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Memorization of Violin Repertoire: Auxiliary Proposals

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Abstract

Experts confirm that effective learning of works to be performed on the violin is only possible through memorization. This research proposes alternative strategies to facilitate and make the work of memorizing violin pieces easier and more effective. The proposed strategies were applied to a sample of ten master's students in violin in music education, using systematic observation and the design-based method. Data analysis was carried out using descriptive and inferential statistics, concluding that the proposed memorization strategies can be effective and can facilitate the memorization process.

Keywords: memorization; strategies; violin; music; pedagogy.

1. Introduction

The importance of memorizing the musical works when learning the violin has been defended and promoted by several pedagogues. Shinichi Suzuki, author of the Suzuki method, believed that students should know the music they play by heart and should not play from the sheet music. For this violin pedagogue, memorization practices should be taught from childhood. Many experts mention that in teaching music, memorization is essential for effectively learning a musical work. Despite being a time-consuming, and a demanding work, it allows the necessary freedom for better technical control and musical expression. In several research, it was observed that violinists generally only work on memorization through systematic repetition, using visual, auditory and kinesthetic memory. This work is not always enough and effective.

The practice of the violin must also include mental gymnastics exercises that

promote synaptic plasticity which is fundamental to the task of musical memorization. One of the ways of mental gymnastics consists of providing the brain during practicing sessions with more information than will be needed during the violin performance. This extra information makes the task more difficult, and at the same time requires systematic repetition. Repetition and rehearsal are the vehicle for passing information into long-term memory, which also enables effective knowledge of the musical work. This research presents mental gymnastics strategies that can help improve the effectiveness of memorizing works from the violin repertoire. The proposals presented in this study were applied and tested on violinists, students of the master's in music teaching at the University of Évora (Portugal), with the aim of observing their effectiveness in memorizing musical works. The study results demonstrated the effectiveness of the proposed memorization strategies.

2. The Memory

In the fourth century B.C., the Greek philosopher Aristotle stated that memory is the scribe of the soul. Memory derives from the Latin (memorĭa) and designates the mental faculty that allows the brain to retain and restore information learned by the human being. According to Squire & Kandel (2002), memory can be defined as the process through which learning lasts over time. Memory means the acquisition, formation, conservation and recall of information. This acquisition is also called learning, since only what has been learned is retained and remembered (Izquierdo, 2018). Lisboa, Chaffin & Demos, (2015) state that memory varies from person to person, as do its traits or capacity. However, despite the existing diversity, the neurological and cognitive system is common to all human beings. Damásio (2010) adds that the mechanism of acquisition, coding, storage and retrieval of information is related to emotions.

Regarding the use of memory for musical performance purposes, Mishra (2010) mentioned that Frédéric Chopin discouraged the memorization of piano works, while Franz Liszt advised his students to memorize. During the 19th century, memorizing music was considered by many to be an act of arrogance and exhibitionism, which is why many musicians played by reading from the score. Franz Liszt was one of the first concert musicians to play from memory in concert; this practice influenced other musicians, and performance from memory became standard practice. As Herrera & Cremades (2020) mention, much of the literature on the subject currently argues that developing musicians' ability to play without sheet music is necessary due to established canons in the music world and audience expectations. For Macmillan (2004), there are advantages to memorizing music. The better the musician knows the work he must interpret, the better level of concentration he will have during the performance. Better knowledge of the score increases the ability to communicate with the audience. Vieira (2021) adds that the act of playing from memory plays a role in the musical growth of musicians because it develops their musicality.

Memorization is a skill that can be learned (Macmillan, 2004). For Holmes (2004), the better the understanding of the channels through which music is transmitted to memory, and how it can be developed during the learning process, the safer the

performance will be. According to experts, even musicians who memorize easily do not always understand how memory works, and this can lead to insecurity. Referring to memory, Holmes (2004) mentions that "if the constituent processes are not understood, they cannot be managed" (p. 12).

Memory is also defined by many researchers as the application of what we learn over time. For Spearman (1927), "Memory consists of cognitive events which by occurring establish dispositions which facilitate their recurrence."; Woodworth (1947) states that "Memory Consists in remembering what has previously been learned." Izquierdo (2018) mentions that we only remember what has been learned. According to Ryburn (1956), in psychology, the mind's ability to store experiences or learning from the past, and reproduce them later, is called memory. According to Izquierdo (2018), the memorization process includes the acquisition, formation, conservation and recall of information. The acquisition of information can be called learning, as we only retain and recall what we learn. It is memory that allows learning to last over time (Squire & Kandel, 2002).

Memorizing a musical work can be seen as another skill beyond the technical and musical mastery of playing the violin. It is important to assess the true need to memorize the music to be performed; orchestral musicians, musicians who dedicate themselves exclusively to chamber music, do not necessarily need to develop this skill consistently. As for soloists, the canons of the past require it, but even for these musicians, nowadays, playing from memory is not a priority condition. Despite the above, memorization should always be practiced and be part of the process of learning to interpret a musical work. Even if the work is performed in concert using sheet music, memorization must be part of the learning process. Hofmann (1920) states that, "...playing from memory is indispensable to the freedom of rendition. You must bear in your mind and memory the whole piece in order to attend properly to its details." (pp. 112, 113). Newman (1984) states that memorizing is a convenience for artistic interpretation. Cienniwa (2014) mentions that "...memorized music is better learned music." (p. 31). The same author lists the following benefits of memorizing musical works:

• There is no longer any need to worry about lighting (musicians are often concerned about being able to read the score properly).
• Allows for a more conscious interpretation.
• Contributed to greater technical development.
• In the case of the violin, the memorization process allows for improved attention to tuning control.
• Performance without music score allows greater freedom of movement.

According to Chen (2024), memory lapses are inevitable, but appropriate strategies can help musicians reduce memory lapses. For Chaffin et al. (2002), experienced performers have a mental map of the piece, which allows them to keep track of where they are as the performance unfolds. If something happens, these musicians do not stop their performance, but gracefully continue to the next reference point and continue the performance. Most of the time, the audience does not even notice these mistakes. For these authors, memorization is the creation of a safety net.

3. Music Memory Types

Experts report that human memory is not a unitary entity, but a composition of multiple independent, interacting systems. The retrieval of retained information is described as different systems that complement each other. Each of the memory systems consists of an association between a specific group of neurons, in such a way that when one is activated, all others are activated, and work together (Nunes, 2008).

There is no consensus among experts regarding the classification of the types of memory that exist in humans. One of the most important theories on this subject is the modal model of Atkinson & Shiffrin (1971). According to Fonte (2020), the modal model is a theory about how information is stored in memory over time, which proposes the division of memory into three parts: sensory, short term, long term.

Macmillan (2004) mentions the existence of different types of information retention in our memory: "long-term memory (we can remember things from many years ago), short-term memory (which operates over one to 30 seconds), and sensory memory (the very short-lived memory of a fleeting sense)" (p. 6).

There are three main types of memory that help musicians remember music: kinesthetic memory, visual memory, and aural memory. Each type of memory has its own characteristics (Fonte, Pipa, Williamon et al., 2022). The three types of memory are different, but they work together and complement each other in the act of memorizing (Atkinson & Shiffrin, 1971). In addition to the three main types of memory, there is another type of memory, the analytical memory, which is used by many musicians. The analytical memory is based on the study and memorization of elements of the score, which can serve as points of reference during the performance of the musical work. These elements may have to do with the form or structure of the musical piece, with melodic phrases or harmonic structure and progression. Garaulet (2019) divides this type of memory into two parameters. The first is based on the form of the musical work (general structure, sections, phrases, motifs), the second on the fundamentals of harmony (tonal functions, understanding of chords, cadences and tonality in general).

According to Bricard (1978), the objective of Kinesthetic memory is to develop muscular coordination to a level at which the performance is almost automated and reflexive, independent of the musician's conscious effort. A good way to develop muscle memory is to practice slowly. Slow practice allows the musician to have more cognitive attention and to be able to focus on details that deserve more concentration (Mishra 2004). Bricard et al. (1978) state that Kinesthetic memory represents controlled and coordinated neuromuscular responses to different auditory, visual and intellectual stimuli. Kolehmainen (2023) mentions that string players need to define fingerings and bowings so that they are exactly the same every time they perform a given piece. If a player plays the same passage with different combinations of bowings and fingerings, it is impossible to establish a coherent muscle memory that produces the same mechanical result every time.

Visual memory consists of a mental image of the score or finger positions. Regarding this type of memory, Chaffin et al. (2012) state that "…some musicians

claim to have a photographic memory, while others claim that their visual memory is weak or useless" (p. 233). Since it is only a mental image and not a real image, there is room for mistakes to be made during the performance. If mistakes occur, the only way for the musician to correct them is to look again at the real object, the score. According to Chaffin et al. (2012), if the musician changes the score, the visual information will be different from the visual memory to which he was previously accustomed, and therefore it will be more difficult for him to play the piece. Cienniwa (2014) states that visual memory can be fully developed using the instrument, but it is more solid when learned without the instrument. The same author states that "When I have a program ready to play, I will spend at least half, if not two-thirds of my time away from the instrument, visualizing the score in "mental" practice." (Cienniwa, 2014, P. 40).

Referring to pianists, Clavere (2011) states that auditory memory is the process of sound recall in which musicians remember sounds aurally and reproduce them in identical sequences and patterns. In musical performance, auditory memory informs the musician of what comes next, offering guides that allow the prediction of a sound that is familiar to him. Audiation introduced by Edwin Gordon, which consists of the ability to imagine a sound and be able to reproduce it, is also of great importance in the development of this type of memory. According to Cienniwa (2014) "…while it is often the first type of memory to be lost under pressure, it has also saved me in a number of instances when I couldn't see or hear what was coming next. Thankfully, my fingers kept on going." (p.39). According to Cienniwa (2014) "The memorization process will be greatly accelerated when one has already heard a piece many times, either by playing it oneself or by hearing other performances." (p. 40).

It is normal practice among students to memorize music, using only systematic repetition. But through systematic repetition, students are not always able to develop the three basic types of memory (visual, aural and kinesthetic). Although practicing this type of memory is very important, it is also not sufficient for effective and solid memorization. As Gerber (2012) states, when using only one or two types of memorizations, the probability of memory failures occurring in performance is high. The continuation of the interpretation of the musical work is compromised, insecurity and anxiety arise.

Experts argue that to increase the success of playing a musical work by heart, various types of memory and memorization strategies must be used. Cerqueira et al. (2012) state that "...a solid memorization is the one where the performer acquires the maximum amount of information - logical, kinesthetic, auditory, etc. - possible aspects of the work, relating and associating each detail" (p.99).

In the literature we can find references to six types of memory (Table 1). Aural, kinesthetic, visual, nominal, analytical and emotional memory, with the first three considered the main ones (Aiello & Williamon, 2002).

Table 1. Representative table of the most used types of memory in music performance.

Kinesthetic memory	Memory related to body movements.
Visual memory	"Photographic" memory of the score.
Aural memory	Memory relating to melodic lines, pitch of sounds, or rhythms.
Analytical memory	Memory relating to the structure and sequential organization of the work.
Nominal memory	Technical or musical instructions from the performer to himself: "pull back"; "now connected"; "higher tuning"; etc.
Emotional memory	The performer's feelings associated with certain passages of a work.

3. Memorization Phases

The system through which information is stored and retrieved from our memory has always been a topic of discussion among experts. One of the main memory models, called the multi-store model or modal model, was proposed in 1968 by Richard Atkinson and Richard Shiffrin. The work of these two scientists was published in 1971 by Stanford University. In this seminal work on memory, these two authors state that:

> Human memory is divided into a short-term working memory and a long-term permanent memory. Control processes act within the short-term working memory to make decisions and regulate information flow, thereby controlling learning and forgetting. (Atkinson & Shiffrin, 1971, p. 1)

Memory can be organized into phases, which correspond to the period of time that information remains available. According to specialists, there are three main phases, the sensory recording phase, short-term storage, and long-term storage.

Initially sensory information is registered, remains for a brief period of time, then decays and is lost. As mentioned by Atkinson & Shiffrin (1968), short-term storage receives sensory records (figure 1). In this information transfer process, it is important to mention the importance of selective attention. As Butler (1983) states, "selective attention involves focusing on some mental activity to the detriment of others" (p. 405). One or more stimuli produce relevant information, the individual is asked to listen to one piece of information and ignore the others, that is, they must focus their attention only on the requested stimulus (Butler, 1983; Garcia, Pereira & Fukuda, 2007).

Information present in short-term storage (or memory) decays and is lost in about 30 seconds, but through rehearsal, subjects may be able to maintain a limited amount of information in this storage for as long as they wish.

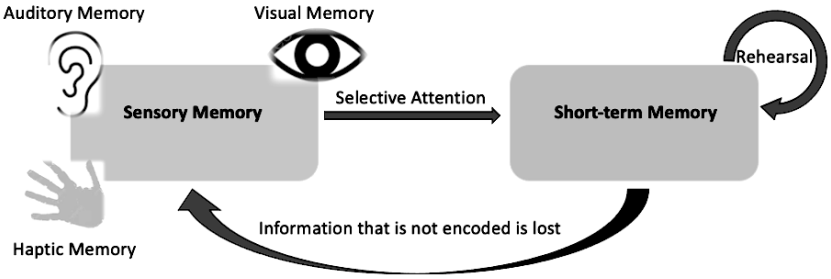

Figure 1. The interactions between different types of memory.

In long-term storage, information is kept quite permanently, this information is the result of transfers of information from short-term storage. The term transfer does not mean that information is removed from one storage and placed in the next; the term transfer means a copy of selected information from one store to another, but without removing that information from the source store. Regarding the transfer of information from short-term storage to long-term storage, Atkinson & Shiffrin (1968) state that:

> We assume that transfer to the long-term store takes place throughout the period that information resides in the short-term store, although the amount and form of the transferred information is markedly influenced by control processes. (p. 94)

As the authors mentioned above state, the transfer of information to long-term storage depends on control processes. In music this process of control is achieved by systematic repetition and rehearsal. Memory can be seen as a mental representation of something we want to remember, in this process several phases of information processing are involved (figure 2).

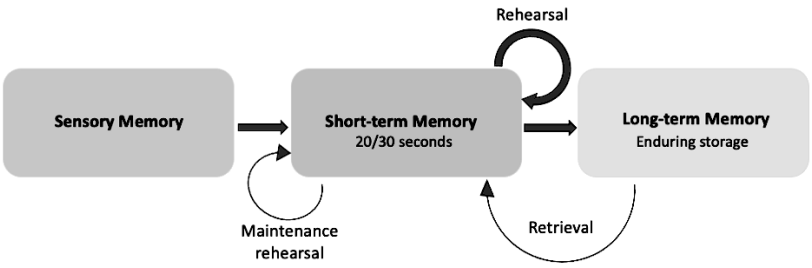

Figure 2. Memory, phases of information processing.

4. Procedure

This research was carried out with the collaboration of 10 participants, violinists, students of the master's in music teaching at the Department of Music at the University of Évora (Portugal). The objective of the research was to observe and analyze the memorization process of Edward Elgar's piece, Salut d'Amour op. 12, carried out by the aforementioned 10 participants. The 10 participants were divided into two groups, an experimental group with 5 participants, and a control group with the remaining 5 students.

The experimental group carried out the memorization work using the memorization auxiliary proposals that will be presented in the following subsection.

The control group did not follow specific instructions to work on memorization; in general, the students relied only on systematic repetition.
The observation of both groups took place in 4 classes (corresponding to one month's classes) lasting 60 minutes, and the result of the memorization work was tested in a public audition. Classes were weekly, the audition was held one week after the fourth class.
The present investigation was based on the systematic observation of participants, using a design-based methodology, to improve and adapt the memorization work process during the investigation. Regarding design-based investigations, Bakker and Van Eerde (2014) state that one of the main characteristics of this type of investigation is that educational strategies can be adjusted during their empirical testing.

5. Auxiliary Strategies in the Violin Music Memorization Process

The auxiliary memorization process, taught and used in the 4 classes to the experimental group, was carried out according to the following 9 phases:
1 - Reading the work, marking fingerings and bowing.
2 - Division of the work into small sections, sections that must have a musical and technical logic that facilitates memorization.
3 - The student must perform the first section of the work, and simultaneously count out loud the beats written in the score.
4 - Without looking at the score, the student must try to play the worked section from memory. If errors occur, the student must consult the score, identify the mistakes made, and make a new attempt to perform it from memory.
5 - The student must play the excerpt again with the help of the sheet music.
6 - The student must perform the same section of the work, and simultaneously say the names of the notes.
7 - Point 4 is repeated.
8 - The student must play the excerpt again with the help of the sheet music.
9 - Finally, the excerpt must be performed by heart with the eyes closed. If errors occur, the student must consult the score, identify the mistakes made, and repeat the process until they can do it without failure.

Figure 3 shows the main phases of the auxiliary memorization process, used by the experimental group in the 4 classes dedicated to memorizing Edward Elgar's play, Salut d'Amour op. 12.

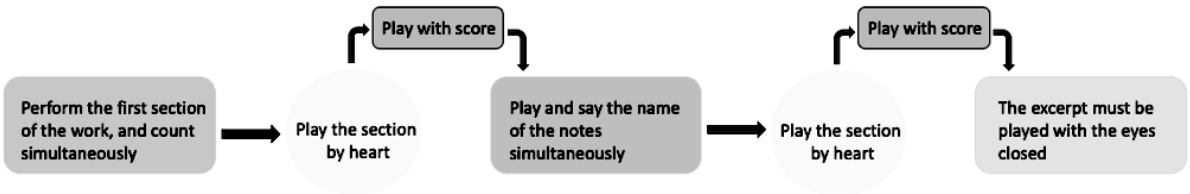

Figure 3. Auxiliary strategies in the memorization process.

The strategies presented refer to working on an excerpt of the piece, for the

following excerpts the process is repeated. Figure 4 shows the score that was used and memorized by all participants in this research. The markings are visible in the document, which determine the organization of the division of the work into excerpts.

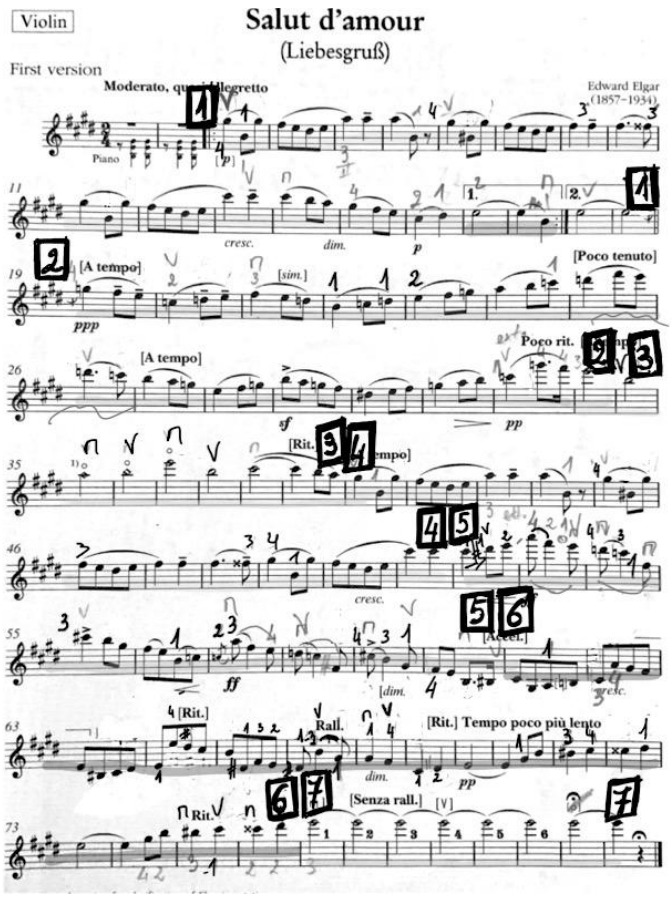

Figure 4. Sheet music used by all the participants in the research. Retrieved from Elgar, E. (1890). Salut d'Amour op. 12. Schoot's & co.

The excerpts marked in the score in figure 4 (①, ②, ③, ④, ⑤, ⑥, ⑦) must be worked on individually. Subsequently, the excerpts must be joined gradually. As an example, after completing the work of memorizing excerpt ②, excerpts ① + ② must be played together, from memory. Afterwards, section ③ must be worked on, then sections ① + ② + ③ must be played together, from memory, and so on until the piece is completed. Participants were asked, after completing the memorization process, to play the piece daily, from by heart, in order to maintain the information. They were asked, if they made mistakes (memory failures), to repeat the passages where the errors occurred using the previously presented auxiliary memorization strategies.

6. Results

All participants, from both groups, mentioned having played the memorized piece daily, between classes and the public audition, which suggests that they did the

work of maintaining and practicing their memory.

Statistical data analysis was carried out using descriptive and inferential statistics, using the SPSS-29.0 software (Statistical Package for the Social Sciences). To carry out the inferential analysis, considering compliance with the necessary criteria for conducting parametric tests, namely the reduced sample size (N=5) for each group, to compare the variables under study depending on the groups (Control and Experimental) it was The Mann-Whitney test was applied, which is the non-parametric test suitable for comparing the distribution functions of a variable at least ordinal measured in two independent samples (Marôco, 2014).

Figure 5 shows the number of classes that each of the participants in the control group needed to complete the process of memorizing Edward Elgar's play Salut d'Amour op. 12. In the control group, 2 participants completed memorization in 2 lessons, the remaining 3 participants in 3 lessons.

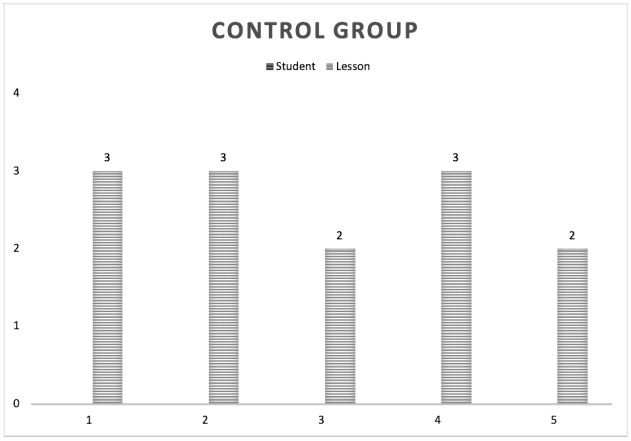

Figure 5. Number of classes needed to complete the memorization process (control group).

Figure 6 shows the number of classes that each participant in the experimental group needed to complete the process of memorizing the proposed piece. In this group, all participants completed the process of memorizing the piece in the first class.

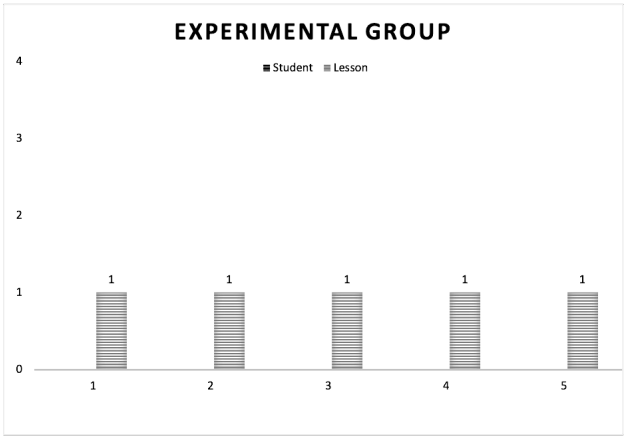

Figure 6. Number of classes needed to complete the memorization process (experimental group).

Figure 7 shows the number of errors or memorization failures for each of the participants in the control group, errors that occurred in the last class, during the last full performance of the piece in that class. In the control group, participant 1 made 5 errors, participant 2 made 2 errors, participant 3 made 1 error.

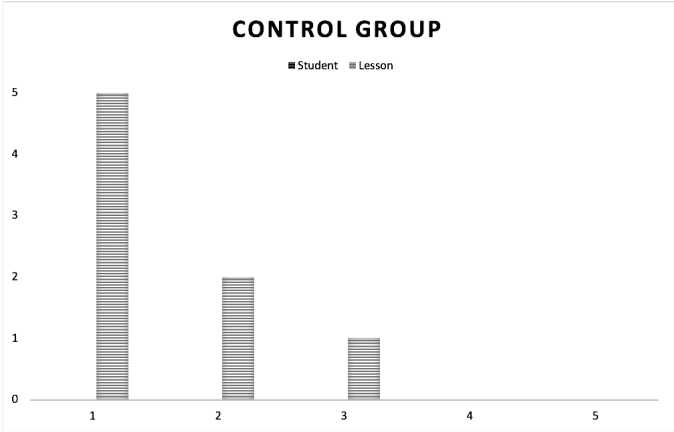

Figure 7. Number of errors made in the last class (control group).

Figure 8 shows the number of errors or memorization failures of each of the participants in the experimental group, like figure 7, the errors that occurred in the last class, during the last full performance of the piece in that class. In the experimental group, participants 1 and 2 made 1 error.

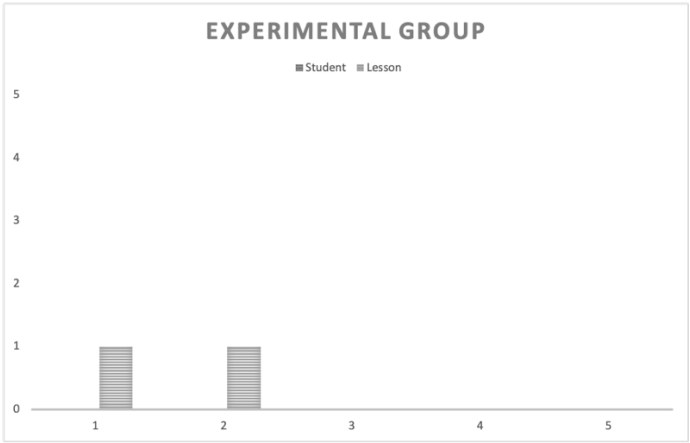

Figure 8. Number of errors made in the last class (experimental group).

The last full performance of the piece in the fourth class served as a pre-test for the audition held the following week. It was a moment of self-diagnosis for the participants, who were able to take note of what they still had to work on and improve.

The audition was the moment for the final evaluation of the memorization work carried out. Figure 9 shows the number of errors or memorization failures for each of the participants in the control group, which occurred during the public audition.

In the control group, only one participant made no errors, participant 1. Of the remaining participants, participant 2 made 5 errors, participant 3 made 4 errors, participant 4 made 1 error, and participant 5 made 3 errors.

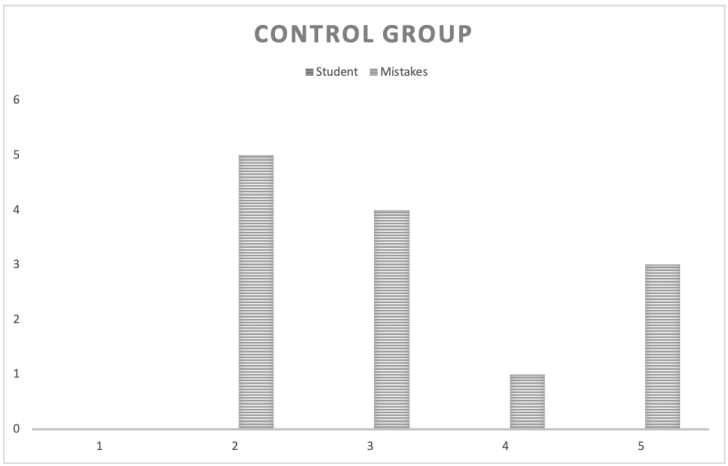

Figure 9. Number of errors made in the public presentation (control group).

In figure 10 we observe the errors or memorization failures of each of the participants in the experimental group, which occurred during the public audition. In this group, only one participant made mistakes, participant 1 made 1 error. The remaining participants made no mistakes and had no memory failures.

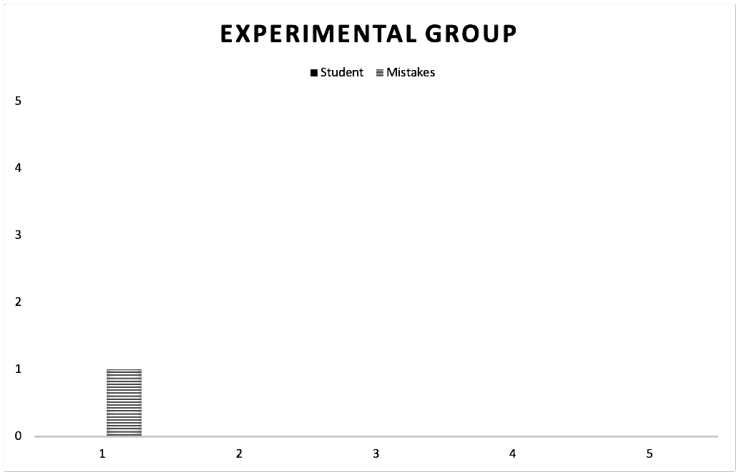

Figure 10. Number of errors made in the public presentation (experimental group).

Figure 11 compares the performance of the two groups in the public audition. From the experimental group, only 1 participant made mistakes. From the control group, 4 participants made mistakes.

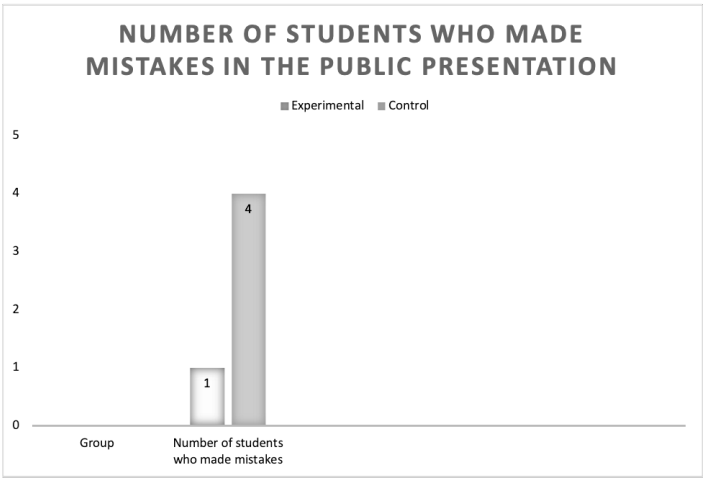

Figure 11. Comparison of the number of students who made mistakes in the two groups.

From the comparison of the variables under study depending on the group (Table 1.) there are statistically significant differences in the Number of classes needed to complete the memorization process (p=0.005); and in the "Number of errors made in the public presentation" (p=0.044), whose means were higher in the control group.

Table 2. Comparison of the variables under study depending on the group.

	Control			Experimental				
	N	Mean	Sd	N	Mean	Sd	dif	*p*
Number of classes needed to complete the memorization process	5	2,60	0,55	5	1,00	0,00	1,60	**0,005**
Number of errors made in the last class	5	1,60	2,07	5	0,40	0,55	1,20	0,309
Number of errors made in the public presentation	5	2,60	2,07	5	0,20	0,45	2,40	**0,044**

(p=Mann-Whintney Test)

Discussion

The results obtained demonstrate the effectiveness of the proposed memorization strategies. The representative data on errors made in the public audition, the final test of the memorization work, shows us that the effectiveness of the experimental group was higher than that of the control group. In the public audition, 4 of the participants in the experimental group did not make any mistakes, in the control group, only 1 participant managed to perform the piece without problems.

Another fact to highlight was the speed in achieving the objective (memorization of the piece). All participants in the experimental group were able to complete the memorization process in just one class. In the control group, participants needed an average of 2 to 3 classes to complete the memorization work.

As evidenced by the descriptive and inferential data analysis, the proposed strategies were useful in speeding up memorization, and in the solidity and effectiveness of executing the memorized work.

The main limitation of this investigation was the sample size, groups with a larger number of participants would have given greater reliability to the results obtained. The fact that auxiliary memorization strategies were tested with Edward Elgar's play Salut d'Amour op. 12, a short work with a relatively simple structure, may have also limited the results. Future tests of the strategies, with longer and structurally more complicated works, would be useful.

References

Aiello, R & Williamon, R. (2002). Memory. In R. Parncutt & G. McPherson (editores), *The Science & Psychology of Music Performance* (pp. 167-181). Oxford University Press.

Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. Spence (Ed.), *The psychology of learning and motivation* (Vol. 2). Academic Press.

Atkinson, R. C., & Shiffrin, R. M. (1971). *The control process of short-term memory* (No. 173). Stanford Univerity. https://web.stanford.edu/group/csli-suppes/techreports/IMSSS_173.pdf

Baddeley, A.D. (1992) Working Memory. *Science, 255*, 556-559. https://doi.org/10.1126/science.1736359

Baddeley, A. D. (1995). The psychology of memory. In A. D. Baddeley, B. A. Wilson, & F. N. Watts (Eds.), *Handbook of memory disorders* (pp. 3–25). John Wiley & Sons.

Bakker, A., & Van Eerde, H. A. A. (2014). An introduction to design- based research with an example from statistics education. In A. Bikner-Ahsbahs, C. Knipping, & N. Presmeg (Eds.), *Doing qualitative research: methodology and methods in mathematics education*. Springer. Doi: 10.1007/978-94-017-9181-6_16

Bricard, N., Woods, S.M., 1978. Memory Problems for Musical Performers. College Music Symposium 18(2), 102–109.

Butler, K. G. (1983). Language processing: selective attention and mnemonic strategies. In: Lasky EZ, Katz J. *Central auditory processing disorders: problems of speech, language, and learning* (pp. 297-319). Park Press.

Cerqueira, D. L.; Zorzal, R. C. & Ávila, G. A. (2012). Considerações sobre a aprendizagem da performance... *Per Musi,26*, 94-109.

Chaffin, R. & Imreh, G. (2002). Practicing Perfection: Piano Performance as Expert Memory. *Psychological Science*, *13*(4), 342–349. https://doi.org/10.1111/j.0956- 7976.2002.00462.x

Chaffin, R., Logan, T. R. & Begosh, k. T. (2012). A memória e a execução musical. *Em Pauta 20* (34/35), 223-244.

Chen, X. (2024). The Importance of Playing from Memory: Considering the Multi-Sensory Approach in Memorizing Music. *Education Reform and Development, 6*(7), 126-130. DOI: 10.26689/erd.v6i7.7734

Cienniwa, P. (2014). *By Heart: The Art of Memorizing Music*. CreateSpace Independent Publishing Platform.

Clavere, J. (2011). *A study guide to Franz Liszt's "Grandes etudes de Paganini" S. 141*. Retrieved from: https://etd.ohiolink.edu/!etd.send_file?accession=ucin1296847312&disposition=inline

Damásio, A. (2010). *O livro da Consciência*. Temas e Debates.

Elgar, E. (1890). *Salut d'Amour op. 12*. Schoot's & co.

Fonte, V. (2020). *Reconsidering memorisation in the context of non-tonal piano music* (Tese de Doutoramento). Royal College of Music. https://doi.org/10.24379/RCM.00001619

Fonte, V.; Pipa, L.; Williamon, A. et al. (2022). Memorising Contemporary Piano Music as Described by Professional Pianists. *Music & Science, 2008*(5), 1–12. https://doi.org/10.1177/20592043221132932

Garcia, V. L.; Pereira, L. D.; Fukuda, Y. (2007). Selective attention-psi performance in children with learning disabilities. *Revista Brasileira de Otorrinolaringologia, 73*(3), 404-11. https://www.scielo.br/j/rboto/a/9pL34kWbVG7mHGW6qpGYjLr/?format=pdf

Garaulet, O. (2019). *Piano and Memory: Strategies to memorize piano music* (Tese de Mestrado). Classical Music Institution. https://www.divaportal.org/smash/get/diva2:1381619/FULLTEXT03.pdf

Gerber, S. (2012). *Virtual Memory in a Multikernel* (Master Dissertation, Swiss Federal Institute of Technology Zurich). Swiss Federal Institute of Technology Zurich Repository: https://barrelfish.org/publications/gerber-master-vm.pdf

Herrera, M. & Cremades, R. (2020) The Study of Memorisation in Piano Students in Higher Education in Mexico. *Musicae Scientiae, 24*(3), 330–341. https://doi.org/10.1177/1029864918805312

Hofmann, J. (1920). *Piano playing with piano questions answered* (ilustrado ed.). Theodore Presser, Co. http://conquest.imslp.info/files/imglnks/usimg/4/49/IMSLP11770-Piano_Playing_-_Josef_Hofmann.pdf

Holmes, P. (2004). New strategies to help memorisation. *Piano Professional.* European Piano Teachers Association. Retrieved from: http://www.jennymacmillan.co.uk/uploads/6/6/2/1/66215923/memorising_x_4_for_pp.pdf

Izquierdo, I. (2018). *Memória* (3ª ed.). Artmed Editora.

Jiménez, B. S. (2012). *Psicología de la memoria: estructuras, procesos, sistemas*. Editorial Universitas, S.A.

Kolehmainen, A. K. (2023). *Utilizing memory styles in learning-how to learn a piece by heart : Learning styles, practice, and reflection* (Dissertation). Retrieved from: https://urn.kb.se/resolve?urn=urn:nbn:se:kmh:diva-5070

Lisboa, T., Chaffin, R., & Demos, A. P. (2015). Recording thoughts while memorizing music: A case study. *Frontiers in Psychology*, *5*, 1–12. https://doi.org/10.3389/fpsyg.2014.01561

Marôco, J. (2014). *Análise Estatística: Com o SPSS Statistics* (6ª ed.). Lisboa: ReportNumber. ISBN 978-989-96763-4-3.

May, C. P & Einstein,G. O (2013). *Memory, A Five-Unit Plan for High School Psychology Teachers.* TOPSS/American Psychological Association.

Macmillan, J. (2004). Successful memorising. *Piano Professional.* European Piano Teachers Association. Retrieved from: http://www.jennymacmillan.co.uk/uploads/6/6/2/1/66215923/memorising_x_4_for_pp.pdf

Mishra, J., 2004. A model of musical memory. *Proceedings of the 8th International Conference on Music Perception and Cognition, Adelaide.* Causal Productions. Retrieved from: https://www.academia.edu/6926642/A_Model_of_musical_memory_PDF

Mishra, J. (2010). A century of memorization pedagogy. *Journal of Historical Research in Music Education*, 32(1), 3-18.

Newman, W. (1984). *The Pianist's Problems: A Modern Approach to Efficient Practice and Musicianly Performance*. Da Capo Press Inc.

Nunes, B. (2008). *Memória: Funcionamento, Perturbações e Treino*. Lidel.

Spearman, C. (1927). The Abilities of Man: Their Nature and Measurement. New York: Macmillan.

Sperling, G. (1960). The information available in brief visual presentations. *Psychological Monographs: General and Applied, 74(11, Whole No. 498).* pp. 1-29.

Squire, L. R., & Kandel, E. R. (2002). *Memória: da mente às moléculas*. Porto Editora.

Suzuki, S. (1994). *Suzuki Violin School, Volume 9*. Chicago: Summy-Birchard Inc.

Vieira, M. (2021). *Using Performance Cues as a Memorization Strategy with Group Piano Students by Implementing Teacher and Student-Directed Learning Approaches* (Phd thesis). Louisiana State University and Agricultural & Mechanical College. https://repository.lsu.edu/gradschool_dissertations/5643/

Woodworth, R. S. & Donald, G. M. (1947). *Psychology*. Henry Holt & Co.