classified as multi-tone, meaning they allow for variation in tone color depending on playing dynamics. In contrast, the MK mallet heads (Marta Klimasara) are wrapped tightly with harder yarn, classifying them as single-tone mallets – in which the core remains equally audible regardless of striking force, resulting in a more uniform timbre (fig. 35).

Figure 35. Mallet models used for the sound spectrum analysis

This selection of mallets for the experiment made it possible to analyze the sound spectrum under various performance conditions – using two mallet models representing both soft and hard heads. One of the models (LS) can be regarded as characteristic of the Stevens technique, while the other (MK) corresponds to the classical technique.

Analytical Tools

The recordings were made using a Shure SM81 microphone and a Tascam Portacapture X8 audio recorder. The microphone was positioned perpendicular to the center of the bar, at a distance of approximately 40 cm (fig. 36).

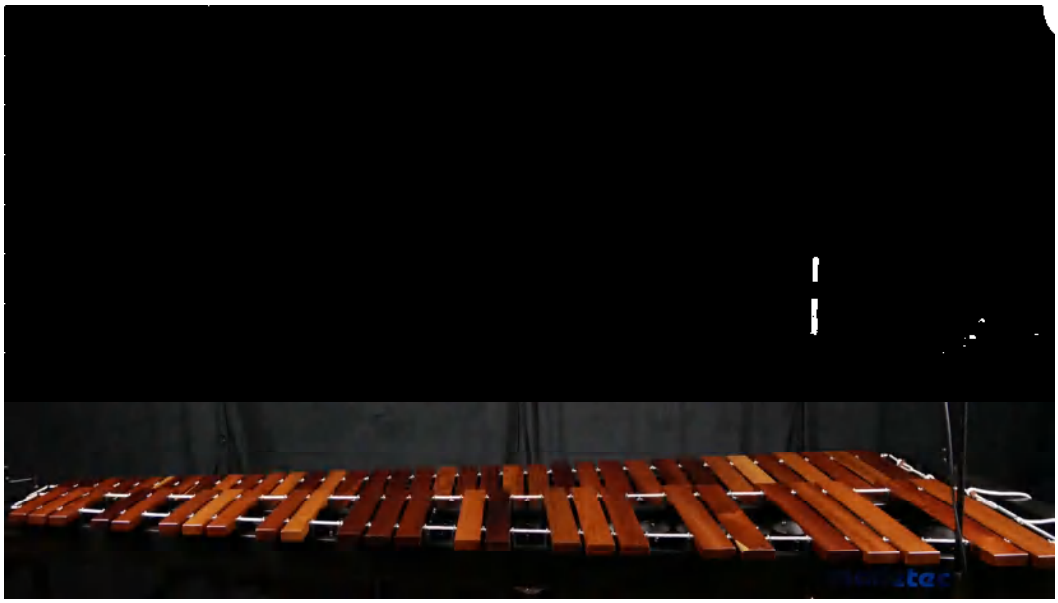


Figure 36. Microphone placement in relation to the marimba bar of the analyzed sound

Three-second, two-channel sound samples were recorded in Wave Sound format at 2116 kbps, 44,100 Hz, and 24-bit quality. The sound spectrum analysis was carried out using the SPEAR software (Sinusoidal Partial Editing Analysis and Resynthesis), version 0.7.3r.

After loading a sound sample, SPEAR generates a spectral analysis in the form of a visual representation of individual partials. Horizontal lines reflect changes in the frequency of each partial over time, while the color intensity of a given line indicates its loudness – lighter shades correspond to softer sounds, whereas black lines represent more clearly audible tones (fig. 37).

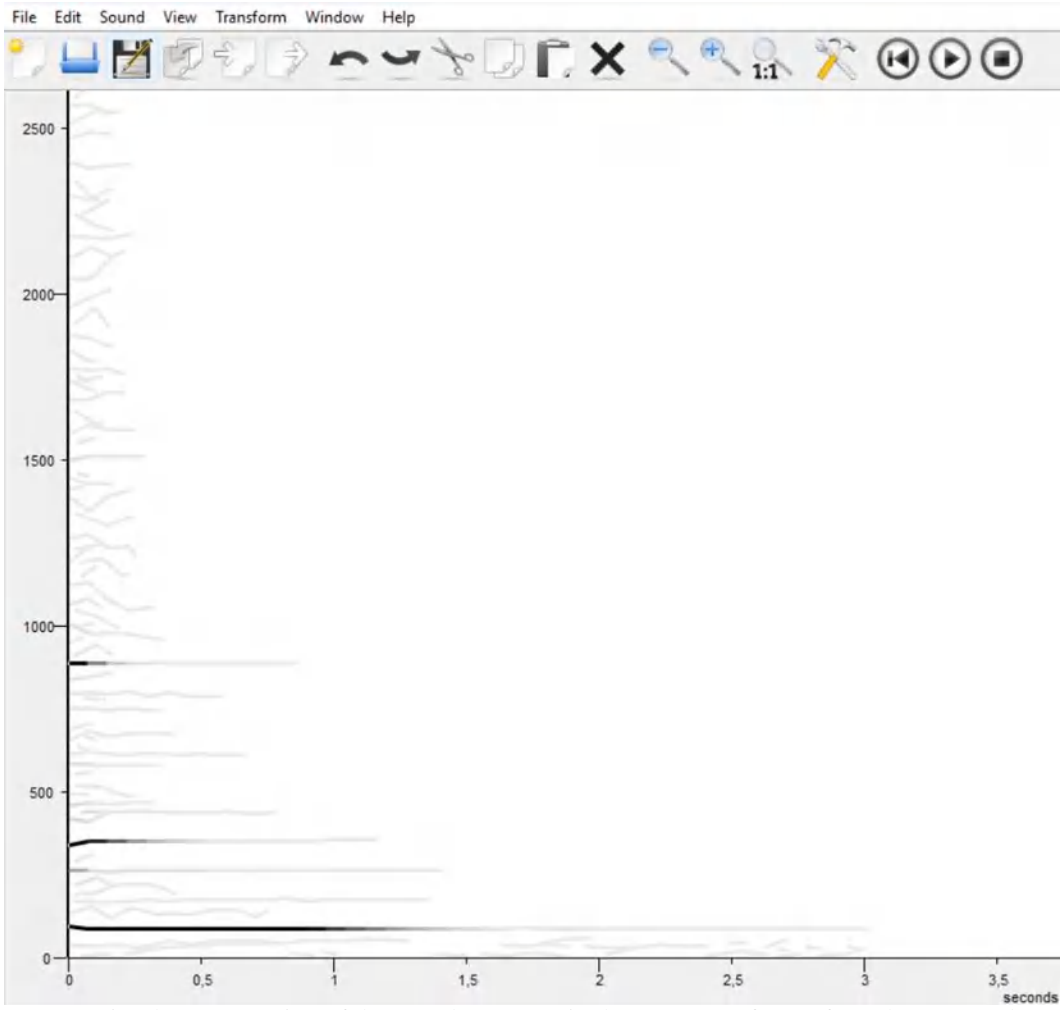


Figure 37. Visual representation of the sound spectrum in the SPEAR software for a three-second sound sample produced by striking with a single LS15 mallet at a point between the center of the bar and the nodal point, showing clearly audible fundamental and the 4th and 10th partials marked in black

The software allows individual partials to be selected and copied into a separate file, enabling their isolation and the analysis of each one individually (fig. 38). After pressing the Export button, the analysis data are saved in a text file, in which the frequency and linear amplitude of each partial are presented as numerical values recorded at 0.01-second intervals (fig. 39).

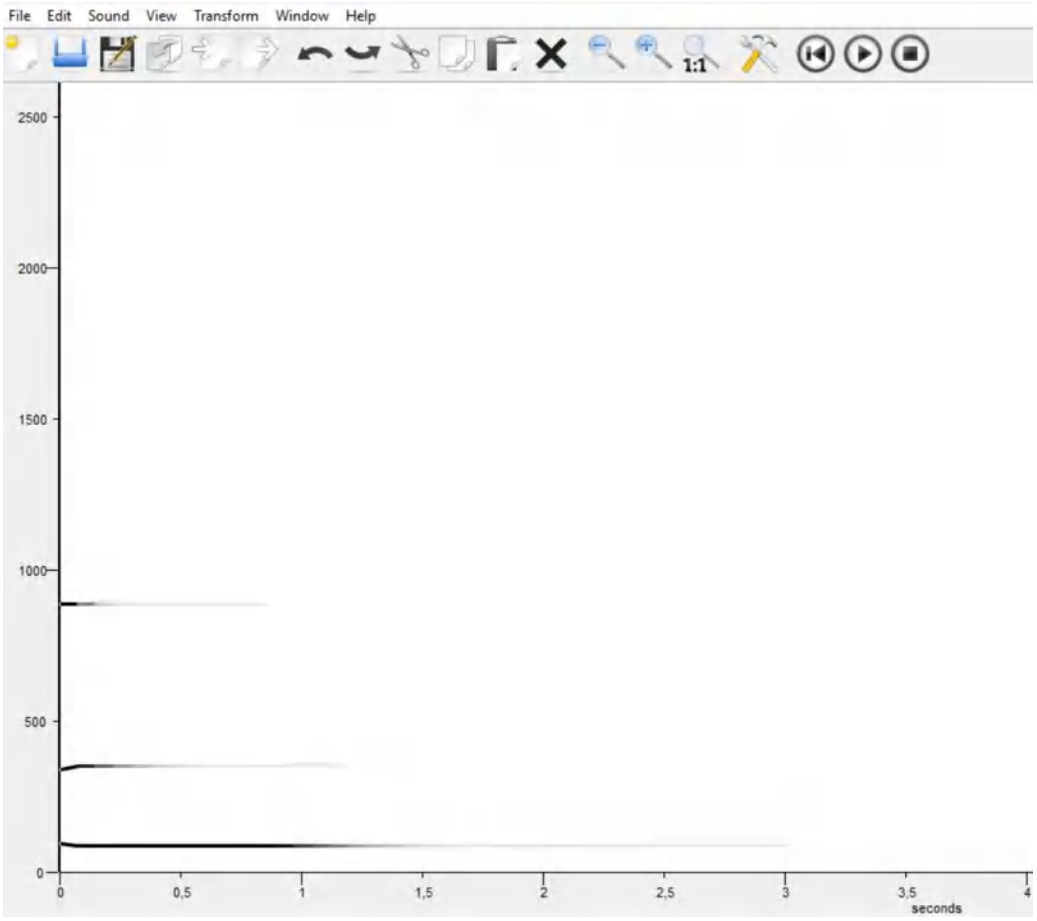
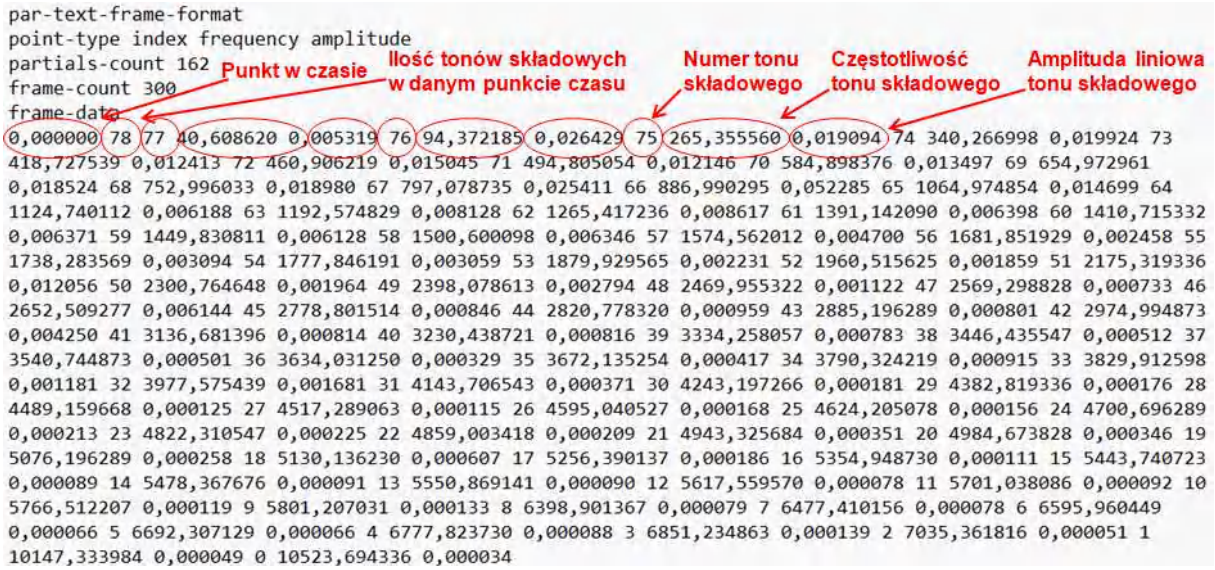


Figure 38. Visual representation of the sound spectrum for the isolated fundamental tone and the 4th and 10th partials in the sound sample produced by a single LS15 mallet strike

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0,018524 68 752,996033 0,018980 67 797,078735 0,025411 66 886,990295 0,052285 65 1064,974854 0,014699 64
1124,740112 0,006188 63 1192,574829 0,008128 62 1265,417236 0,008617 61 1391,142090 0,006398 60 1410,715332
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10147,333984 0,000049 0 10523,694336 0,000034
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Figure 39. Sound spectrum representation exported from the SPEAR software in numerical form, showing the first hundredth of a second of the sound sample produced by striking with a single LS15 mallet at a point between the center of the bar and the nodal point

Recording Procedure

For the purposes of the experiment, I recorded a total of 60 sound samples. All sounds were performed using the piston stroke technique, as discussed in Chapter 2. Each stroke began from a height of approximately 20 cm above the bar, and I aimed to keep the striking force and speed as consistent as possible across all trials.

First, I recorded eight sound samples played with a single mallet held in the left hand – two samples for each of the four mallet models (LS5, LS15, MK6, and MK16). The sounds were recorded at two striking points: directly in the center of the bar and at a midpoint between the center and the nodal point. The single-mallet sound samples serve as a reference point for analyzing the sound spectra obtained using the Stevens grip and the traditional grip; thus, they may be considered the experiment's control group. All sounds – both single-mallet and four-mallet grip samples – were played with the left hand, as the left hand most often carries the lower-octave parts on the marimba.

In the second stage, I recorded sound samples performed using the Stevens grip. A total of sixteen samples were collected – four for each of the four mallet models. Using each mallet type, I performed strikes at the two previously described points on the marimba

bar, playing with the left hand. For each configuration, I made separate recordings using the outer mallet (designated as No. 1 in *Method of Movement*) and the inner mallet (designated as No. 2).[183]

Analytical procedure

My spectral analysis consisted of comparing the sum of the linear amplitudes of the fundamental tone and the two main partials – the 4th and 10th harmonics – with the sums of the amplitudes of the remaining partials. As mentioned in subsection 3.5, the fundamental (labeled No. 1 in the experiment) and the 4th and 10th partials result from the three strongest transverse vibrations of the marimba bar and are the most significant for the perception of pitch and the characteristic "marimba tone." For this reason, they were taken as the primary reference points. Based on this foundation, I was able to estimate the approximate contribution of noise generated by the mallet's impact on the bar – together with torsional and lateral vibrations, which are less relevant to pitch perception – to the overall sound of each sample.

Three key points were identified in each sound sample, representing the moments that influence the perception of the produced sound's timbre (marked with Roman numerals in the tables).:

I. The point of the highest sum of linear amplitudes of all excited partials – representing, theoretically, the loudest moment of the produced sound – occurred at 0.02 or 0.03 seconds after striking the bar. At this moment, the sound is dominated by noise components created by the contact between the mallet and the bar material, while the fundamental tone, resulting from the strongest transverse vibration of the bar, has not yet reached its target frequency. As the analysis showed, at the moment of impact, the fundamental tone was always present at a slightly higher frequency than that corresponding to the actual pitch of the bar. The process of its stabilization occurred no earlier than 0.04 seconds after the strike. The higher the level of impact noise relative

[183] L.H. Stevens, *Method of Movement…*, op. cit., s. 5.

to the partials generated by the bar's transverse vibrations, the more the sound is perceived as "sharper," "brighter," and more "percussive."

II. The point of the highest loudness of the fundamental tone together with the two other tuned partials of the bar (the 4th and 10th), which usually coincided with the moment when the fundamental tone reached its target frequency. This phenomenon consistently occurred within the range of 0.04 to 0.1 seconds after striking the bar. A sound in which, after frequency stabilization, the fundamental together with the 4th and 10th partials clearly dominates should be perceived as "purer," "darker," and more "transparent," with a more discernible pitch and a more distinct color resulting from the proportion of partials produced by the bar's transverse vibrations, compared with a sound containing a greater share of other partials. If the moment of maximum amplitude of the fundamental and tuned partials occurs earlier (e.g., at 0.04 seconds), the level of noise intensity from the impact remains relatively high. Conversely, if the maximum amplitude of these components occurs later (e.g., at 0.09 seconds), the initial impact noise has already decayed, allowing for a clearer perception of the blend of the fundamental and tuned partials at their loudest point.

III. The point of the highest loudness of the fundamental tone – theoretically, the moment of the clearest perception of pitch itself. In nearly every case, this occurred at approximately 0.3 seconds after striking the bar.

At these three identified points, I analyzed the following parameters:

- the ratio of the loudness of the fundamental tone and the 4th and 10th partials to the remaining partials – this allows for assessing the proportion between the impact noise and the actual, perceptible tone produced by the marimba bar,
- the ratio of the loudness of the fundamental tone and the 4th and 10th partials relative to one another – this makes it possible to identify differences in tone color resulting from the striking point on the bar (as described in subsection 3.5), as well as to assess whether these proportions may depend on the type of four-mallet grip used for a given sound sample,

- the linear amplitude of the fundamental tone at point III was compared with the sum of the linear amplitudes of all partials at point I, which made it possible to assess the proportion of noise to the perceptible pitch in a given sound sample.

Repeatability of the Experiment

The ideal situation would be to prepare sound samples with identical intensity. However, when the samples are recorded by a live performer, this is not possible. Although the force, height, and speed of the stroke can be adjusted to produce two sounds at the same dynamic level, it is impossible to generate sounds of exactly the same loudness. Therefore, in my analysis, I assumed that the sounds would have similar but slightly different intensities. I thus focused on proportional comparisons of the sums of the linear amplitudes of individual components of the produced sound.

3.6.3 Results

The sound sample analysis tables are divided into three categories:

1. results of sound samples performed with a single mallet (vid. 27–34),
2. results of sound samples performed using the Stevens grip (vid. 35–50),
3. results of sound samples performed using the traditional grip (vid. 51–66).

On the left side of each table, the models of the mallets used (LS5, LS15, MK6, and MK16) are indicated, along with the number of the mallet used to strike the bar (in the case of sound samples recorded using four-mallet techniques).

The top row of the table, marked with Roman numerals I, II, and III, indicates the three analysis points described in the previous subsection:

- point I – the moment of the maximum sum of amplitudes (maximum loudness) of all partials, representing the dominance of impact noise,
- point II – the moment of the maximum sum of amplitudes of the fundamental tone and the 4th and 10th partials, representing the dominance of tones corresponding to the first three transverse vibrations,

- point III – the moment of the maximum amplitude of the fundamental tone, representing the dominance of the fundamental over the other partials.

For each of these three points, I determined the time of occurrence and the corresponding value of the sum of linear amplitudes:

- for point I **–** the sum of the linear amplitudes of all partials**,**
- for point II – the sum of the linear amplitudes of the fundamental tone and the two specified partials,
- for point III – the linear amplitude of the fundamental tone alone.

For each of the three points, I indicated the percentage values representing the proportions between the transverse vibration tones (marked with the abbreviation “AS” from “alikwoty strojone”, or tuned partials) and the remaining partials (marked with the letter “H” from “hałas,” meaning noise). Next to these designations are the proportional values of the linear amplitudes of the fundamental tone and the other tuned partials at each analysis point (marked with the numbers “1” for the fundamental and “4” and “10” for the partials). For point III, an additional percentage value was indicated, showing the relation to the sum of the linear amplitudes of all partials at point I (fig. 40).

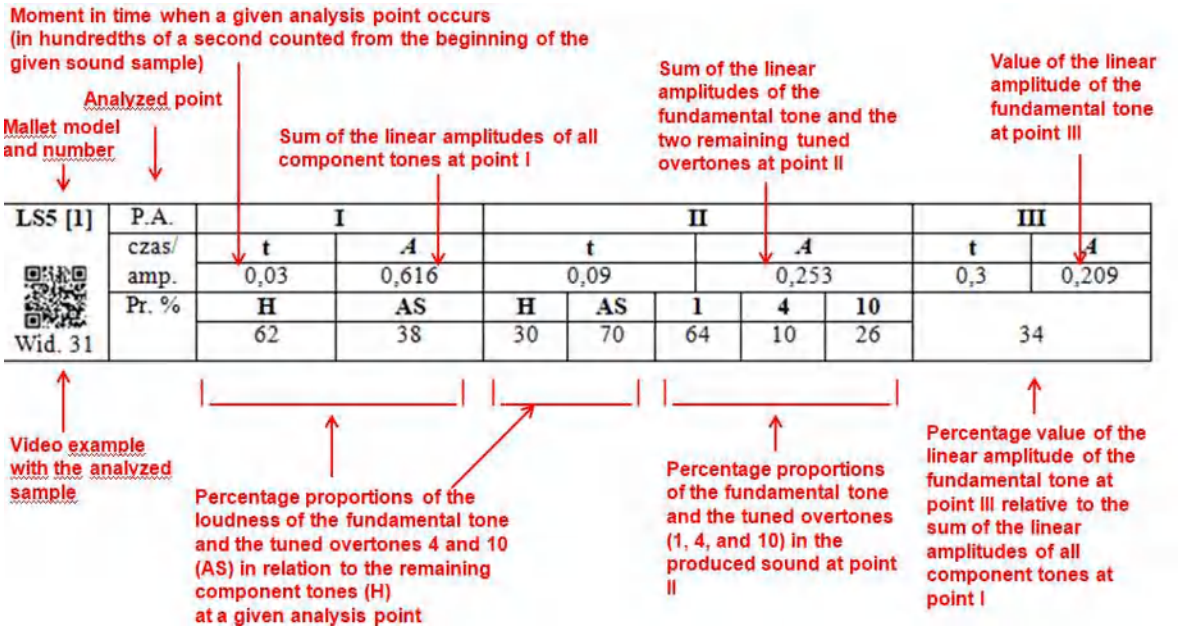


Figure 40. Explanation of a sample data table from the spectral analysis

Single-Mallet Strokes at the Center of the Bar:

LS5	P.A.	I		II					III	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,502	0,09		0,227			0,3	0,209
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 23		59	41	26	74	70	3	27	42	

Table 15. Parameters of the sound produced by striking the center of the bar with a single LS5 mallet

LS15	P.A.	I		II					III	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,549	0,05		0,207			0,3	0,166
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 24		65	35	48	52	49	7	44	30	

Table 16. Parameters of the sound produced by striking the center of the bar with a single LS15 mallet

MK6	P.A.	I		II					III	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,856	0,05		0,361			0,3	0,231
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 25		60	40	45	55	41	9	50	27	

Table 17. Parameters of the sound produced by striking the center of the bar with a single MK6 mallet

MK16	P.A.	I		II					III	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,969	0,04		0,358			0,3	0,188
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 26		66	34	53	47	31	7	62	19	

Table 18. Parameters of the sound produced by striking the center of the bar with a single MK16 mallet

Single-Mallet Strokes Between the Center and the Nodal Point of the Bar:

LS5	P.A.	I		II					III	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,435	0,1		0,212			0,3	0,163
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 27		63	37	22	78	59	28	13	37	

Table 19. Parameters of the sound produced by striking the bar with a single LS5 mallet between the center and the nodal point

LS15	P.A.	I		II					III	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,516	0,05		0,197			0,3	0,122
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 28		67	33	44	56	38	26	36	24	

Table 20. Parameters of the sound produced by striking the bar with a single LS15 mallet between the center and the nodal point

MK6	P.A.	I		II					III	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,02	0,804	0,05		0,297			0,3	0,152
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 29		68	32	44	56	31	27	42	19	

Table 21. Parameters of the sound produced by striking the bar with a single MK6 mallet between the center and the nodal point

MK16	P.A.	I		II					III	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,02	0,986	0,04		0,295			0,3	0,123
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 30		73	27	59	41	24	22	54	13	

Table 22. Parameters of the sound produced by striking the bar with a single MK16 mallet between the center and the nodal point

Strokes at the Center of the Bar Performed Using the Stevens Grip:

LS5 [1]	P.A.	I		II					III	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,03	0,616	0,09		0,253			0,3	0,209
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 31		62	38	30	70	64	10	26	34	

Table 23. Parameters of the sound produced by striking the center of the bar with mallet No. 1, model LS5, using the Stevens grip

LS5 [2]	P.A.	I		II					III	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,03	0,565	0,08		0,242				0,208
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 32		60	40	33	67	64	6	30	37	

Table 24. Parameters of the sound produced by striking the center of the bar with mallet No. 2, model LS5, using the Stevens grip

LS15 [1]	P.A.	I		II					III	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,03	0,597	0,05		0,219			0,3	0,173
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 33		65	35	50	50	49	7	44	29	

Table 25. Parameters of the sound produced by striking the center of the bar with mallet No. 1, model LS15, using the Stevens grip

LS15 [2]	P.A.	I		II					III	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,03	0,644	0,05		0,223			0,3	0,172
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 34		73	27	53	47	47	7	46	27	

Table 26. Parameters of the sound produced by striking the center of the bar with mallet No. 2, model LS15, using the Stevens grip

MK6 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,926	0,04		0,331			0,3	0,229
Vid. 35	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
		68	32	56	44	43	7	50	25	

Table 27. Parameters of the sound produced by striking the center of the bar with mallet No. 1, model MK6, using the Stevens grip

MK6 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,773	0,08		0,274			0,3	0,231
Vid. 36	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
		67	33	39	61	64	7	29	30	

Table 28. Parameters of the sound produced by striking the center of the bar with mallet No. 2, model MK6, using the Stevens grip

MK16 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	1,217	0,04		0,397			0,3	0,202
Vid. 37	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
		68	32	59	41	30	3	67	17	

Table 29. Parameters of the sound produced by striking the center of the bar with mallet No. 1, model MK16, using the Stevens grip

MK16 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	1,05	0,04		0,398			0,3	0,194
Vid. 38	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
		66	34	54	46	29	6	65	18	

Table 30. Parameters of the sound produced by striking the center of the bar with mallet No. 2, model MK16, using the Stevens grip

Strokes Between the Center of the Bar and the Nodal Point Performed Using the Stevens Grip:

LS5 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,431	0,09		0,191			0,3	0,132
Vid. 39	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
		61	39	23	77	51	27	22	31	

Table 31. Parameters of the sound produced by striking the bar with mallet No. 1, model LS5, at a point between the center and the nodal point, using the Stevens grip

LS5 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,472	0,09		0.217			0,3	0,150
Vid. 40	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
		61	39	24	76	52	27	21	32	

Table 32. Parameters of the sound produced by striking the bar with mallet No. 2, model LS5, at a point between the center and the nodal point, using the Stevens grip

LS15 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,603	0,04		0,196			0,3	0,115
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 41		70	30	56	44	34	21	45	19	

Table 33. Parameters of the sound produced by striking the bar with mallet No. 1, model LS15, at a point between the center and the nodal point, using the Stevens grip

LS15 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,618	0,08		0,203			0,3	0,134
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 42		71	29	34	66	47	25	28	22	

Table 34. Parameters of the sound produced by striking the bar with mallet No. 2, model LS15, at a point between the center and the nodal point, using the Stevens grip

MK6 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	1,053	0,04		0,333			0,3	0,159
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 43		70	30	57	43	28	21	51	15	

Table 35. Parameters of the sound produced by striking the bar with mallet No. 1, model MK6, at a point between the center and the nodal point, using the Stevens grip

MK6 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,824	0,04		0,310			0,3	0,160
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 44		66	34	50	50	30	25	45	19	

Table 36. Parameters of the sound produced by striking the bar with mallet No. 2, model MK6, at a point between the center and the nodal point, using the Stevens grip

MK16 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	1,136	0,04		0,299			0,31	0,124
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 45		75	25	65	35	24	18	58	11	

Table 37. Parameters of the sound produced by striking the bar with mallet No. 1, model MK16, at a point between the center and the nodal point, using the Stevens grip

MK16 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,960	0,04		0,281			0,3	0,143
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 46		73	27	58	42	29	24	47	15	

Table 38. Parameters of the sound produced by striking the bar with mallet No. 2, model MK16, at a point between the center and the nodal point, using the Stevens grip

Strokes at the Center of the Bar Performed Using the Traditional Grip:

LS5 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,548	0,09		0,236			0,3	0,212
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 47		61	39	25	75	69	4	27	39	

Table 39. Parameters of the sound produced by striking the center of the bar with mallet No. 1, model LS5, using the traditional grip

LS5 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,425	0,1		0,201			0,3	0,207
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 48		68	32	26	74	80	6	14	49	

Table 40. Parameters of the sound produced by striking the center of the bar with mallet No. 2, model LS5, using the traditional grip

LS15 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,674	0,04		0,233			0,3	0,176
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 49		67	33	58	42	42	5	53	26	

Table 41. Parameters of the sound produced by striking the center of the bar with mallet No. 1, model LS15, using the traditional grip

LS15 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,543	0,05		0,206			0,3	0,164
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 50		67	33	48	52	50	8	42	30	

Table 42. Parameters of the sound produced by striking the center of the bar with mallet No. 2, model LS15, using the traditional grip

MK6 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,699	0,04		0,280			0,3	0,221
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 51		61	39	52	48	47	2	51	32	

Table 43. Parameters of the sound produced by striking the center of the bar with mallet No. 1, model MK6, using the traditional grip

MK6 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,03	0,652	0,05		0,298			0,3	0,211
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 52		58	42	43	57	44	10	46	32	

Table 44. Parameters of the sound produced by striking the center of the bar with mallet No. 2, model MK6, using the traditional grip

MK16 [1]	P.A.	**I**		**II**					**III**	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,02	0,908	0,04		0,325			0,3	0,189
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 53		67	33	54	46	35	2	63	21	

Table 45. Parameters of the sound produced by striking the center of the bar with mallet No. 1, model MK16, using the traditional grip

MK16 [2]	P.A.	**I**		**II**					**III**	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,02	0,992	0,04		0,328			0,3	0,185
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 54		70	30	57	43	34	7	59	19	

Table 46. Parameters of the sound produced by striking the center of the bar with mallet No. 2, model MK16, using the traditional grip

Strokes Between the Center of the Bar and the Nodal Point Performed Using the Traditional Grip:

LS5 [1]	P.A.	**I**		**II**					**III**	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,03	0,461	0,1		0,206			0,3	0,156
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 55		62	38	25	75	57	26	17	34	

Table 47. Parameters of the sound produced by striking the bar with mallet No. 1, model LS5, at a point between the center and the nodal point, using the traditional grip

LS5 [2]	P.A.	**I**		**II**					**III**	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,02	0,478	0,07		0,224			0,3	0,149
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 56		60	40	29	71	46	26	28	31	

Table 48. Parameters of the sound produced by striking the bar with mallet No. 2, model LS5, at a point between the center and the nodal point, using the traditional grip

LS15 [1]	P.A.	**I**		**II**					**III**	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,02	0,510	0,09		0,170			0,3	0,118
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 57		71	29	28	72	51	25	24	23	

Table 49. Parameters of the sound produced by striking the bar with mallet No. 1, model LS15, at a point between the center and the nodal point, using the traditional grip

LS15 [2]	P.A.	**I**		**II**					**III**	
	time/ amp.	**t**	***A***	**t**		***A***			**t**	***A***
		0,02	0,533	0,05		0,196			0,3	0,121
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 58		67	33	44	56	38	25	37	23	

Table 50. Parameters of the sound produced by striking the bar with mallet No. 2, model LS15, at a point between the center and the nodal point, using the traditional grip

MK6 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,682	0,1		0,244			0,3	0,173
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 59		71	29	27	73	55	29	16	25	

Table 51. Parameters of the sound produced by striking the bar with mallet No. 1, model MK6, at a point between the center and the nodal point, using the traditional grip

MK6 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,652	0,07		0,267			0,3	0,166
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 60		64	36	31	69	43	29	28	25	

Table 52. Parameters of the sound produced by striking the bar with mallet No. 2, model MK6, at a point between the center and the nodal point, using the traditional grip

MK16 [1]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,939	0,04		0,260			0,3	0,139
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 61		75	25	62	38	30	22	48	15	

Table 53. Parameters of the sound produced by striking the bar with mallet No. 1, model MK16, at a point between the center and the nodal point, using the traditional grip

MK16 [2]	P.A.	**I**		**II**					**III**	
	time/	**t**	***A***	**t**		***A***			**t**	***A***
	amp.	0,02	0,809	0,04		0,258			0,3	0,125
	Pr. %	**H**	**AS**	**H**	**AS**	**1**	**4**	**10**		
Vid. 62		70	30	55	45	28	24	48	15	

Table 54. Parameters of the sound produced by striking the bar with mallet No. 2, model MK16, at a point between the center and the nodal point, using the traditional grip

In the tables below, I present the maximum differences in the intensity of linear amplitudes for each case. The percentage value in the table indicates the instance in which I recorded the greatest discrepancy of the analyzed parameter between two types of sound samples. I compared the sounds produced using four-mallet grips with those produced using a single mallet, the sounds obtained with the Stevens grip with those produced using the traditional grip, and the sounds performed with mallets No. 1 and No. 2 for each four-mallet grip.

For example, if the greatest difference between the sums of linear amplitudes in a given comparison concerned the noise level at analysis point I, that parameter was included in the table along with the corresponding percentage value of the difference between the analyzed

samples. In another case, the difference could involve the intensity of the fundamental tone or one of the tuned partials. Detailed data specifying which particular parameter showed the greatest difference in intensity were not included in the table – I focused solely on the percentage values, without further specification. Since all major differences in individual parameters can influence the perceived timbre of the sound, precisely indicating which aspect they concern is not essential for drawing conclusions from the experiment. Finally, all percentage values were summed, and I calculated the average value of the largest differences for the analyzed elements in the compared sound samples.

Mallet model	**Bar center**	**Point between center and node**	**Average**
LS5	4%	1%	2%
LS15	8%	22%	15%
MK6	21%	6%	13%
MK16	5%	11%	8%
Average	9%	10%	**9%**

Table 55. Maximum Differences in Linear Amplitude Values Between Sound Samples Produced with Mallets No. 1 and No. 2 Using the Stevens Grip

Mallet model	**Bar center**	**Point between center and node**	**Average**
LS5	13%	11%	12%
LS15	11%	16%	13%
MK6	9%	12%	10%
MK16	5%	7%	6%
Average	9%	11%	**10%**

Table 56. Maximum Differences in Linear Amplitude Values Between Sound Samples Produced with Mallets No. 1 and No. 2 Using the Traditional Grip

Mallet model	**Bar center**		**Point between center and node**		**Average**
	Pałka 1	**Pałka 2**	**Pałka 1**	**Pałka 2**	
LS5	8%	6%	9%	8%	8%
LS15	2%	8%	12%	15%	9%
MK6	11%	23%	13%	6%	13%
MK16	6%	3%	6%	7%	5%
Average	7%	10%	10%	9%	**9%**

Table 57. Maximum Differences in Linear Amplitude Values Between Sound Samples Produced with a Single Mallet and with Mallets No. 1 and No. 2 Using the Stevens Grip

Mallet model	Bar center		Point between center and node		Average
	Pałka 1	Pałka 2	Pałka 1	Pałka 2	
LS5	3%	13%	4%	15%	9%
LS15	10%	2%	16%	1%	7%
MK6	7%	5%	26%	14%	13%
MK16	5%	4%	6%	6%	5%
Average	6%	6%	13%	9%	**8%**

Table 58. Maximum Differences in Linear Amplitude Intensities Between Sound Samples Produced with a Single Mallet and with Mallets No. 1 and No. 2 Using the Traditional Grip

Mallet model	Bar center	Point between center and node	Average
LS5	6%	6%	6%
LS15	9%	28%	18%
MK6	7%	30%	18%
MK16	5%	10%	7%
Average	7%	18%	**12%**

Table 59. Maximum Differences in Linear Amplitude Values Between Sound Samples Produced with Mallet No. 1 Using the Stevens Grip and Mallet No. 1 Using the Traditional Grip

Mallet model	Bar center	Point between center and node	Average
LS5	16%	6%	11%
LS15	2%	12%	7%
MK6	13%	26%	19%
MK16	4%	10%	7%
Average	9%	13%	**11%**

Table 60. Maximum Differences in Linear Amplitude Values Between Sound Samples Produced with Mallet No. 1 Using the Stevens Grip and Mallet No. 2 Using the Traditional Grip

Mallet model	Bar center	Point between center and node	Average
LS5	8%	5%	6%
LS15	7%	6%	6%
MK6	9%	29%	19%
MK16	6%	4%	5%
Average	7%	11%	**9%**

Table 61. Maximum Differences in Linear Amplitude Values Between Sound Samples Produced with Mallet No. 2 Using the Stevens Grip and Mallet No. 1 Using the Traditional Grip

Mallet model	Bar center	Point between center and node	Average
LS5	16%	7%	11%
LS15	5%	10%	7%
MK6	20%	19%	19%
MK16	6%	3%	4%
Average	12%	9%	**10%**

Table 62. Maximum Differences in Linear Amplitude Values Between Sound Samples Produced with Mallet No. 2 Using the Stevens Grip and Mallet No. 2 Using the Traditional Grip

3.6.4 Conclusions

Does the type of four-mallet grip affect the sound produced on the marimba, and if so, to what extent?

The results of the experiment did not reveal any clear differences in sound quality between the four-mallet techniques used. With the exception of a few cases where the differences in timbre between the same types of strikes performed with the same mallets but using different four-mallet grips exceeded 20%, most results indicated differences of around 10%

The degree of variation in the timbre of sounds produced using different four-mallet grips is comparable to the differences observed between sounds generated by the outer mallet (No. 1) and the inner mallet (No. 2) held in the same hand, or between sounds produced with a four-mallet grip and those produced with a single mallet. Anomalies exceeding 20% difference – most often observed in strikes performed with MK6 mallets – may result from various factors, such as the angle of the strike, the striking point, or inconsistencies between the mallets themselves, caused, for instance, by differences in yarn wrapping or uneven wear of the yarn in different areas.

This spectral analysis represents only a starting point for further, more detailed research. A broader range of mallet models should be included, and the differences between them should be precisely documented. In the event of anomalies, the sound samples should be re-recorded and subjected to thorough reanalysis. Additional spectral parameters should also be considered, such as the presence of partials resulting from

torsional and lateral vibrations. The samples should cover various dynamic levels, and the acoustic conditions of the recording environment should be fully controlled.

However, an extended spectral analysis lies beyond the scope of this study and could serve as the subject of a separate dissertation. Nevertheless, the results I obtained fully meet the objectives of this work and allow me to formulate a conclusion that supports my earlier intuitive hypothesis: while individual techniques may influence the ease or difficulty of producing a particular type of sound, none of them prevent the performer from achieving the desired tone quality. This is confirmed by the observation that a performer, when attempting to produce the same sound using different techniques, is capable of achieving spectral consistency, with variations that in most cases do not exceed 10%.

3.7 Summary

Based on the results of the conducted experiments, I propose the following two lists of factors that a performer – proficient in both the Stevens technique and the classical technique – may consider when choosing the type of four-mallet grip, depending on the technical challenges encountered in a given piece.

List of Reasons for Using the Stevens Technique and Grip (in order from most to least important):

1. The necessity of performing extreme intervals – beyond an octave in the register from C2 to C4, and beyond a ninth in higher registers – for strokes such as Single Alternating, Double Lateral, and Double Vertical.
2. A significant number of large intervals (greater than or equal to an octave in the bass register) in Single Alternating, Double Lateral, and Double Vertical strokes – especially in transpositions that require moving the hand between the diatonic and chromatic keyboards.
3. The necessity of performing very rapid and continuous interval changes (particularly for simultaneous intervals played with one hand in Double Vertical strokes).

4. A substantial number of small intervals in Single Alternating and Double Lateral strokes.
5. The necessity of performing a polyphonic texture in which each voice is played with a separate mallet, especially when executing two independent voices with the two mallets of one hand.
6. Accented notes occurring during the execution of Single Alternating and Double Lateral strokes.
7. A significant number of Double Lateral strokes.
8. A significant number of Single Alternating strokes.
9. Mallet selection – the need to increase the perceived weight of the mallets held in one hand.

List of Reasons for Using the Classical Technique and Traditional Grip (in order from most to least important):

1. A significant number of intervals connecting the diatonic and chromatic keyboards in the middle and upper registers for Double Vertical, Single Alternating, or Double Lateral strokes.
2. The necessity of performing Double Vertical, Single Alternating, Double Lateral, or dependent and independent tremolo strokes with a wide hand span.
3. The necessity of performing long, dynamically intense passages (especially in the upper registers and at fast tempos).
4. A large number of Double Vertical strokes (especially in loud dynamic levels).
5. A large number of dead strokes,
6. Independent tremolos performed on a single note.
7. Fast repetitions of Single Independent strokes while maintaining a small angle of separation between the mallets held in one hand.
8. A large number of Double Vertical strokes performed with mallets of different weights,
9. Mallet selection – the need to reduce the perceived weight of the mallets held in one hand.

Chapter 4

Analysis of the Recorded Repertoire

4.1 Repertoire Selection

The recorded repertoire was selected to present a wide range of styles and technical challenges. It includes both contemporary works and an adaptation of a lute suite by Silvius Leopold Weiss from the Baroque period. The list features both lesser-known and well-established pieces within the percussion community, originating from various parts of the world and composed by marimbist-composers (using either the Stevens or classical technique) as well as by composers not directly associated with percussion performance:

1. **Eric Sammut:** ***Caméléon*** (1999) – A work of medium-high technical difficulty, part of the standard repertoire of percussionists worldwide, written by a French composer-marimbist who employs the Stevens technique.
2. **Tomasz Arnold:** ***Scherzo 3*** (2020) – A technically very demanding and little-known work, written by a Polish composer-marimbist who employs both the Stevens and classical techniques.
3. **Keiko Abe:** ***Wind in the Bamboo Grove*** (1987) – One of the most popular marimba works, of medium difficulty, written by a Japanese composer-marimbist who employs the classical technique.
4. **Silvius Leopold Weiss:** ***Suite No. 4 in G major*** WeissSW5 (1706-1730) – a transcription of a Baroque lute suite not performed by marimbists.
5. **Leigh Howard Stevens:** ***Houdini's Last Trick*** (2019) – A gaining-in-popularity work of medium-high difficulty, written by the creator of the Stevens technique and author of the textbook *Method of Movement*.
6. **Steven Stucky:** ***Isabelle Dances*** (2012) – A little-known, technically demanding work, written by a composer from the USA who is not associated with percussion performance.
7. **Joseph Schwantner:** ***Velocities*** (1990) – A technically demanding work, part of the standard repertoire of marimbists worldwide, written for Leigh Howard Stevens by a composer from the USA who is not associated with percussion performance.

8. **Marcin Błażewicz:** ***Sahay Manush*** (2009) – A duet for marimba and multi-percussion, little known internationally and technically demanding, written for Marta Klimasara and Jürgen Spitschka by a Polish composer who is not associated with percussion performance.

Depending on the technical challenges present in each piece, I used either the Stevens technique or the classical technique for the performance. The recordings, however, were made two and one year(s) prior to the completion of the practical experiments described in Chapter 3 (in July 2023 and July 2024). Therefore, my choice of technique for each piece was based largely on performative intuition and on the greater sense of ease that a particular technique provided in executing the work.

In the following part of the final chapter, I will attempt to support my intuitive choices with theoretical knowledge gained through the analysis of the textbook *Method of Movement* and through conducting practical experiments based on it. In the description of each piece forming part of the artistic component of this dissertation, I have included a specification of the technique used in the recording, accompanied by a list of arguments (formulated in the summary of Chapter 3) ordered from most to least important in each case. The reasoning is further supported by musical examples with descriptive annotations, which include time references to the recordings corresponding to specific passages in each piece.

4.2 Eric Sammut: *Caméléon*

Recording location: USB drive.

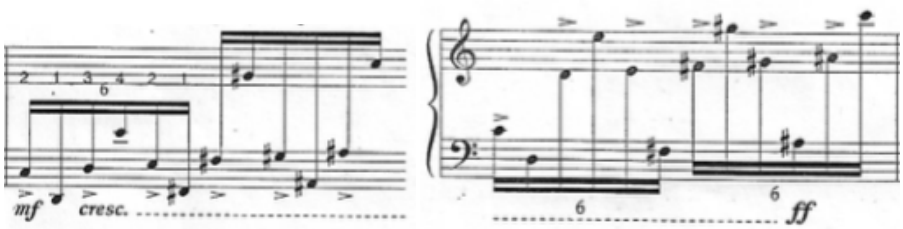
Choice of technique: Stevens.

Argumentation

1. Recreation of the composer's performance method. Using the technique employed by the composer of the work may lead to a better understanding of the sound characteristics of the piece and the composer's performance style, thereby enabling a more convincing interpretation. Additionally, mallets endorsed by the composer

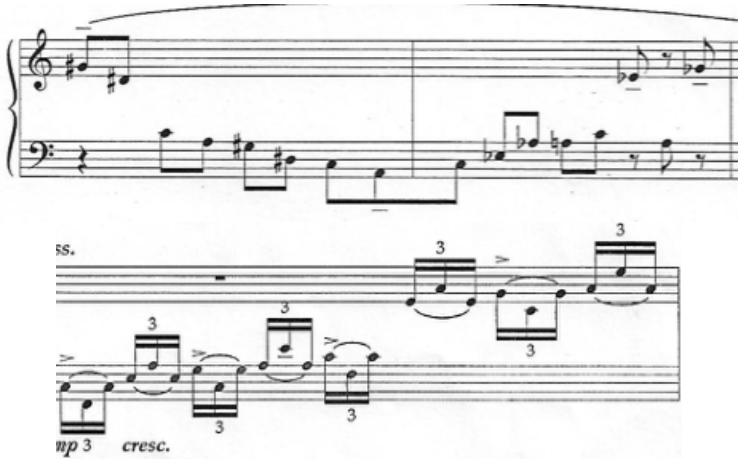
were used for the recording, ensuring that the conditions under which the composer would perform the work personally were faithfully recreated.

2. A significant number of large intervals for the strokes of Single Alternating i Double Lateral type (Example 31).



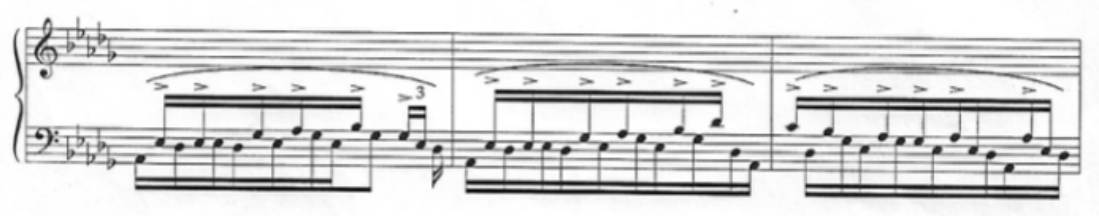
Example 31. Eric Sammut, *Caméléon*, mm. 71, Keyboard Percussion Publications, Elberon, NJ, 1999, pp. 5 – large intervals in the execution of Double Lateral strokes with accents, 2:21

3. Accented notes occurring during the execution of Single Alternating and Double Lateral strokes (Example 31 and 32).
4. A significant number of Double Lateral strokes (Example 31 and 32).



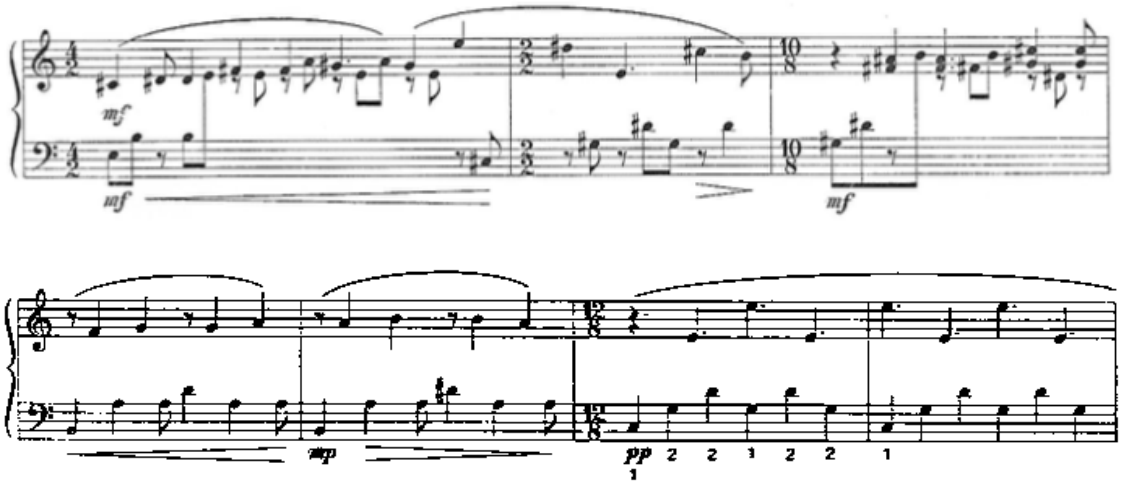
Example 32. Eric Sammut, *Caméléon*, mm. 15–16 and 68, Keyboard Percussion Publications, Elberon, NJ, 1999, pp. 2 and 5 – additional examples of Double Lateral strokes in the piece, 0:33, 2:15

5. A substantial number of small intervals in Single Alternating and Double Lateral strokes (Example 33).



Example 33. Eric Sammut, *Caméléon*, Keyboard Percussion Publications, Elberon, NJ, 1999, p. 7, mm. 93–95 – small intervals for Double Lateral strokes with accents, 3:02

6. A significant number of Single Alternating strokes (Example 34).



Example 34. Sammut, Caméléon, mm. 3–5 and 23–26, Keyboard Percussion Publications, Elberon NJ 1999, pp. 1 and 2 – examples of Single Alternating strokes in the piece, 0:00

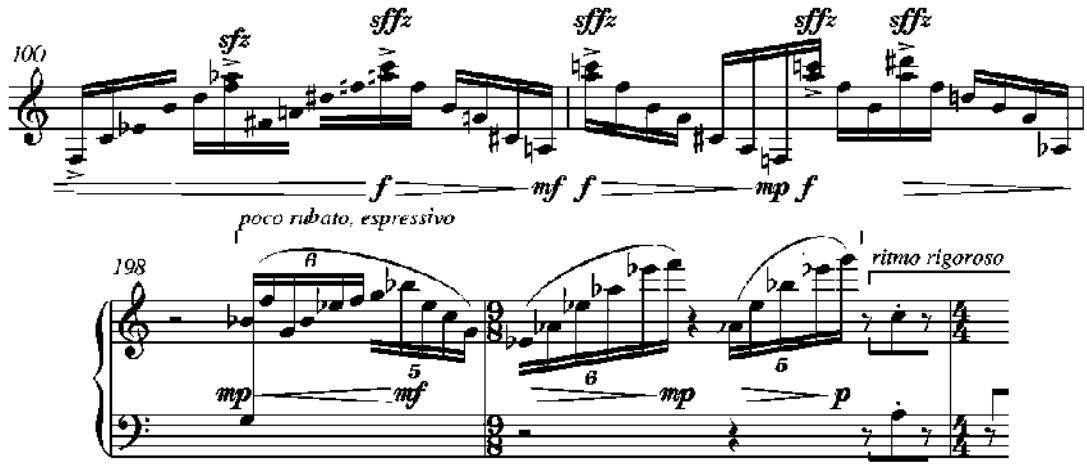
4.3 Tomasz Arnold: *Scherzo 3*

Recording location: USB drive,
https://youtu.be/coB8Q8Rlj70

Choice of technique: classical.

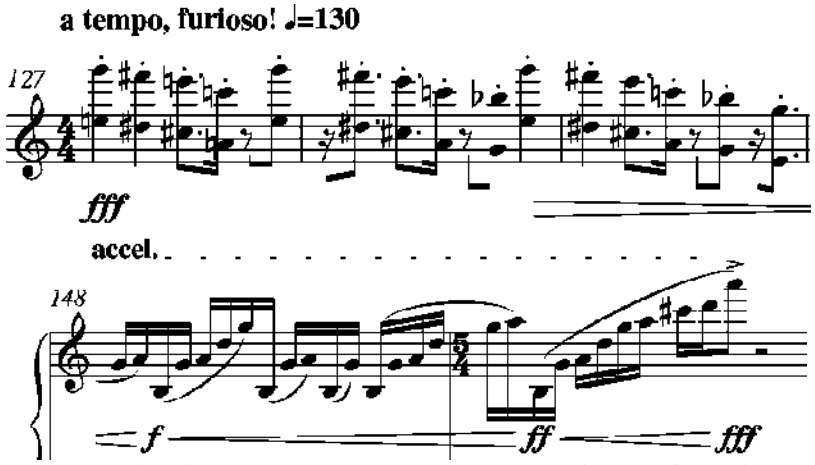
Argumentation

1. A significant number of intervals connecting the diatonic and chromatic keyboards in the middle and upper registers for Double Vertical, Single Alternating, or Double Lateral strokes (Example 35).



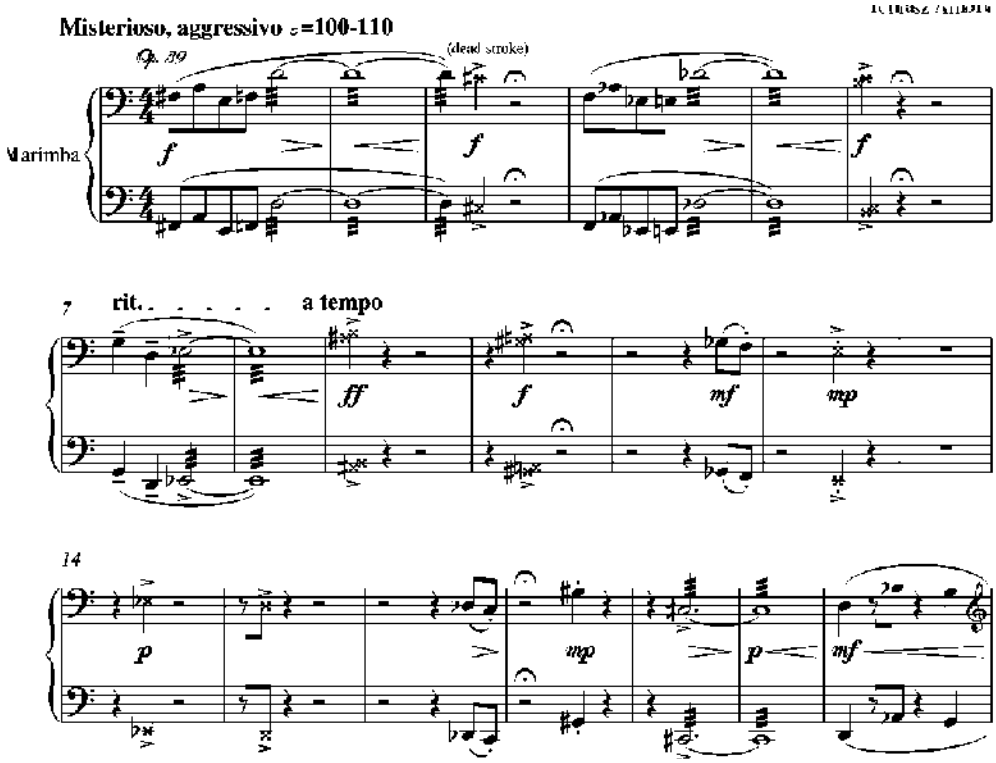
Example 35. Tomasz Arnold, Scherzo 3, mm. 100–101 and 198–199, in: Chopin – Alter Ego, 2020, pp. 48 and 53 – examples of intervals connecting the diatonic and chromatic keyboards for Single Alternating, Double Lateral, and Double Vertical strokes, 3:00, 6:58

2. The necessity of performing dynamically intense passages in the upper registers (Example 36).



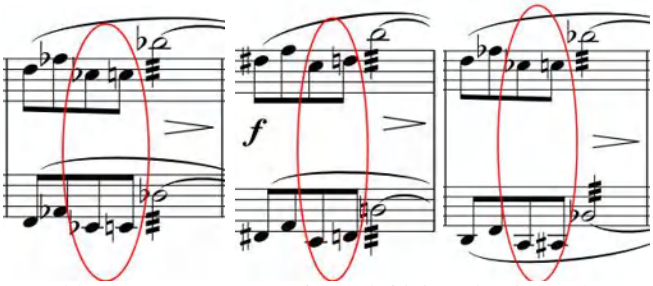
Example 36. Tomasz Arnold, *Scherzo 3*, mm. 127–129 and 148–149, in: Chopin – Alter Ego, 2020, pp. 50 and 51 – examples of dynamically intense passages in the upper registers, 3:59, 4:33

3. A large number of dead strokes (Example 37).



Example 37. Tomasz Arnold, Scherzo 3, mm. 1–20, in: Chopin – Alter Ego, 2020, p. 45 – examples of dead stroke hits, 0:14

4. Fast repetitions of Single Independent strokes while maintaining a small angle of separation between the mallets held in one hand (Example 38).



Example 38. Tomasz Arnold, Scherzo 3, mm. 4, 62, and 65, in: Chopin – Alter Ego, 2020, pp. 45–47 – examples of fast note repetitions using Single Independent strokes with a small mallet angle, resulting from the two preceding notes played with Double Lateral strokes, 0:21, 1:43, 1:50

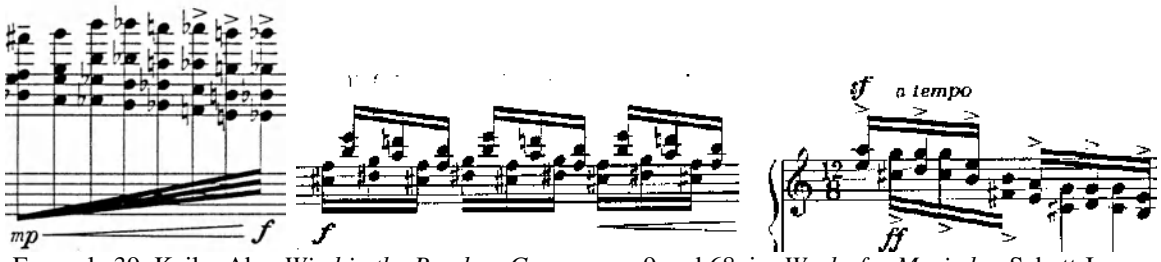
4.4 Keiko Abe: *Wind in the Bamboo Grove*

Recording location: USB drive.

Choice of technique: classical.

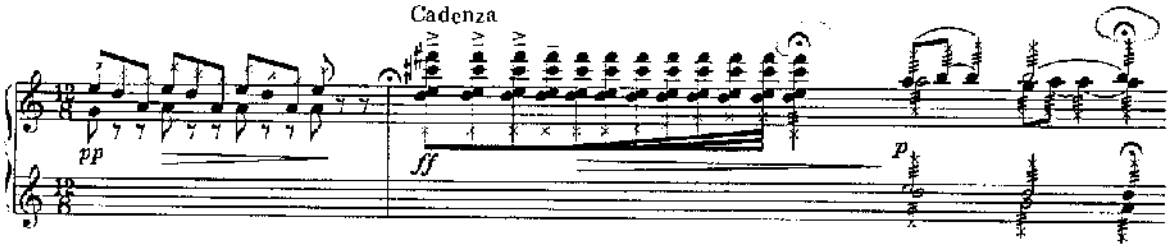
Argumentation

1. Reconstruction of the composer's performance method, who uses the traditional grip and considers it the proper one for performing her music (a discussion of this issue in relation to Keiko Abe can be found in Chapter 2).
2. The necessity of performing dynamically intense passages in the upper registers (Example 39).
3. A significant number of intervals connecting the diatonic and chromatic keyboards in the middle and upper registers for Double Vertical strokes (Example 39).



Example 39. Keiko Abe, *Wind in the Bamboo Grove*, mm. 9 and 68, in: *Works for Marimba*, Schott Japan Company Ltd., Koka 1987, pp. 13 and 18 – examples of dynamically intense passages in the upper registers featuring intervals that connect the diatonic and chromatic keyboards through the use of Double Vertical strokes, 1:06, 1:42

4. A large number of Double Vertical strokes with loud dynamics (Example 39).
5. Sound effects produced by striking the edges of the bars with the shafts of the mallets, which are somewhat easier to perform with shortened mallets using the traditional grip (Example 40).



Example 40. Keiko Abe, *Wind in the Bamboo Grove*, mm. 42–43, in: *Works for Marimba*, Schott Japan Company Ltd., Koka 1987, p. 15 – a passage of the piece featuring strokes made with the shafts of the mallets on the edges of the bars, 2:44

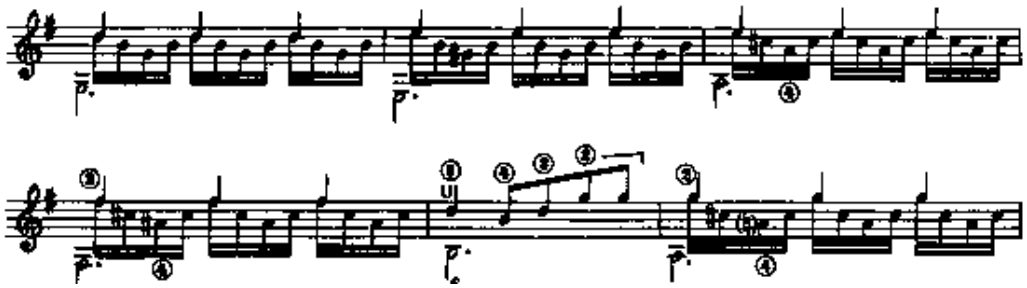
4.5 Silvius Leopold Weiss: *Suite No. 4 in G major*

Recording location: USB drive.

Choice of technique: Stevens.

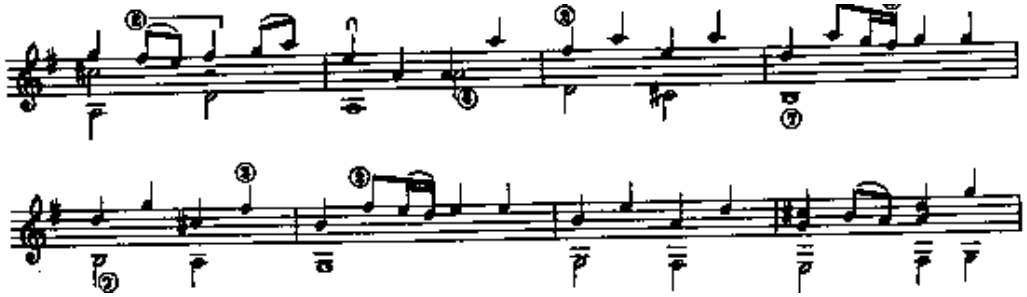
Argumentation

1. A significant number of Double Lateral strokes (Example 41).



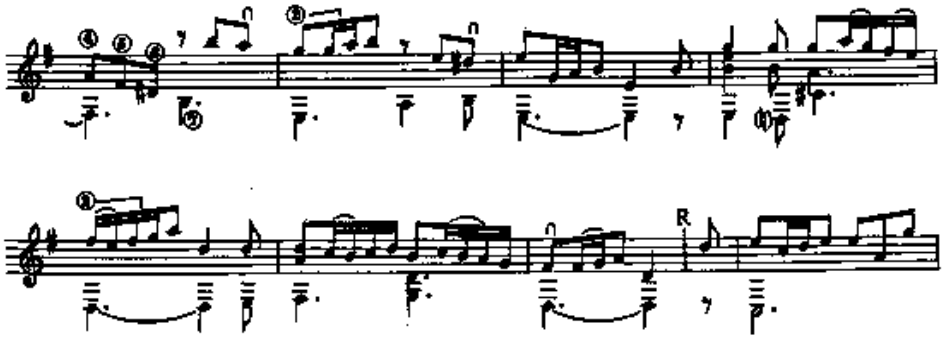
Example 41. Silvius Leopold Weiss, *Suite IV*, *Courante*, mm. 22–27, in: *Intavolatura di Luto*, transcription by Ruggero Chiesa, Suvini Zerboni, Milan 1969, p. 36 – Double Lateral strokes, 7:57

2. A significant number of Single Alternating strokes (Example 42).



Example 42. Silvius Leopold Weiss, *Suite IV*, *Bourée*, mm. 9–16, in: *Intavolatura di Luto*, transcription by Ruggero Chiesa, Suvini Zerboni, Milan 1969, p. 38 – Single Alternating strokes, 9:27

3. The necessity of performing a polyphonic texture (Example 43).



Example 43. Silvius Leopold Weiss, Suite IV, Gigue, mm. 28–35, in: Intavolatura di Luto, transcription by Ruggero Chiesa, Suvini Zerboni, Milan 1969, p. 43 – polyphonic texture, 18:45

4. Mallet selection – the need to increase the perceived weight of the mallets held in one hand. I performed the slower sections of the piece using soft and heavy mallets, whose full sound was easier for me to achieve with the Stevens technique. Spectral analysis did not confirm any significant differences between the techniques in terms of the resulting sound, so the choice is largely subjective. However, the Stevens grip, in which the weight of the mallet is utilized to its fullest extent, makes it easier for me to achieve a fuller tone with soft mallet heads. When playing at a slow tempo, there is no need for excessive movement, so muscle fatigue from the heavier mallets is not an issue, and their greater weight together with the characteristics of the Stevens grip provide extensive control over the produced sound.

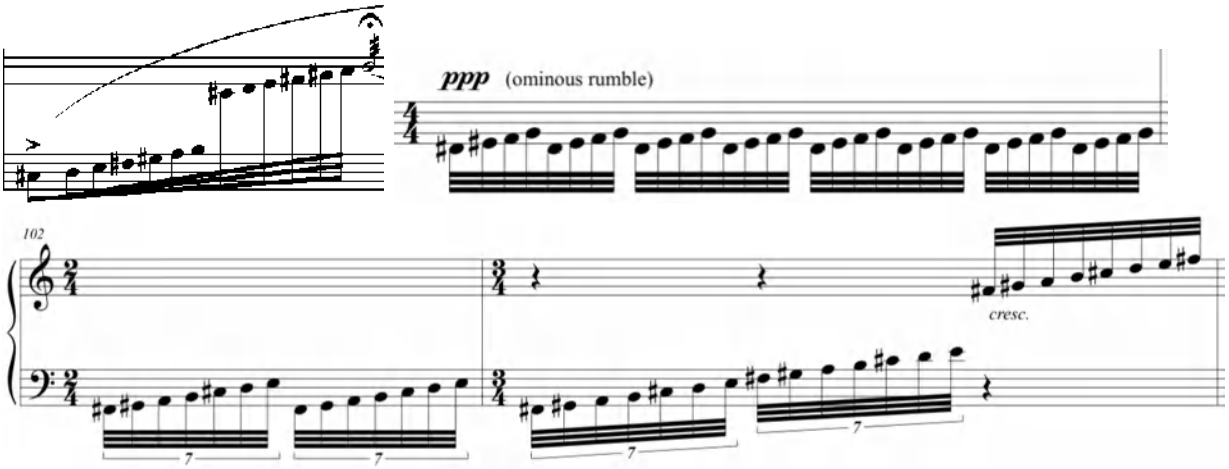
4.6 Leigh Howard Stevens: *Houdini's Last Trick*

Recording location: USB drive, https://youtu.be/kUcOX-28dYc

Choice of technique: Stevens.

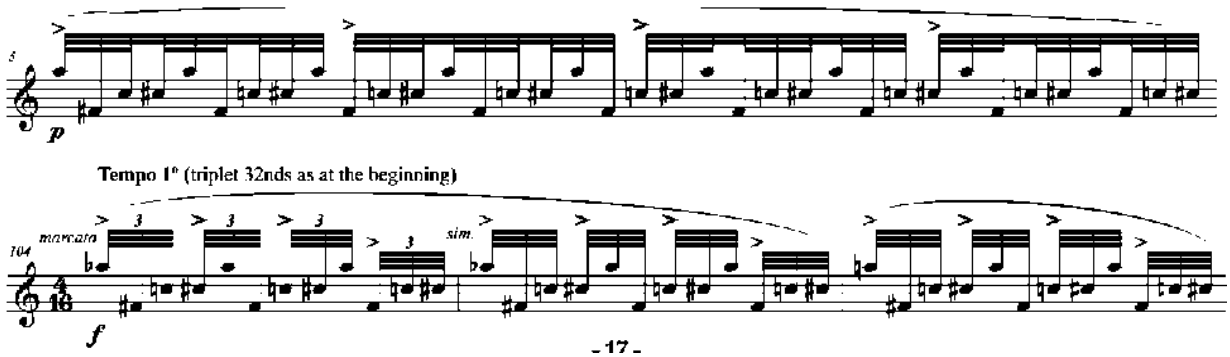
Argumentation

1. Reconstruction of the performance method of the composer who is the author of the Stevens technique. For a better understanding of the work and its interpretation related to the type of sound produced, it seems appropriate to use the technique developed by the composer himself.
2. A substantial number of small intervals with Double Lateral strokes (Example 44).



Example 44. Leigh Howard Stevens, *Houdini's Last Trick*, Keyboard Percussion Publications, Asbury Park, NY 2019, pp. 4 and 17, mm. 22 and 101–103 – examples of small intervals for Double Lateral strokes, 1:02, 4:58

3. Accented notes occurring during the execution of Single Alternating strokes (Example 45).



Example 45. Leigh Howard Stevens, Houdini's Last Trick, Keyboard Percussion Publications, Asbury Park, NY 2019, pp. 1 and 17, mm. 3 and 104 – examples of accented notes for Single Alternating strokes, 0:07, 5:03

4. A significant number of Double Lateral strokes (Example 44).
5. A significant number of Single Alternating strokes (Example 45).
6. Mallet selection – the need to increase the perceived weight of the mallets held in one hand. I performed the piece using the mallets suggested by the composer in the score – Malletech LS (Leigh Stevens) models: LS5 as the bass mallet (no. 1) and LS15 for the remaining mallets (nos. 2–4). The LS mallets are very light and better suited to the Stevens grip.

4.7 Steven Stucky: *Isabelle Dances*

Recording location: USB drive,

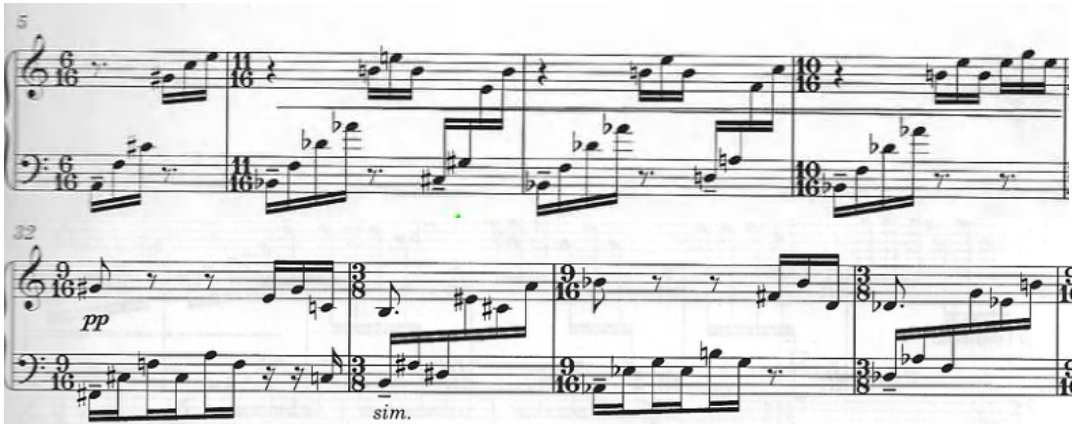
https://youtu.be/RXEWWO0TIhY

Mov. 1: ***Bounce***

Choice of technique: Stevens,

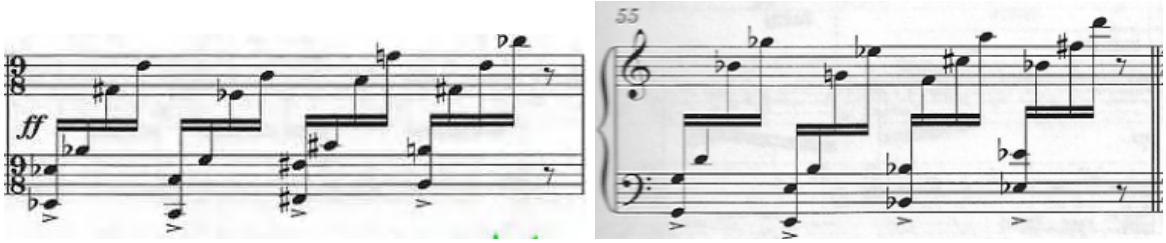
Argumentation

1. A significant number of Double Lateral strokes (Example 46).



Example 46. Steven Stucky, *Isabelle Dances*, Mov. 1 *Bounce*, Merion Music Inc., Bryn Mawr, PA 2012, pp. 1–2, mm. 5–8 and 32–35 – example of Double Vertical strokes with tenuto markings for the bass notes, 0:18

2. A significant number of large intervals (greater than or equal to an octave in the bass register) with Double Vertical strokes (Example 47).



Example 47. Steven Stucky, Isabelle Dances, Part 1 Bounce, Merion Music Inc., Bryn Mawr, PA 2012, p. 4, mm. 54–55 – example of large intervals for Double Vertical strokes, 1:32

3. Mallet selection – the need to increase the perceived weight of the mallets held in one hand. Many passages in this section require placing the passage on a strongly emphasized bass note with tenuto articulation (Example 46). On the marimba, I

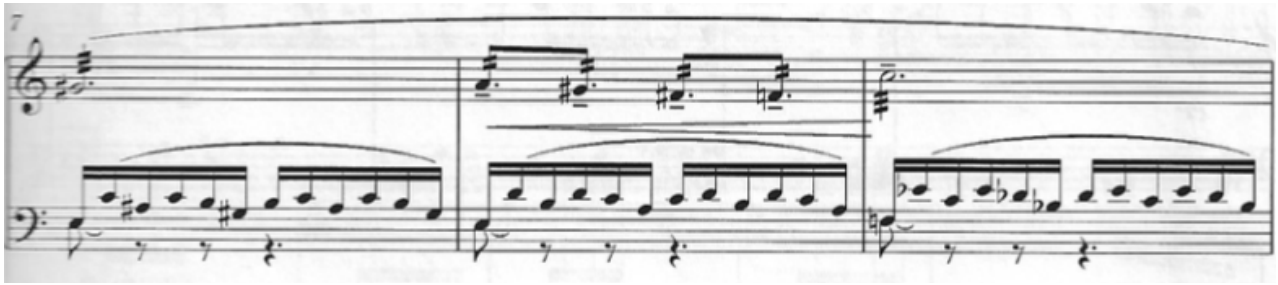
understand *tenuto* articulation as marking the note with a type of stroke that extends the mallet's contact with the bar – the opposite of an accent or *staccato* articulation, where the contact between the mallet and the bar is as short as possible. To achieve this effect, I used a heavy, soft, but tightly wrapped bass mallet, which allows for a soft yet focused sound with a clear attack. The Stevens grip made it possible to take greater advantage of the bass mallet's weight and facilitated the performance of heavy notes with *tenuto* articulation.

Mov. 2: *Dream – Homage to Chopin*.

Choice of technique: classical.

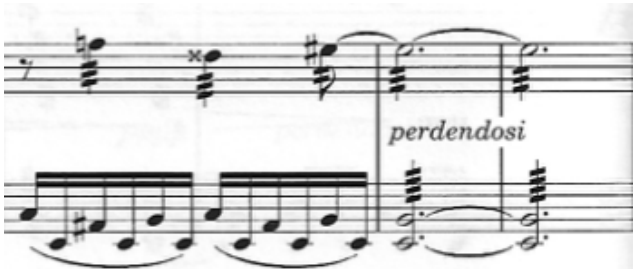
Argumentation

1. Independent tremolos performed on a single note (Example 48).



Example 48. Steven Stucky, *Isabelle Dances*, Mov. 2 *Dream – Homage to Chopin*, Merion Music Inc., Bryn Mawr, PA 2012, p. 6, mm. 7–9 – independent tremolos performed on a single note, 3:07

2. The necessity of performing independent tremolo strokes with a wide hand span (Example 49).



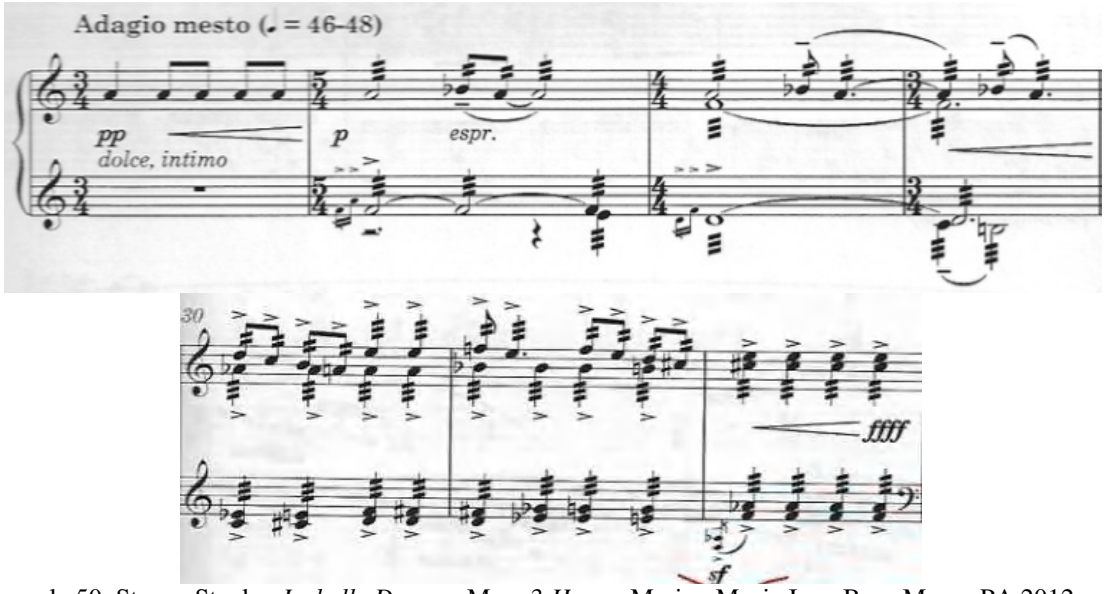
Example 49. Steven Stucky, *Isabelle Dances*, Mov. 2 *Dream – Homage to Chopin*, Merion Music Inc., Bryn Mawr, PA 2012, p. 9, mm. 66–68 – independent tremolo with a large hand span, 7:25

Mov. 3: *Hover*

Choice of technique: Stevens.

Argumentation

1. Mallet selection – A chorale-style piece that requires multitone mallets, allowing for soft sounds in quiet dynamics as well as tremolo chords in loud dynamics and in the higher register of the instrument (Example 50). In this case, a good choice of mallets for me were the Leigh Howard Stevens signature mallets (model LS15), which are very light. The Stevens grip, by increasing the perceived weight of the mallet in the hand, made it possible to achieve greater sound control in passages with single strokes played softly and at a slow tempo. At the same time, the light weight of the LS15 mallets made it easier to perform loud tremolo chords in the higher registers, while the hard core of these multi-tone mallets allowed for achieving the intended loud dynamics with maximum possible resonance of the bars in the upper range of the marimba.



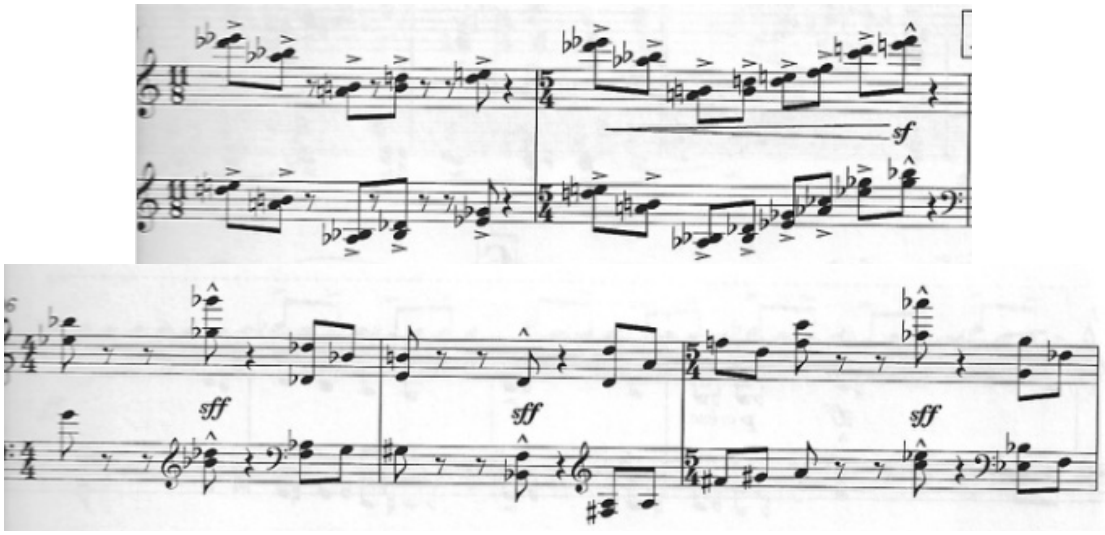
Example 50. Steven Stucky, *Isabelle Dances*, Mov. 3 *Hover*, Merion Music Inc., Bryn Mawr, PA 2012, pp. 10–11, mm. 1–4 and 30–32 – dynamic contrasts in tremolo passages, 8:02, 11:21

Część 4: ***Stomp – Homage to Bartok***

Choice of technique: classical.

Argumentation

1. A significant number of intervals connecting the diatonic and chromatic keyboards in the middle and upper registers for Double Vertical strokes (Example 51).



Example 51. Steven Stucky, *Isabelle Dances*, mov. 4 *Stomp – Homage to Bartók*, Merion Music Inc., Bryn Mawr, PA 2012, pp. 12 and 18, mm. 4–5 and 106–108 – examples of Double Vertical strokes in the middle and upper registers, in loud dynamics, using intervals that connect the diatonic and chromatic keyboards, 13:18, 16:05

2. The necessity of performing dynamically intense passages in the upper registers (Example 51).
3. A large number of Double Vertical strokes in loud dynamic levels (Example 51).
4. Mallet selection – the need to reduce the perceived weight of the mallets held in one hand. For the recording, I used heavy mallets (Innovative Percussion model NJZ5 for mallets no. 2, 3, and 4, and Marimba One model KMB2 for the bass mallet no. 1). The models are heavy, and the piece contains many passages in fast tempo and loud dynamics. Therefore, I needed to use a technique that would not cause excessive hand muscle fatigue.

4.8 Joseph Schwantner: *Velocities*

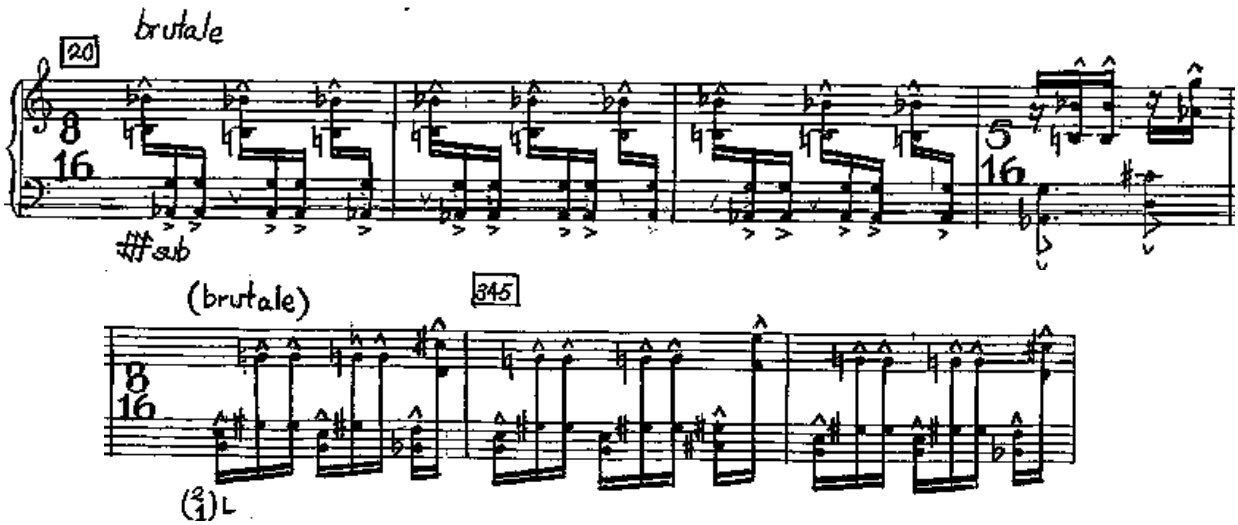
Recording location: USB drive,

https://youtu.be/zmIqsfCk_q0

Choice of technique: classical.

Argumentation

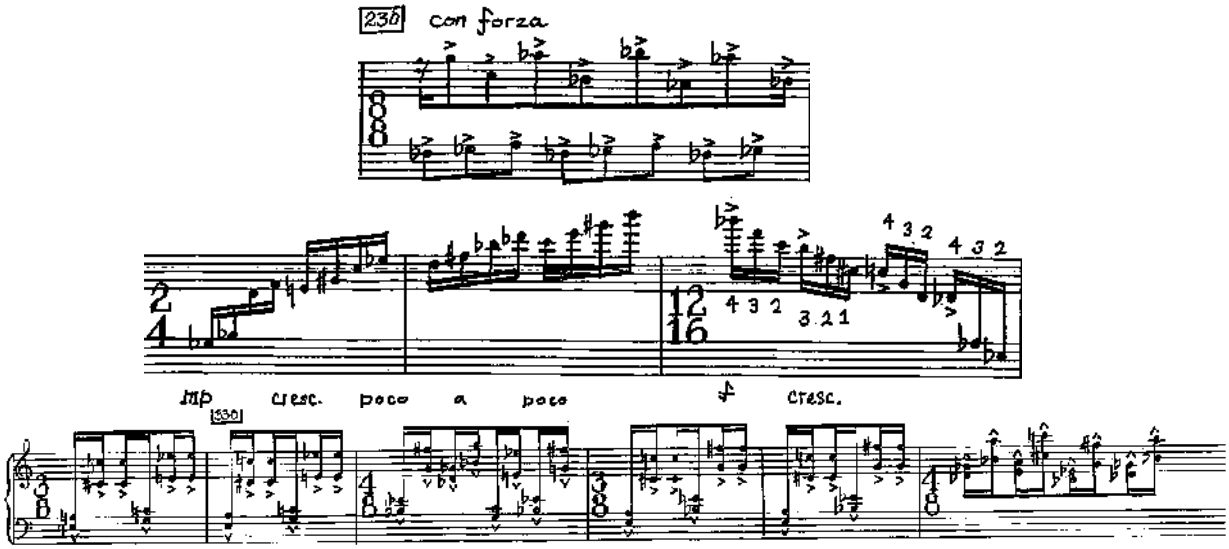
1. A large number of Double Vertical strokes in very loud dynamic levels (Example 52).



Example 52. Joseph Schwantner, *Velocities*, Helicon Music Corporation, Valley Forge, PA 1990, pp. 1 and 15, mm. 20–23 and 344–346 – examples of Double Vertical strokes in loud dynamics, 0:18, 7:01

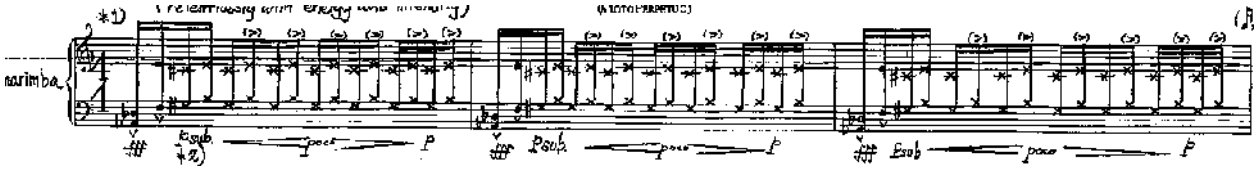
2. The necessity of performing long, dynamically intense passages in the upper registers (Example 53).

3. A significant number of intervals connecting the diatonic and chromatic keyboards in the middle and upper registers for Double Vertical, Single Alternating, or Double Lateral strokes (Example 53).



Example 53. Joseph Schwantner, *Velocities*, Helicon Music Corporation, Valley Forge, PA 1990, pp. 11 and 13–14, mm. 230, 286–288, and 329–334 – examples of strokes connecting the diatonic and chromatic keyboards in the middle and upper registers, 5:31, 6:25, 7:11

4. Sound effects produced by striking the edges of the bars with the shafts of the mallets (Example 54).



Example 54. Joseph Schwantner, *Velocities*, Helicon Music Corporation, Valley Forge, PA 1990, p. 1, mm. 1–3 – sound effects produced by striking the edges of the bars with the shafts of the mallets, 0:00

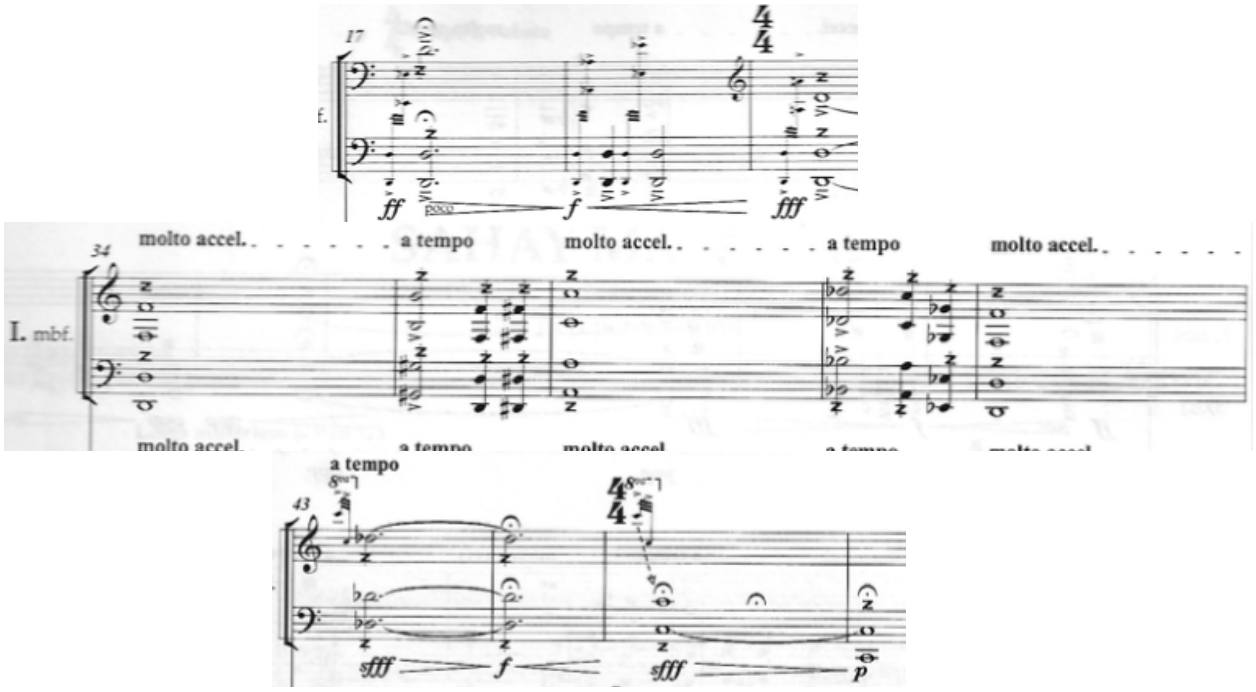
4.9 Marcin Błażewicz: *Sahay Manush*

Recording location: USB drive, https://youtu.be/JdGR1XQrd7E

Choice of technique: Stevens (measures 1–127), classical (measures 128 until the end).

Argumentation for measures 1–127 (Stevens technique)

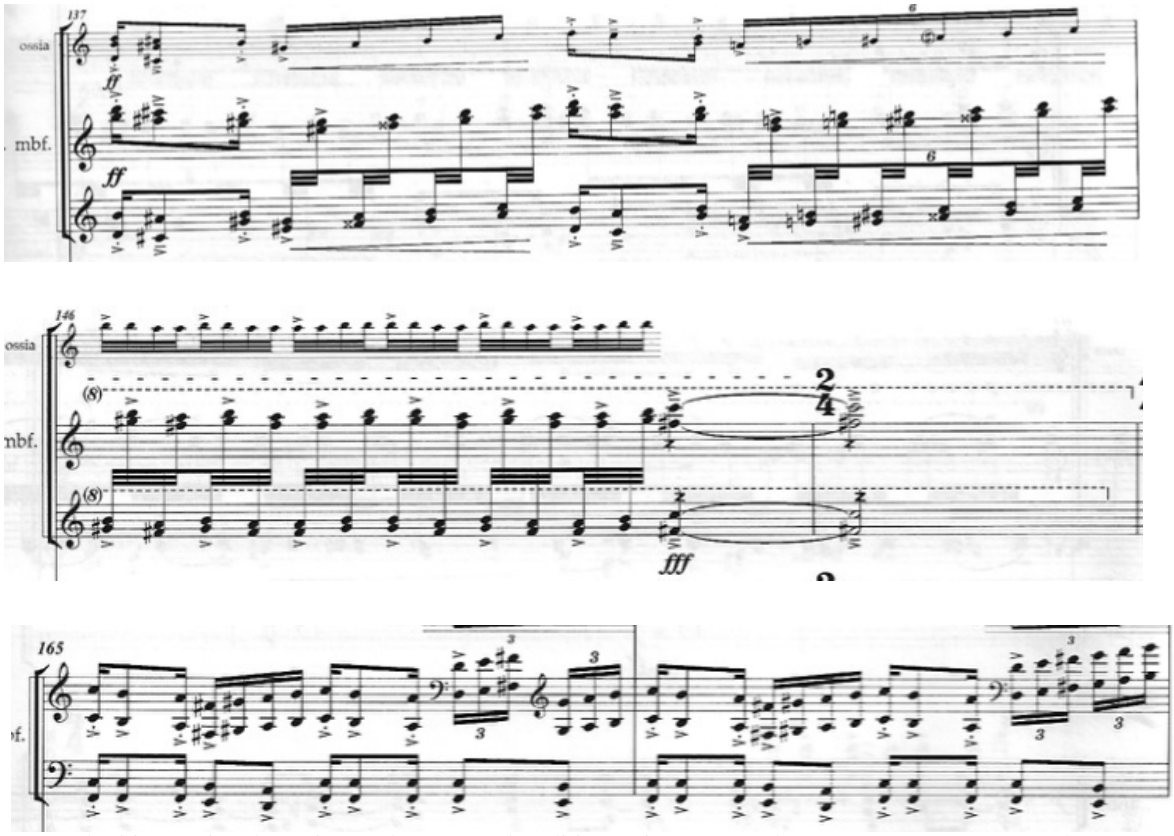
1. A significant number of large intervals with Double Lateral, and Double Vertical strokes (Example 55).



Example 55. Marcin Błażewicz, *Sahay Manush*, Edition Svitzer, Copenhagen 2009, pp. 5–6, mm. 17–19, 34–38, and 43–46 – examples of large intervals for Double Vertical and Double Lateral strokes, 1:55, 3:16, 3:40

Argumentation from measure 128 (classical technique)

1. A significant number of intervals connecting the diatonic and chromatic keyboards in the middle and upper registers for Double Vertical strokes (Example 56).



Example 56. Marcin Błażewicz, *Sahay Manush*, Edition Svitzer, Copenhagen 2009, pp. 17, 20, and 22, mm. 137, 146–147, and 165–166 – examples of passages in the upper registers and intense dynamics using Double Vertical strokes with intervals connecting the diatonic and chromatic keyboards, 9:07, 9:22, 10:15

2. The necessity of performing dynamically intense passages in high registers (Example 56).
3. A large number of Double Vertical strokes in loud dynamics (Example 56).
4. Mallet selection – the need to reduce the perceived weight of the mallets held in one hand. To perform this loud and fast piece, I used heavy mallets by Resta, model Jean Geoffroy 5.5.

Final Thoughts

Preparing the historical overview and confirming the insufficiency of didactic materials for learning four-mallet technique prior to the first edition of *Method of Movement* turned out to be a relatively easy task. Indeed, this textbook remains to this day one of the most detailed and comprehensive sources, covering many aspects of marimba performance – extending well beyond the mechanics of four-mallet grip itself.

The high quality of the publication stems not only from the precision of its descriptions but also from its methodological rigor and the objective, scholarly reasoning behind the adopted solutions. In my opinion, it is precisely these qualities that make the educational value of *Method of Movement* surpass most other materials of this kind published both before and after 1979. However, the question of whether the technique described by Stevens is unquestionably superior to others is far from clear-cut and remains a complex issue.

One of the essential, though rarely discussed, differences between Stevens's technique and the classical technique lies in the meticulousness and precision of Stevens's pedagogical approach. Thanks to these qualities, the Stevens technique can be regarded as a thoroughly developed and self-contained system, fully documented in a single publication — *Method of Movement*.

As I described in Chapter 2, many texts referring to Stevens's technique appeared after the publication of *Method of Movement*. However, it must be emphasized that these materials merely continue Stevens's pedagogical legacy rather than offer independent, original systems of four-mallet technique based on either the Stevens or Musser grip. In most cases, they present the same methods from slightly different perspectives or enriched with alternative sets of exercises. Occasionally, authors attempt to supplement *Method of Movement* with topics they believe Stevens omitted. An example is the expansion of stroke types to include Triple Lateral and One-Handed Roll, found in David Skidmore's textbook *A Fresh Approach to Technique and Musicianship with Four Mallets*[184].

[184] D. Skidmore, *A Fresh Approach*…, op. cit., 11.

The classical technique, on the other hand, continues to evolve. Authors who employ the traditional grip consistently propose new ideas and refinements. Many pedagogical systems for four-mallet playing based on this grip have developed gradually, shaped by the knowledge available at the time and open to external influences.

It is therefore not surprising that after 1979 some authors began incorporating elements borrowed from Stevens's technique – taken directly from *Method of Movement* – into their own traditional-grip-based systems. As mentioned in Chapter 2, one example of this approach is the traditional grip variant featuring a vertical hand position and the use of rotational motion, described in Milkov's *Four Mallet Method: My Pianistic Approach*. It is worth noting, however, that apart from this specific similarity, the four-mallet techniques presented in Milkov's publication differ significantly from those described in *Method of Movement* as well as from pedagogical sources related to the classical traditional grip technique, such as Nancy Zeltsman's *Four-Mallet Marimba Playing*.

Thus, when comparing the Stevens technique with the contemporary version of the classical technique, one must keep in mind that we are juxtaposing two fundamentally different pedagogical approaches: on one side, a closed and complete system of four-mallet technique that has remained largely unchanged since 1979; on the other, a continually evolving system with as many variants and interpretations as there are performers who use it.

Of course, the consistency and longevity of Stevens's technique – maintained almost unchanged for nearly half a century – may be seen as a sign of its superiority over the classical technique, which, as numerous new publications show, continually requires revision and "improvement." On the other hand, one might argue that this very evolution and openness of the classical technique based on the traditional grip demonstrates its potential as a more inspiring and individualistic approach than the standardized Stevens technique.

If, however, we were to compare the Stevens technique with the version of the classical traditional grip existing at the time of the first edition of *Method of Movement*, the conclusion is clear: in 1979, Stevens's technique represented a groundbreaking and

unquestionably superior method of playing. This is evidenced not only by the *Method of Movement* itself but also by Leigh Howard Stevens's virtuosic recordings from the 1980s and the technical level of the repertoire he performed or commissioned. Some of the works written for him – such as *West Side Suite* and *Night Rhapsody* by John Serry – are still considered among the most technically demanding pieces in the marimba literature. Within the first decade after the publication of *Method of Movement*, Stevens, through his performances of works that challenge even today's most advanced marimbists, practically demonstrated the effectiveness and superiority of his four-mallet playing method.

Today, numerous examples of elements of Stevens's technique can be found in four-mallet methods based on the traditional grip. However, we could only truly assess their prevalence if every marimbist using the classical technique were to publish a detailed pedagogical manual describing their approach. As shown in Chapter 2, my own version of the classical technique with the traditional grip also incorporates elements borrowed from the Stevens technique – for example, the use of wrist rotation in Single Independent strokes, the combination of rotational and vertical motion in Single Alternating and Double Lateral strokes, and, as in Milkov's approach, the vertical positioning of the hand holding the mallets.

Except for a few details – such as those described in Chapter 2 concerning the involvement of the arm in more dynamically intense strokes or the visual gestures reflecting the desired sound character – the differences between my version of the classical technique and the Stevens technique (excluding the grip itself) are not as radical as they might initially seem. Many of the outcomes observed in the experiments presented in Chapter 3, where one technique yielded clearly better results than the other, stem from the inherent mechanics of the Stevens grip compared to the traditional grip, rather than from fundamental differences in other aspects of playing technique.

The experiments conducted in Chapter 3 revealed that many of the exercises in *Method of Movement* proved more effective when performed using one technique or the other. These findings show that while one technique may be more efficient for a specific technical problem, it usually does not preclude successful execution with the alternative. I found only a few cases where performing an exercise was impossible (or nearly

impossible) using one of the techniques. All such rare instances were related to a single issue – the length of the mallets used in a given four-mallet grip.

The Stevens grip allows for fuller use of mallet length, as each mallet is held individually at the end of its shaft. In the traditional grip, the mallets are somewhat shortened due to their crossing. This seemingly simple difference makes some exercises requiring large intervals played with Double Vertical strokes in the bass register – especially those connecting the chromatic and diatonic keyboards – impossible or nearly impossible to perform with the traditional grip. Conversely, the longer mallets used in the Stevens grip can cause difficulty when playing triads and four-note chords with Double Vertical strokes at wide hand spans, especially in passages requiring the elbows to extend outward (see Fig. 27). For example, performing Exercise 202 from *Method of Movement* in B-flat major with the Stevens grip proved practically impossible for me (see Vid. 19). A similar difficulty arose in the final measure of the second movement of Steven Stucky's *Isabelle Dances*, discussed in Chapter 4.

Based on these observations, it can be concluded that authors of contemporary, 21st-century pedagogical publications – such as David Skidmore – are correct in noting that the choice of four-mallet grip is primarily a matter of individual preference. The four-mallet technique encompasses far more than the grip itself, and its proper application can yield desirable results regardless of whether the Stevens or traditional grip is used.

However, considering all the technical aspects discussed above, this statement is not entirely unassailable. One can easily argue that the choice of four-mallet technique should not be based solely on performer preference, as it has a tangible impact on technical capability. When performing the most demanding works in marimba literature, a player must accept the possibility of encountering passages that are unplayable with their preferred grip. Such situations may require adapting one's technique, developing an alternative fingering solution, or even changing to a different four-mallet grip.

The results of the practical experiments presented in Chapter 3 indicate that both the Stevens technique and the classical traditional-grip technique – despite their respective strengths and weaknesses – are, in most cases, sufficient for effectively solving the

technical challenges found in *Method of Movement*. To provide a precise answer to which of the two is more universal, one would need to compile a comprehensive repertoire list annotated with all instances in which a given grip or technique proves inadequate for addressing specific technical problems. Next, one would analyze how many of these instances pertain to the Stevens technique and how many to cross-grip-based techniques, such as the classical traditional grip or the Burton grip.

If we take the practical content of *Method of Movement* as the criterion for determining the universality of each technique, the conclusion would be that the Stevens technique appears more universal, as I encountered fewer critical issues preventing the effective execution of exercises when using it. The previously mentioned problem of insufficient mallet length in the traditional grip caused more difficulties than the excessive length of mallets in the Stevens grip.

However, it should be emphasized that the practical exercises in the textbook cannot serve as the sole basis for definitively confirming the superiority of the Stevens technique, since the material in *Method of Movement* does not cover the full spectrum of technical situations possible in four-mallet playing. Later pedagogical publications that expand on certain topics demonstrate that Stevens's textbook, while foundational, is not entirely exhaustive and has its limitations.

To fully and conclusively assess the universality of four-mallet techniques, it would be necessary to create the aforementioned repertoire list and analyze the effectiveness of each technique not only in marimba performance but also across other instruments such as vibraphone, xylophone, glockenspiel, and multi-percussion setups – contexts in which cross-grip techniques are often preferred for four-mallet playing. Developing such a list and conducting a comprehensive cross-instrumental analysis would, however, be complex enough to warrant an independent doctoral dissertation.

Taking into account that both techniques discussed in this work have their strengths and limitations, one can conclude that the only truly complete approach to four-mallet performance is mastery of both the Stevens technique and one of the cross-grip-based

techniques – the classical traditional grip or the Burton grip. I believe this conclusion best summarizes the findings of this research.

The knowledge of both the Stevens technique and one of the cross-grip-based techniques is increasingly becoming the approach adopted by modern percussionists and is gradually emerging as a new standard. In concerts and percussion competitions, it is now common to see performers use the Stevens technique when playing marimba works requiring a bass octave and wide intervals, while performing vibraphone or multi-percussion pieces with cross-grip techniques. In my opinion, all indications suggest that this trend will continue to strengthen until mastery of at least two four-mallet techniques becomes an international norm among percussionists aspiring to perform the most demanding and diverse repertoire in the percussion literature.

Summary

In this dissertation, I attempt to undertake an objective and detailed examination of four-mallet marimba techniques, focusing specifically on a comparative analysis of two methods I employ in my own performance practice on marimba: the traditional grip and the Leigh Howard Stevens technique. I have deliberately limited my scope to these two approaches, omitting, for example, the widely used "Burton grip." While the Burton grip is highly versatile, its origins and associations with its creator – renowned vibraphonist Gary Burton – have led it to be primarily identified with vibraphone performance. This narrowing of focus reflects my intention to offer an in-depth discussion of the two techniques in which I possess the highest level of proficiency as a performer.

The study is structured around an evaluation of two key theses put forward by L.H. Stevens in his famous publication *Method of Movement for Marimba*:

1. Traditional four-mallet methodology is insufficient to meet the needs of the contemporary marimbist (as "contemporary" was understood in 1979, the year of the book's first publication).
2. The Stevens technique yields superior results to the traditional grip in almost every instance.

Chapter 1 addresses the validity of the first thesis by examining twenty-one pedagogical sources on four-mallet performance published prior to *Method of Movement*. While the majority of these are American publications, several European works are also included. Many of these sources – long out of print and now rare – were obtained through online antiquarian booksellers, during research visits to the Eastman School of Music and SUNY University at Buffalo libraries, and via the Jagiellonian University's interlibrary loan service. This survey of pre-1979 materials forms the basis for conclusions on the adequacy of existing pedagogical resources for learning four-mallet technique before the advent of Stevens's method.

Chapter 2 offers a detailed theoretical analysis of *Method of Movement*. I examine all the techniques Stevens describes, with particular emphasis on his recurrent theme of "movement efficiency." I also explore similarities between Stevens's approach

and elements of my own adaptation of the traditional grip. The purpose here is to identify, from a theoretical standpoint, which aspects of the Stevens technique might confer an advantage over the classical approach, thereby laying the groundwork for the practical experiments described in the following chapter. I further highlight areas where the two techniques overlap, and identify features of the Stevens technique that have subsequently been incorporated into modern variations of the traditional grip. The chapter concludes with a bibliography of pedagogical sources published after *Method of Movement*, illustrating the continued influence of both Stevens's pedagogy and classical methodologies.

Chapter 3 presents a series of practical experiments comparing the two techniques, conducted using my own performance skills in both the traditional grip and the Stevens technique. The aim is to test Stevens's second thesis regarding the superiority of his method. Four experiments are described:

1. Speed Test 1 – measuring which technique enables higher performance tempo for exercises from the practical section of *Method of Movement*, played in the base key (C major) without transposition. This test was conducted in 2022, early in the dissertation process, when my proficiency in the Stevens technique was still developing.
2. Movement Efficiency Test – assessing which technique more effectively minimizes the range of motion required to execute *Method of Movement* exercises in various transpositions, some of which necessitate less comfortable playing positions.
3. Speed Test 2 – a repeat of the first speed test in 2025, at the conclusion of the dissertation, allowing for direct comparison with the 2022 results and tracking my technical development in the Stevens technique. This repetition also controls for the possibility that the earlier results were skewed by lower initial proficiency.
4. Sound Spectrum Study – a preliminary investigation into whether the choice of four-mallet technique can directly affect the timbre and quality of sound produced.

In addition to documenting these experiments and their outcomes, Chapter 3 analyzes the primary sources in which Stevens articulated his views on the superiority of his technique – namely Chapter V of *Method of Movement* and his articles in "Modern Percussionist". I also review later publications by other authors that adopt and propagate Stevens's hierarchy of four-mallet methods, a narrative that places the traditional grip at the lowest tier and the Stevens technique at the highest.

As a prelude to the sound spectrum study, the chapter also surveys literature on the acoustics of keyboard percussion instruments, along with scholarly and practitioner perspectives on factors influencing tone production. This review traces a growing awareness among 20th-century percussionists of the ways in which stroke type, mallet material, and point of contact on the bar can shape tone quality, and how these variables can be measured. The section concludes with an interview excerpt from Belgian marimbist Ludwig Albert, published in Percussive Notes, in which he suggests that the choice of four-mallet technique may directly influence the marimba's sound. This statement served as the conceptual starting point for my own sound spectrum research.

Chapter 4 analyzes the recorded repertoire forming the artistic component of this dissertation. These recordings illustrate the practical application of both the Stevens and classical techniques, selected according to the specific technical demands of each work. Performances were executed using the technique best suited to the piece in question, with justifications drawn from both the practical experiments and the theoretical analysis of *Method of Movement*.

The recordings are provided on an accompanying USB drive. Works previously published on my YouTube channel are also referenced via QR codes in Chapter 4, linking directly to the online materials.

The written component of the dissertation includes not only musical examples, illustrations, and tables, but also embedded video demonstrations of the technical issues discussed. These are integrated into the text via QR codes, which redirect to YouTube-hosted videos when scanned with a smartphone. All video materials are also stored on the accompanying USB drive in a dedicated folder titled "Przykłady wideo."

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Video 48. A stroke at the center of the bar with mallet no. 2, LS5 model, using the traditional grip 202
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Video 49. A stroke at the center of the bar with mallet no. 1, LS15 model, using the traditional grip 202
https://youtu.be/SnB1ZNcH1kQ

List of Tables

Anex – Recordings Data

File 1. Eric Sammut: *Caméléon*

Duration: 6:17
Instrumentation: marimba solo
Performers: Tomasz Arnold
Audio recording: Bartek Staniak
Audio editing: Tomasz Arnold
Mix and Master: Bartek Staniak
Video recording: Jan Frączek
Video editing: Tomasz Arnold
Production: 04.07.2024 in Sala koncertowa PSM I and II stopnia im. prof. Józefa Świdra in Jastrzębie Zdrój. Implemented with funds from the Krzysztof Penderecki Academy of Music in Kraków.

File 2. Tomasz Arnold: *Scherzo 3*

Duration: 11:59
Instrumentation: marimba solo
Performers: Tomasz Arnold
Audio recording: Tomasz Arnold
Audio editing: Tomasz Arnold
Mix and Master: Bartek Staniak
Video recording: Tomasz Arnold
Video editing: Tomasz Arnold
Production: 22.08.2023 in Sala koncertowa PSM I and II stopnia im. prof. Józefa Świdra in Jastrzębie Zdrój. Carried out as a part of the Republic of Poland's Ministry of Culture and National Heritage Scholarship – project *Marimba Trips*.

File 3. Keiko Abe: ***Wind in the Bamboo Grove***

Duration: 6:14
Instrumentation: marimba solo
Performers: Tomasz Arnold
Audio recording: Bartek Staniak
Audio editing: Tomasz Arnold
Mix and Master: Bartek Staniak
Video recording: Jan Frączek
Video editing: Tomasz Arnold
Production: 05.07.2024 in Sala koncertowa PSM I and II stopnia im. prof. Józefa Świdra in Jastrzębie Zdrój. Implemented with funds from the Krzysztof Penderecki Academy of Music in Kraków.

File 4. Silvius Leopold Weiss: ***Suite No. 4 in G Major*** **–** Perludium, Allemande, Courante, Bourée, Sarabande, Menuet, Gigue

Duration: 19:57
Instrumentation: marimba solo
Performers: Tomasz Arnold
Audio recording: Bartek Staniak
Audio editing: Tomasz Arnold
Mix and Master: Bartek Staniak
Video recording: Jan Frączek
Video editing: Tomasz Arnold
Production: 04-05.07.2024 in Sala koncertowa PSM I and II stopnia im. prof. Józefa Świdra in Jastrzębie Zdrój. Implemented with funds from the Krzysztof Penderecki Academy of Music in Kraków.

File 5. Leigh Howard Stevens: *Houdini's Last Trick*

Duration: 6:31
Instrumentation: marimba solo
Performers: Tomasz Arnold
Audio recording: Bartek Staniak
Audio editing: Tomasz Arnold
Mix and Master: Bartek Staniak
Video recording: Jan Frączek
Video editing: Tomasz Arnold
Production: 05.07.2024 in Sala koncertowa PSM I and II stopnia im. prof. Józefa Świdra in Jastrzębie Zdrój. Implemented with funds from the Krzysztof Penderecki Academy of Music in Kraków.

File 6. Steven Stucky: *Isabelle Dances* – *Bounce, Dream – Homage to Chopin*, *Hover*, *Stomp – Homage to Bartok*.

Duration: 16:51
Instrumentation: marimba solo
Performers: Tomasz Arnold
Audio recording: Tomasz Arnold
Audio editing: Tomasz Arnold
Mix and Master: Bartek Staniak
Video recording: Tomasz Arnold
Video editing: Tomasz Arnold
Production: 19.08.2023 in Sala koncertowa PSM I and II stopnia im. prof. Józefa Świdra in Jastrzębie Zdrój. Carried out as a part of the Republic of Poland's Ministry of Culture and National Heritage Scholarship – project *Marimba Trips*.

File 7. Joseph Schwantner: *Velocities*

Duration: 7:53
Instrumentation: marimba solo
Performers: Tomasz Arnold
Audio recording: Bartek Staniak
Audio editing: Tomasz Arnold
Mix and Master: Bartek Staniak
Nagranie wideo: Jan Frączek
Video recording: Tomasz Arnold
Video editing: Tomasz Arnold
Production: 05.07.2024 in Sala koncertowa PSM I and II stopnia im. prof. Józefa Świdra in Jastrzębie Zdrój. Implemented with funds from the Krzysztof Penderecki Academy of Music in Kraków.

File 8. Marcin Błażewicz: *Sahay Manush*

Duration: 14:59
Instrumentation: marimba, multiperkusja
Performers: Tomasz Arnold – marimba, Tomasz Kowalczyk – multiperkusja
Audio recording: Bartek Staniak
Audio editing: Bartek Staniak
Mix and Master: Bartek Staniak
Video recording: Tomasz Arnold
Video editing: Tomasz Arnold
Production: 21.08.2023 in Sala koncertowa PSM I and II stopnia im. prof. Józefa Świdra in Jastrzębie Zdrój. Carried out as a part of the Republic of Poland's Ministry of Culture and National Heritage Scholarship – project *Marimba Trips*.