MUSICA THEORICA 2023, V. 8.1
SCIENTIFIC ARTICLE
10.52930/mt.v8i1.262
Submission date: Jun/12/2023
Final approval date: Jul/06/2023

The Effect of Aural Analysis on Melodic Dictation[1]

O efeito da análise auditiva no ditado melódico

Caroline Caregnato
Universidade do Estado do Amazonas

Pablo da Silva Gusmão
Universidade Federal de Santa Maria

Abstract: This study approaches melodic dictation in relation to aural analysis, by investigating the effect of an aural analysis, accomplished before dictation taking, on its results. 98 music undergraduates participated in the study by performing a melodic dictation task. The participants were divided into a control group and an experimental group. Subjects in the experimental situation were asked to answer a few questions about the melody regarding structure, motifs and harmonic tension prior to notating it. The participants in the control group performed significantly better. Moreover, no association between the precision of analysis and performance in the dictation task was found. It is possible that the difference in performance is due to an attention overload, provoked by the dual task accomplished by the experimental group, which may happen when aural analysis is not a well-practiced strategy. The analytical task could have impacted either the memory encoding phase or it could have interfered with the recent memory. Further research is needed, therefore, in order to explore the impact of trained versus untrained analytical tasks during melodic dictation.

Keywords: aural skills. Melodic dictation. Ear training. Aural analysis. Musical attention.

Resumo: Este estudo aborda o ditado melódico em relação à análise auditiva, investigando o efeito de uma análise auditiva, efetuada antes da realização de um ditado, nos resultados deste. Participaram do estudo 98 graduandos em música que realizaram um ditado melódico. Os participantes foram divididos em um grupo de controle e em um grupo experimental. Os sujeitos da situação experimental foram convidados a responder a algumas perguntas sobre a melodia relacionadas a estrutura, motivos e tensão harmônica, antes de

[1] Esse trabalho foi executado com o apoio financeiro da Fundação de Amparo à Pesquisa do Estado do Amazonas (FAPEAM) e do Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq).

notá-la. Os participantes do grupo de controle tiveram um desempenho significativamente melhor. Além disso, não foi encontrada associação entre a precisão da análise e o desempenho na tarefa de ditado. É possível que a diferença de desempenho se deva a uma sobrecarga da atenção, provocada pela dupla tarefa realizada pelo grupo experimental, o que pode acontecer quando a análise auditiva não é uma estratégia bem praticada. A tarefa analítica pode ter afetado a fase de codificação da memória ou pode ter interferido na memória recente. Pesquisas futuras são, portanto, necessárias para determinar o impacto de atividades analíticas treinadas versus não-treinadas no desempenho em ditado melódico.

Palavras-chave: habilidades auditivas. Ditado melódico. Percepção musical. Análise auditiva. Atenção musical.

* * *

1. Introduction

Melodic dictations usually figure as one of the most practiced activities in Ear Training classes and they usually are employed aiming to develop students' capacity to listen and to comprehend music (Klonoski 2006), or to develop their ability to hear music with understanding and as meaningful patterns (Rogers 2004). All these purposes may be synthesized around the concept of aural analysis, as defined by Telesco (1991, p. 179): "to hear music is to analyze it and to analyze music is to understand it more fully". In other words, aural analysis is being understood here as listening to music in order to comprehend it and to identify its elements and their relationship to the overall structure. Thereby, it seems possible to say that one of the aims of dictation taking is to improve students' capacity to aurally analyze the music they hear. So, it is plausible to suppose that students' development in dictation could be improved if analytical activities were consciously practiced along with musical writing. Examples of analytical activities in this context could include the aural identification of implied harmonies, phrasing, cadences, melodic and/or rhythmic motifs, repetition versus contrast, structural versus ornamental notes. This study approaches melodic dictation in relation to aural analysis.

1.1 Aural Analysis and Instructors' and Students' Practices

Strategies involving aural analysis are usually related to dictation at Ear Training classes. According to a survey conducted by Paney and Buonviri (2017) with 270 college music instructors from the United States, 44% of them advise students, on a first hearing of the music, to direct their attention to broader

aspects (e.g., mode, meter, length, phrases, cadences, repetition, motives, contour, scalar or triadic patterns, etc.) and not solely to rhythmic or melodic questions. Additionally, 82% of those instructors declared to recommend listening before writing dictations. A survey conducted by Buonviri and Paney (2015) with 398 American Advanced Placement Music Theory teachers also observed that 58% of them advised students to listen before writing. We believe that the instructors adopt these strategies to impel students to analyze the music they hear before writing and because it may improve their performance on dictation, due to an improvement in their musical understanding.

Nevertheless, these recommendations are not completely followed by all students. Blix (2013) investigated the strategies employed by 10 students of a music conservatory, while transcribing an excerpt of a piano piece. She observed that they engaged themselves in very few cognitive strategies such as analyzing chords, musical form, rhythmic structure, and scale degrees, applying more frequently compensatory strategies, as "guessing" pitches and rhythms, among other "easy ways to solve the tasks" (Blix 2013, p. 112), as fingering on his or her instrument. Observing groups of 15 and 5 subjects transcribing two-voice excerpts, in two different experiments, Killam et al. (2003) also noticed an absence of harmonic analysis among their participants. They solved the dictation task observing one voice at a time, but they analyzed scale degrees and phrase resolutions. A similar conclusion was achieved by Potter (1990) who observed, among 25 music students, only a few subjects reacting to implied harmonies in the melodic dictations they took.

The subjects of these studies could potentially benefit from employing more analytical strategies and observing broader musical aspects while listening and writing music. At least it is what is done by individuals with a successful performance in dictations and transcriptions. A great part of the 6 undergraduates successful dictation takers observed by Buonviri (2014), for example, directed their attention to broader aspects of the melody, such as phrase repetitions, scale, pitch range, and meter. They also analyzed the excerpts to be written, comparing them with their theoretical knowledge to fix errors or fill the dictation. The professional musician, which was the participant with the best performance among the 9 observed by Caregnato (2016) transcribing a three-voices excerpt, also analyzed vertical aspects of the music to deduce and write the inner and less evident voice of the music. Karpinski (2000) also interviewed

a successful dictation taker after a dictation task, who reported having extracted information from it, such as references to tonic and dominant chords, arpeggiation, scale degree functions as well as parallel phrase structure and motivic sequences. Vargas et al. (2007) also observed 3 music students transcribing melodies and noticed that the one with the best results on the task observed a great number of musical elements, while analyzing the melodies, and employed a great number of visual and kinesthetic strategies. On the other hand, Vargas and Lopes (2008) observed, among their 14 students transcribing melodies, that the subjects with the best performance accomplished more internal or abstract reasoning, not recurring to explicit actions. Menezes (2010) confirmed these findings observing 50 music undergraduates taking dictation. She noticed that the subjects with the best results employed more tonal strategies (related to scale degree identification), and that they exploited better the non-tonal strategies (related to intervals identification). One of us and a colleague (Caregnato; Rauski 2022) also surveyed 236 music students, professional and amateur musicians, investigating their strategies for melodic dictation taking and its results. The participants with the best auto-declared performance on melodic dictations reported they used to observe broader aspects of the music, such as conjunct and disjunct motion, nonharmonic tones, implied harmony, and arpeggiated chords. In sum, successful students seem to analyze various aspects of the music they are intended to write during dictation taking, not solely paying attention to the rhythms and the pitches as isolated unites.

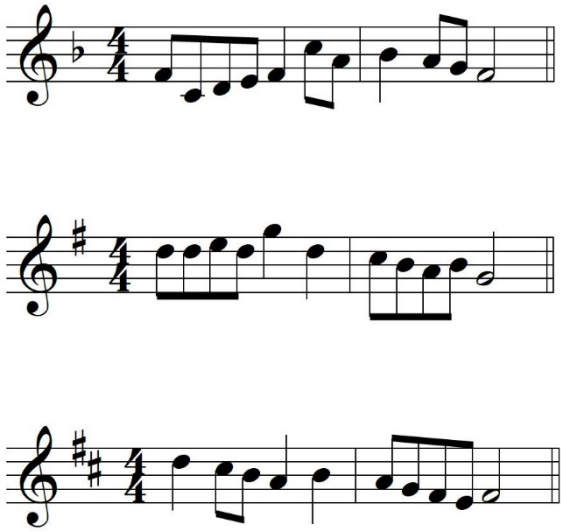
1.2 Strategies Aiming to Improve Students' Performance on Dictation

A series of studies, which may be related to aural analysis, have been conducted exploring strategies for dictation taking. These strategies, usually adopted by students or suggested by instructors, were tested in order to observe their effectiveness. One of these strategies was to write while listening to dictation. Instructors usually do not recommend students to do it, advising listening before writing because it may prevent them from distractions and from not analyzing the music. Buonviri (2017) investigated this strategy and observed if it could compromise individuals' performance. He conducted an experimental study with 54 music undergraduates, who took melodic dictations under three conditions: listening before writing; writing while listening; and without specific

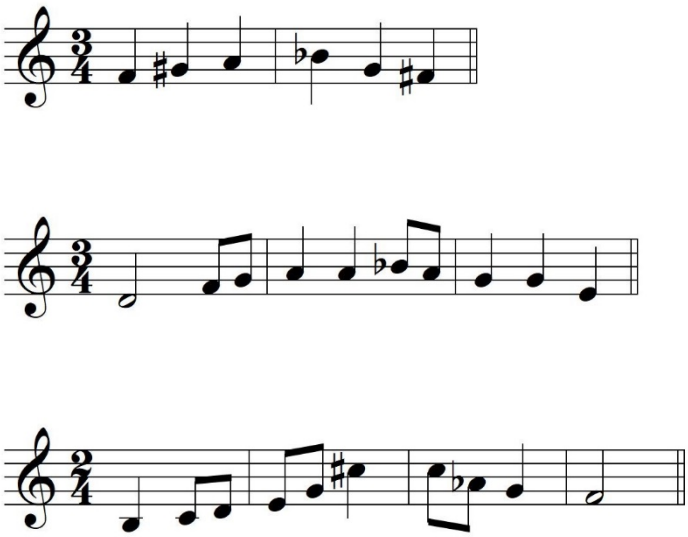
instructions. His results showed no significant difference between these conditions. He even investigated subjects' preferred strategy, comparing individuals' performance on it and on the other strategy. Again, no significant difference was observed.

A different result, however, was found by Pembrook (1986) on an experimental study with 136 music undergraduates, who took melodic dictations writing while listening, writing after listening, or singing the melody of the dictation before writing. Significant better results were found among the participants who wrote while listening, being the worst results observed among those who sang before writing, because they committed mistakes on melody memorization. He also observed that the strategy adopted spontaneously by the majority of the subjects was to write while listening, which may justify the results, since participants performed better under the condition that they were more experienced in and which probably did not compromise their concentration and analysis, due to the practice acquired doing it.

One reason these studies observed disparate results may be found in the features of the melodies that were dictated to the participants. In Buonviri (2017) the length of the melodies were two measures long. All melodies were tonal, starting and ending on degrees that were part of the tonic chord. They consisted of many scalar movements, while the leaps mostly represented arpeggiation of tonic or dominant chords (see Ex. 1). The melodies used in Pembrook (1986), on the other hand, contained 6, 10 or 16 notes, but did not consist of many typical patterns. Half of the melodies used by Pembrook (1986) were atonal, but even the tonal ones started and ended in degrees which did not necessarily express a tonic-dominant relationship. Likewise, they lacked patterns such as triad arpeggiations (see Ex. 2). Therefore, Pembrook's (1986) melodies imposed a higher demand on participant's analysis, because they did not display musical information that was easy to be encoded on traditional patterns. It may explain why the subjects who did not have time to analyze (that is, the ones who wrote while listening) had better results: their notations were not disturbed by a disadvantaged analysis. In summary, these results seem not to definitively overthrow the hypothesis that the analysis contributes to melodic dictation taking.



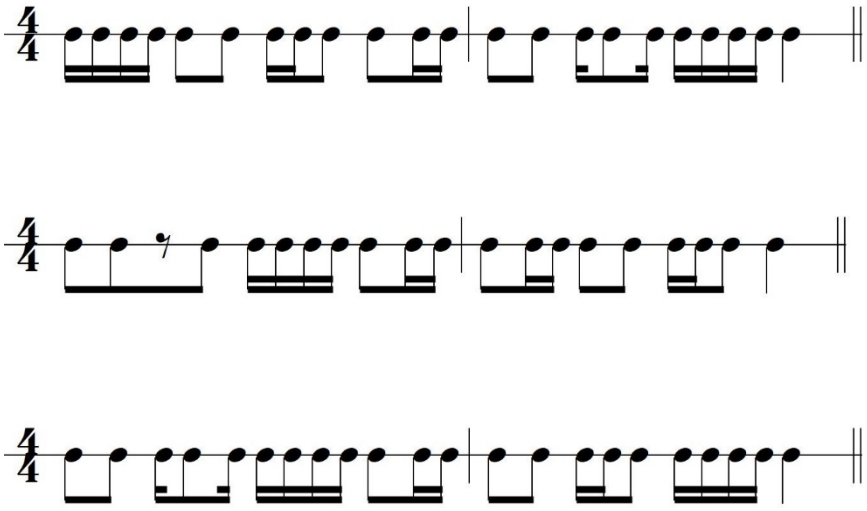
Example 1: Examples of melodic dictation employed by Buonviri (2017)



Example 2: Examples of melodic dictation employed by Pembrook (1986)

Results similar to Pembrook's (1986) were found by Buonviri (2021), this time approaching rhythmic dictation in an experimental study with 54 music undergraduates. They took dictation employing approaches previously learned: writing while listening; listening before writing; and with no specific instruction. The performance of Buonviri's (2021) participants was significantly better when writing while listening. Like in the previous discussion, regarding Pembrook's (1986) melodies, the excerpts used in Buonviri (2021) might have created a high demand on analysis, since besides lacking any kind of tonal context which could assist in the encoding process, the examples did not show any sort of motivic

patterns or repetition. Each beat carried a different rhythmic pattern which did not hold any obvious relationship to previous or following patterns (see Ex. 3). This time, however, most of the participants reported that they tended to listen before writing when approaching dictation without specific instructions. This finding induces us to question the hypothesis that the participants perform best on the condition they are more familiar with or that they prefer the most, because it was not observed this turn. Therefore, considering Buonviri's (2017; 2021) and Pembrook's (1986) studies, we may observe that besides not existing a consensus regarding the commitment that writing while listening could add to subjects' analytical capacity and dictation performance, there is no agreement about the explanation for those researches which found benefits related to writing while listening (Buonviri 2021; Pembrook, 1986). There might be a relationship between the results achieved by subjects on dictation and how successful were their analyzes, but more research is needed to clarify this question.



Example 3: Examples of rhythmic dictation employed by Buonviri (2021)

Another group of studies investigated the strategy of singing related to dictation. Since subjects need to pay attention to sing a melody, we believe that singing may lead individuals to analyze, at least in a certain way, what they hear. Thus, it seems plausible to suppose that singing may improve subjects' performance on dictation. It was indeed observed by one of us and colleagues (Caregnato *et al.* 2023), in an experimental study conducted with 54 music undergraduates. The experimental group, who performed a sight-singing prior to a melodic dictation, had better scores than the control group, who just took

the dictation without any specific instruction. It seems that the sight-singing induced the participants to recognize, on the melody dictated, the melodic patterns that they just sang. Positive results related to singing before writing a dictation, however, were not found on another research. On an experimental study, conducted by Buonviri (2015) with 49 music undergraduates, some participants sang a preparatory pattern before dictation, remained silent before a dictation (as a preparation), or took a dictation without previous time or singing. Participants had a worse performance when singing before the dictation.

Singing a dictated melody, before writing, also harmed the subjects' performance. Buonviri (2019) observed it conducting an experimental study with 44 music undergraduates, who took melodic dictations singing the dictated melody before writing, making audible sounds that could help to accomplish the exercise, and in silence. He observed no significant difference between keeping silent and making voluntary sounds but singing the melody before writing worsened subjects' performance when compared to all the other conditions. Likewise, through an experimental study, Lima, Caregnato and Silva (2021) investigated 68 music undergraduates taking a collective dictation silently or singing spontaneously while writing. Those who sang achieved a considerably lower performance. Similar results were also observed by Pembrook (1987) on an experimental study with 153 music undergraduates, who accomplished exercises of same/different melodies discrimination singing the first melody before listening to the second, or remaining silent before the second melody, or being presented immediately to the second melody. The participants who sang had the worst performance, again, and no difference was found between remaining silent and listening immediately to the repetition of the melody.

According to the last-mentioned studies (Lima; Caregnato; Silva 2021; Buonviri 2015; 2019; Pembrook 1987), it is better to instruct nothing than to instruct students to sing. In synthesis, singing seems to distract subjects, possibly causing a commitment on the analysis accomplished with the vocalization. However, the accuracy of the melody sung also needs to be considered, because inaccurate singing may lead to an imprecise analysis and, consequently, to an incorrect writing. Lima, Caregnato and Silva (2021), Buonviri (2019) and Pembrook (1987) reported inaccurate singing among their participants. Buonviri (2015) did not evaluate their participants singing proficiency. Thus, the poor performance on dictation, observed by the mentioned studies, may be explained

by an imprecise singing and not, necessarily, to the absence of contributions related to the vocalization. This observation may also be endorsed by the positive results found by Caregnato *et al.* (2023). We conducted a collective sight-singing prior to the dictation, in which more skilled participants supported their classmates to reach a correct version of the melody, while singing it. Consequently, with an accurate singing, participants of the experimental group built well-formed mental references, thus being more able to analyze and to write what they heard than their peers of the control group. In summary, singing seems to contribute to dictation taking if it offers correct references for the analysis.

1.3 Inducing Students to Pay Attention to What They Hear

The studies mentioned previously brought unexpected results, but they were not approaching aural analysis, specifically. This matter was somehow investigated by Beckett (1997) and Paney (2016), who induced groups of students to pay attention to some musical aspects while taking dictations. Beckett (1997) studied 60 Ear Training students taking two-part dictations under these conditions: paying attention to the rhythm and writing it first; paying attention and writing first the pitches; and writing pitches and rhythms in the order they preferred. She was interested in knowing if paying attention to or, in other words, analyzing rhythm or pitch could lead participants to have better results in these aspects. Her results, however, showed that individuals' performance was lower when attending to the pitches, but paying attention to the rhythm increased their achievements in rhythmic writing. One possible explanation is related to their preferred private nondirected strategies, since most of the participants (63.3%) preferred to listen to one line at a time, and only 21.6% used to adopt approaches like those directed-attention strategies used in the study. Additionally, Beckett (1997) asked the subjects what they believed to be an efficient approach to take two-part dictations. They said it was better to pay attention or to analyze broader aspects of the melody, such as harmonic progressions, motivic entries, and imitations, but the efficiency of this strategy remained to be explored by future studies.

Paney (2016), in turn, found similar results on an experimental study with 64 music undergraduates. His participants were divided into two groups: a

control one, who took melodic dictation without specific instructions, and a treatment one, who received instructions before listening to the music about which aspects they should observe. These subjects were oriented to count beats per measure on a first hearing, to find the tonic and if the key was major or minor on a second hearing, to sing the first pitches of the melody after a third hearing, and to sing the last pitches on a final hearing. The control group achieved better results because, according to the author, the procedures adopted with the treatment group should be practiced in advance to be effective, or an easier way of replying to the questions should be offered. Furthermore, the instructions to the treatment group were recorded with a short time for writing, interrupting participants' responses. Paney (2016) also does not say if the subjects in the treatment condition replied correctly to the questions, so future studies could explore this and the other questions that remained from this research.

1.4 Purpose of the Present Study

Considering the relevance of integrating analysis to Ear Training and to the dictation (Klonoski 2006; Rogers 2004; Telesco 1991), this paper investigates the effect of aural analysis over melodic dictation. More specifically, we addressed the question: what is the effect of an aural analysis, accomplished before dictation taking, on its results?

Previous studies showed that aural analysis may not bring benefits to subjects' performance on dictation. However, we hypothesized that contributions could be found by adopting procedures different than those employed previously. That is, by conducting the participants to analyze broader aspects of the melody, such as harmonic progressions, motivic entries, and imitations (as suggested by Beckett 1997); by offering an easier way of replying to the analytical questions (as suggested by Paney 2016), by giving more time for writing, and by simulating an Ear Training class. Adopting these procedures, we tried to promote conditions for subjects to achieve success on analysis, since we believe that failures on dictation taking, observed by previous studies (Beckett 1997; Paney 2016), could be related to failures on analysis. In other words, we investigated the hypothesis that students' achievements on dictation are related to their achievements on analyzing what they hear.

2. Method

2.1 Participants

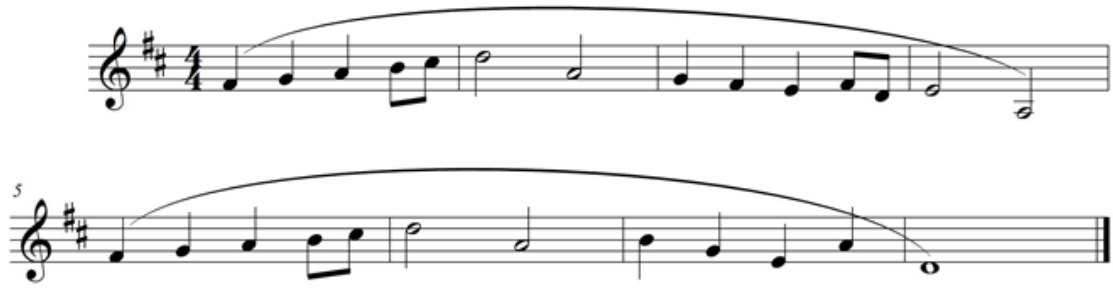
This research counted on the participation of 98 music undergraduates, from two universities situated in Brazil – University 1 (U1) (72.45%) and University 2 (U2) (27.55%). During the research, the subjects were enrolled in Ear Training classes conducted by the authors of this paper. Among the participants, 51% were bachelor students in music performance or composition and 49% belonged to music education certification degree. Their age was 25 years old on average, with ages ranging from 17 to 57. Their time of study in music was 8 years on average and it ranged from half a year to 30 years. They were studying or playing guitar (22.5%), singing (9.2%), violin (9.2%), piano (8.2%), flute (7.1%), electric guitar (7.1%), trumpet (7.1%), percussion (5.1%), battery (4.1%), clarinet (3.1%), double bass (3.1%), saxophone (2 %), keyboard (2 %), trombone (2 %), horn (2 %), bass guitar (1%), recorder (1%), tuba (1%), viola (1%), cello (1%) and conducting (1%). All subjects enrolled in the research were informed about the study to be accomplished and signed a consent. They received no financial advantage or benefits for their participation.

2.2 Procedures

We accomplished an experimental study with a between-group design. The participants were randomized into two groups, being 48 (n = 34 U1; n = 14 U2) of them allocated into the control group and 50 (n = 37 U1; n = 13 U2) into the experimental one. Groups with unequal quantities were obtained because the randomization was accomplished inside the classes attended by the participants at their universities, and in those with an odd number of subjects, the biggest group was defined by raffle. The participants had no access to the activities accomplished by the group which they did not belong to, and data were collected collectively on experimental and control groups, trying to keep the research ambient as close as possible to a conventional Ear Training class.

Participants in the control group started the experiment by receiving an answer sheet containing an area for personal information and another for taking a melodic dictation. This should be written on a staff divided into eight blank measures, containing a treble clef, D major key signature, 4/4 time signature, and

an F♯4 quarter note at the beginning of the first measure. The melody employed (Ex. 4) consisted of an excerpt of Ludwig van Beethoven's Violin Concerto in D major op. 61, first movement, and it was extracted from Kraft's (1967) manual for Ear Training. Seeking ecological validity, the dictation was played live on the piano, in a tempo judged as comfortable by the instructors of the participants, ranging from 80 to 85 bpm (the performances were not preceded or accompanied by a metronome. The tempos were measured during analysis). Since differences in tempo were minimal, and happened on the control and experimental groups, we believe they did not impact the results.



Example 4: Melodic dictation employed during the study

The control group was informed that they were going to take a dictation written in D major. After this, they listened to a D major scale and an arpeggiation of the tonic triad. These were played on the piano and simultaneously sang by the participants. The melody in Ex. 4 was played twice, with silence between each performance lasting a time equivalent to that of the melody. After the second hearing, participants had 6 minutes to write the melody in silence. We offered this interval trying to provide sufficient time specially for the experimental group, which had also to analyze the melody during this period. The professors of the participants usually granted them 3 minutes for writing dictations during tests. Given the extra task the experimental group was going to receive, we decided to double this amount. Ending the dictation, the melody was played a third time and the participants had 2 extra minutes to finish the dictation. In total, the participants had 8 minutes only for writing the melody.

The experimental group received an answer sheet like that of the control group, but with a questionnaire added to it that aimed at conducting subjects to analyze the melody of the dictation. We requested their responses in textual form, trying to simplify participants' replies (as suggested in Paney, 2016), and

the questions approached broader aspects of the music (as proposed in Beckett, 1997):

1) How many phrases do you hear in the melody? (open-ended response)
2) What is the length of each phrase? (open-ended response)
3) Are there motives or small musical ideas that are repeated within the melody? (answer options: "yes" and "no") If yes, where are the repetitions? (open-ended response)
4) Have you identified points of tension and harmonic relaxation? (answer options: "yes" and "no") If yes, where are the harmonic tensions? (open-ended response) And the relaxations? (open-ended response)

The participants of the experimental group were instructed to reply to these questions before starting to write the melody. After receiving the orientations, the subjects followed the same procedures adopted by the control group. That is, experimental and control groups listened and sang the scale and the arpeggiation of D major, and heard the dictation three times, observing the same time between each repetition.

Following the method employed by Paney (2016), the dictations were scored granting one point for each pitch (up to a maximum of 25) and each rhythm (up to 25) written accordingly. Besides, to consider partially correct answers, we followed a method employed by us previously (Lima, Caregnato, Silva, 2021; Caregnato et al., 2023): we granted one point for each note written with the correct pitch even when on a wrong beat (up to 25 points), one point for each pair of consecutive notes which formed conjunct motions (up to 16 points) or disjunct motions (up to 9 points) accordingly, and one point for each pair of notes written on the expected direction (up to 25 points), even if the interval was not correct. We also granted one point for each interval written correctly, even when transposed (e.g., major and minor thirds were considered as equivalent) (up to 25 points). The maximum score possible to be obtained was 150 points.

As the questionnaire answered by the experimental group had as its aims to promote the analysis of phraseological aspects of the music dictated and to stimulate the recognition of repetitions and implied harmony, we corrected their responses verifying if they had understood these three questions. Thus, the replies for questions 1 and 2 were considered together to define if participants

had recognized the existence of phrases. Answers pointing that the excerpt had 4 phrases with 2 measures, or 2 phrases with 4 measures were considered right. We considered as an absence of recognition answers totally or partially in blank, vague, mentioning the existence of 3 or 8 phrases, or resulting in a number of measures larger than the melody. Answers to question 3 were used to define if participants had recognized the motivic repetition in the music. We considered as an absence of recognition answers that were in blank, incomplete, vague, or not recognizing the repetition of measures 1 and 2 in measures 5 and 6. Answers to question 4 were used to observe the recognition of implied harmony. We considered as an absence of recognition answers that were in blank, incomplete, vague, or that did not fit into any of the traditional harmonization possibilities for the excerpt.

The dictations were also scored a second way, employing categories similar to those used during the evaluation of the answers to the questionnaire. We verified subjects' recognition of the repetition of measures 1 and 2 in measures 5 and 6, considering as correct dictations containing pitches that were present in the same way at the beginning of the two phrases of the melody (even if written incorrectly. We observed only the repetition of a pattern). Finally, we analyzed a possible recognition of the implied harmony, observing if the dictations included pitches compatible with a dominant chord on the fourth measure (i.e., if the participants had recognized the existence of an implied half cadence at the end of the first phrase), and also if they incorporated pitches compatible with dominant and tonic chords at the end of the second phrase (suggesting a perfect cadence, as observed in Beethoven's concerto, at the end of the first appearance of the theme used in this research). The dictations were organized into three categories regarding the recognition of these harmonic questions: integral (when pitches were written accordingly at the end of both phrases), partial (when pitches were written accordingly at the end of only one phrase), and null.

3. Results

Participants of the control group obtained scores on the dictation ranging from 15 to 150, a mean of 101.13 points (*SD* = 39.42), and median of 109.5, with a 95% *CI* [89.68; 112.57]. The participants of the experimental group had a worse

performance, with scores ranging from 6 to 150, a mean of 80.18 points (*SD* = 41,01), and median of 81.5, with 95% *CI* [68.53; 91.83]. The great variation in scores of both groups may be explained by the different amount of previous study in music that the participants had (as exposed earlier, it ranged from half a year to 30 years). Since the data showed an asymmetric distribution, we applied the Mann-Whitney test that pointed to the existence of a significant difference between the performance of both groups, U (z = -2.68, n = 98) = 823.50, p = 0.007.

Regarding the answers to the questionnaire, filled by the experimental group (n = 50) and presenting the results of subjects' aural analysis of the dictation, 76% of the participants demonstrated to recognize the existence of phrases. Also, 50% recognized melodic repetition. Finally, 23.7% demonstrated integral recognition of implied harmony, 21% partially recognized it, and 55.3% demonstrated null recognition.

As previously explained, in addition to being scored, dictations of the experimental group were also categorized according to a second method of analysis. The results of this analysis revealed that 60% of the participants wrote a melodic repetition at the beginning of the second phrase. Regarding the recognition of implied harmony at the end of both phrases, 60% of the participants demonstrated null perception, 22% a partial recognition, and only 18% recognized it completely.

We compared the results of the experimental group obtained on the dictation with those similar observations obtained on the questionnaire. Tables 1 and 2 present these relations. Regarding the relation between subjects' capacity to recognize repetitions during analysis and to write them, despite the differences observed on Table 1, a Pearson's chi-squared test pointed to a non-significant association, $X2$ (1, N = 50) = 0.33, p = 0.56. In other words, it seems that the capacity to identify repetitions during analysis is not necessarily associated to the success on this matter, during dictation taking. A Fisher's exact test was used to observe the relation, presented on Table 2, between recognition of implied harmony on the questionnaire and the presence of this aspect on the dictation. Again, no significant association was observed, p = 0,18. Therefore, it seems that to not identify implied harmony during the analysis (which was the most observed response) is an action that is not associated with the performance in the dictation.

	Repetition/Analysis		
Repetition/ Dictation	No	Yes	**Total**
No	11 55% 44%	9 45% 36%	20 100% **40%**
Yes	14 46.7% 56%	16 53.3% 64%	30 100% **60%**
Total	25 **50%** 100%	25 **50%** 100%	50 100% 100%

Table 1: Relation between recognition of repetitions during analysis and during dictation

	Implied harmony/ Analysis		
Implied harmony/ Dictation	No	Yes	**Total**
Null	17 81% 54.8%	4 19% 57.1%	21 100% **55.3%**
Partial	7 87.5% 22.5%	1 12.5% 14.3%	8 100% **21%**
Integral	7 77.8% 22.5%	2 22.2% 28.6%	9 100% **23.7%**
Total	31 **81.6%** 100%	7 **18.4%** 100%	38 100% 100%

Table 2: Relation between recognition of implied harmony during analysis and during dictation

4. Discussion

The question investigated here was: what is the effect of an aural analysis, accomplished before dictation taking, on its results? We tried to answer this by modifying procedures employed by previous studies (Beckett 1997; Paney 2016), which did not find positive effects of analysis related to dictation. Thus, we conducted the following strategies aiming to promote subjects' analysis: we invited participants to observe broader aspects of the melody, offered an easier way of replying to the analytical questions, provided more time for writing, and presented the dictation in conditions similar to those of participants' Ear Training classes, seeking ecological validity. Despite that, our statistics led us to the same conclusions of other authors: the experimental group, which aurally analyzed the dictation, had a significantly lower performance than the control group, which took dictation without previous preparation.

Initially, we hypothesized that students' achievements on dictation were directly related to their achievements on analyzing what they hear. That is, we hypothesized that the participants' poor results on dictation taking could be explained by a deficient analysis. Our statistics, however, found no significant association between subjects' results on analysis and dictation, leading us to reject our initial hypothesis of explanation. For example, less than half of our subjects recognized the implied harmony during analysis (23.7% demonstrated integral recognition and 21% partially recognized it). Also, less than half of them wrote a melody compatible with any implied harmony (18% showed complete recognition and 22% showed a partial recognition). Despite the similarity of the results achieved by the participants on the analysis and on the dictation, the statistical tests employed did not allow us to say that the dictation and the analysis are related or, in other words, that the inferior performance on dictation taking may be explained by a poor musical analysis.

It is important to notice, however, that we reached these conclusions by counting with a small sample, composed of 50 participants, pertaining to the experimental group. This small number led us to employ less sensitive statistical tests (the Pearson's chi-squared test and the Fisher's exact test). Different results could be found with a bigger sample. Thus, the initial hypothesis (that students' achievements in the dictation are related to their achievements on the analysis) cannot be completely discarded and could be better explored on future studies, with more participants.

Another possibility to explain the inferior performance of the experimental group is that they did not have enough time to analyze and to write the dictation. But we think that this explanation should be discarded, since we offered 8 minutes for silent writing, and that this time was bigger than that employed on other studies with comparable results. Paney's (2016) participants, for example, received only 30 seconds for silent writing, after each one of the four repetitions of an 8 measures excerpts, and Pembrook's (1986) subjects received no more than 2 minutes for writing 6 measures melodies, played once. Buonviri's studies (2015; 2019) were accomplished with only one presentation of each melody to be written and a time of 45 seconds for writing each of them. Since a greater number of repetitions may improve participants' performance (Cornelius; Brown 2020; Pembrook 1986), our subjects heard the dictation 3 times. Karpinski (2000) has also proposed a formula that would estimate the optimal number of times students should listen to the melody in a dictation task: P=(Ch/L)+1, where P is the number of repetitions, Ch is the amount of chunks in the melody, and L is the working memory limit in chunks. However, this formula has little practical application since both Ch and L are difficult to evaluate and are case-dependent. Karpinski (2007) himself recommends that the melodies in his "Manual for Ear Training and Sight Singing" should be played three times, with one to two minutes between each exposure. The time between listenings in our study was significantly larger. Thus, we believe that more time for writing by itself would not lead the participants to a better performance. Paney's (2010) findings also seem to support our argumentation, since his participants with worse results on a melodic dictation spent more time on writing, leading him to defend that "allowing unlimited time may not be helpful in increasing success" (Paney 2010, p. 28). Anyway, future research could examine the influence of time for writing and also of the number of repetitions on aural analysis, aiming to observe if there is an optimal combination of these factors in which the performance of subjects is better.

Nevertheless, we believe that other possible explanations could be found, but this time observing subjects' cognition. We believe that their attention may have been overloaded and that their memory may have been impaired while analyzing, because participants were not used to practice analysis in the way proposed here. The participants enrolled in this research were used to discussing musical aspects such as phrases repetitions, harmonic tensions and relaxations,

while dictation taking at their Ear Training classes. But these discussions were always accomplished with the entire class, orally and guided by the professor. That is, they were not used to answering to an individual written questionnaire before writing their dictations. When a new skill is being learnt, Styles (2006, p. 209) defends that "attention needs to be directed to the component processes of the task, but as the skill becomes proceduralised, less and less attention should not be needed for the step-by-step execution of the task". It is possible that if the subjects had extensively practiced individual written analysis before notation and had internalized the procedures (or rules) of such task, they could achieve better performance, for "in the novice, the rules are held in the working memory, but in the expert these rules have become more proceduralised, or automatic, and therefore make little demand on attention or working memory" (Styles 2006, p. 209).

Thus, it may be the case that the participants of our study have not had enough of written analyzes integrated with dictation tasks during their Ear Training classes. Therefore, even though it is logical to conceive a relationship between analytical task and melodic understanding, it is possible that employing an unpracticed strategy may have harmed the initial stages of the process of hearing the melody, by interfering in the student's attention. In other words, the analytical task may be overloading the attentional capacity of the students in the experimental group, depriving them of a full attention that the students in the control group enjoyed, which could ensure a more robust memory encoding. It is, thus, reasonable to assume that it was not the aural analysis itself that caused the worse performance of the experimental group, but the fact that it was a new or unpracticed task.

Our findings suggest, in other words, that it is not sufficient to simply change data collection procedures trying to improve subjects' analyses. Translating it into pedagogical terms, it is not enough to change our evaluation procedures. It seems necessary to promote pedagogical changes, related to Ear Training teaching, to increase students' involvement with individual and written analysis, performed during dictation taking. Future research could explore the effects that training this kind of analysis, in advance and during several classes, could have on participants' dictation.

Lastly, on the questionnaire presented to the experimental group, some questions may have overloaded the participant's attention more intensely. That

is the case, for example, of question number 4, regarding harmonic tensions and relaxations. On the fourth measure of the melody we may observe harmonic tension, due to an implied dominant. This information, however, conflates with both the less rhythmic activity and the descending melodic contour, found on this measure, since they suggest a relaxation. To find the harmonic tension on this point means to pay attention only to the harmonic information and to disregard the information offered by the rhythm and the melodic contour. It means that the participants of our study may have had their attention challenged more intensely by some questions. In other words, this observation suggests that different analytical questions could raise different levels of attention overload. Thus, future studies could test the influence of different kinds of analytical questions (e.g., more or less ambiguous questions, open-ended versus closed-ended questions) on the subject's attentional overload.

In synthesis, this paper explored methodological questions suggested for future research by Beckett (1997) and Paney (2016) achieving, however, similar results: to analyze musical aspects while dictation taking is an action that damages individuals' performance. We observed that it does not happen due to mistakes committed during the analysis and we suggest that it is also not due to a lack of time for writing. We advocate, on the other hand, that unpracticed actions, such as the one employed by the participants of this research, may have overloaded individuals' attention, damaging their memorization and, consequently, their performance on a melodic dictation. This final hypothesis remains to be better explored by future studies. It does not mean, however, that the aural analysis should be admonished or excluded from Ear Training classes. On the contrary, it should be practiced more frequently, not only verbally, but in written form. Thus, the analysis could become a usual activity, one that does not lead to cognitive overload, and the analytical exercises could help Ear Training classes to achieve its purpose of expanding students' ability to understand music.

References

1. Beckett, C. A. 1997. Directing student attention during two-part dictation. *Journal of Research in Music Education*, v. 45, n. 4, p. 613–625. <https://doi.org/10.2307/3345426>.

2. Blix, H. S. 2013. Learning strategies in ear training. In Reitan, I. E.; Bergby, A. K.; Jakhelln, V. C.; Shetelig, G.; Øye, I. F. (Eds.). *Aural perspectives on musical learning and practice in higher music education*, p. 97–115. Oslo: NMH-publikasjoner. Available at <https://nmh.brage.unit.no/nmh-xmlui/bitstream/handle/11250/227769/Aural_Perspectives_2013.pdf?sequence=1&isAllowed=y>.

3. Buonviri, N. O. 2014. An exploration of undergraduate music majors' melodic dictation strategies. *Update: Applications of Research in Music Education*, v. *33*, n. 1, p. 21–30. < http://doi:10.1177/8755123314521036>.

4. _____. 2015. Effects of a preparatory singing pattern on melodic dictation success. *Journal of Research in Music Education*, v. *63*, n. 1, p. 102–113. <https://doi.org/10.1177/0022429415570754>.

5. _____. O. 2017. Effects of two listening strategies for melodic dictation. *Journal of Research in Music Education*, v. *65*, n. 3, p. 347–359. <https://doi.org/10.1177/0022429417728925>.

6. _____. 2019. Effects of silence, sound, and singing on melodic dictation accuracy. *Journal of Research in Music Education*, v. 66, n. 4, p. 365–374. <https://doi.org/10.1177/0022429418801333>.

7. _____. 2021. Effects of two approaches to rhythmic dictation. *Journal of Research in Music Education*, v. *68*, n. 4, p. 469-481. <https://doi.org/10.1177/0022429420946308>.

8. Buonviri, N. O.; Paney, A. S. 2015. Melodic dictation instruction: A survey of advanced placement music theory teachers. *Journal of Research in Music Education*, v. *63*, n. 2, p. 224–237. https://doi.org/10.1177/0022429415584141.

9. Caregnato, C. 2016. *O desenvolvimento da competência de notar músicas ouvidas: Um estudo fundamentado na teoria de Piaget visando à construção de contribuições à atividade docente* [The development of the competence to notate heard music: A study grounded in Piaget's theory aiming contributions to pedagogical activity] (Doctoral dissertation). UNICAMP. Available at <http://repositorio.unicamp.br/jspui/handle/REPOSIP/304769>.

10. Caregnato, C.; Rauski, R. 2022. A realização de ditados melódicos em Percepção Musical: um levantamento de estratégias usadas no Brasil. *Música Hodie*, v. 22, p. 1–34. Available at <https://revistas.ufg.br/musica/article/view/70051>.

11. Caregnato, C.; Silva, R., Otutumi, C. H. V.; Rocha, L. J. S. 2023. The effect of collective sight-singing before melodic dictation: A pilot study. *International*

Journal of Music Education, online first. <https://doi.org/10.1177/02557614231152306>.

12. Cornelius, N.; Brown, J. L. 2020. The interaction of repetition and difficulty for working memory in melodic dictation tasks. *Research Studies in Music Education*, v. 42, n. 3, p. 293-309. <http://doi:10.1177/1321103X18821194>.
13. Karpinski, G. S. 2000. *Aural skills acquisition: The development of listening, reading, and performing skills in college-level musicians*. Oxford: Oxford University Press.
14. _____. 2007. *Instructor's Dictation Manual to Accompany the Manual for Ear Training and Sight-Singing*. New York: W. W. Norton.
15. Killam, R. N.; Baczewski, P. C.; Hayslip Jr, B. 2003. A model of performing musicians' melodic perception through transcription of two-voice contrapuntal music. *Musicae Scientiae*, v. *7*, n. 2, p. 263–291. <https://doi.org/10.1177/102986490300700204>.
16. Klonoski, E. 2006. Improving dictation as an aural-skills instructional tool. *Music Educators Journal*, v. *93*, p. 54–59. <https://doi.org/10.1177/002743210609300124>.
17. Kraft, L. 1967. *A new approach to ear training*. New York: W. W. Norton & Company.
18. Lima, F. G. B., Caregnato, C., & Silva, R. da. 2021. The singing effect during melodic dictation. *International Journal of Music Education*, v. 39, n. 4, p. 438–449. <https://doi.org/10.1177/0255761421989114>.
19. Menezes, R. C. 2010. *Les stratégies cognitives utilisées lors de la transcription musicale et des facteurs cognitifs pouvant influencer leur résultat* [Cognitive strategies used during musical transcription and cognitive factors that can influence their outcome] (Master thesis). Université Laval. Available at <https://corpus.ulaval.ca/jspui/handle/20.500.11794/22124>.
20. Paney, A. 2010. Dictation strategies of first-year university of music students. *Missouri Journal of Research in Music Education*, v. *47*, n. 1, p. 23–30. <https://www.researchgate.net/publication/299438333_Dictation_Strategies_of_First-Year_University_of_Music_Students>.
21. _____. 2016. The effect of directing attention on melodic dictation testing. *Psychology of Music*, v. 44, n. 1, p. 15–24. <http://doi:10.1177/0305735614547409>.

22. Paney, A. S.; Buonviri, N. O. 2017. Developing melodic dictation pedagogy: A survey of college theory instructors. *Update: Applications of Research in Music Education*, v. *36*, n. 1, p. 51–58. <https://doi.org/10.1177/8755123316686815>.

23. Pembrook, R. G. 1986. Interference of the transcription process and other selected variables on perception and memory during melodic dictation. *Journal of Research in Music Education*, v. *34*, n. 4, p. 238–261. <http://doi:10.2307/3345259>.

24. _____. 1987. The effect of vocalization on melodic memory conservation. *Journal of Research in Music Education*, v. 35, n. 3, p. 155–169. <https://doi.org/10.2307/3344958>.

25. Potter, G. 1990. Identifying successful dictation strategies. *Journal of Music Theory Pedagogy*, v. *4*, n. 1, p. 63–71. <https://digitalcollections.lipscomb.edu/jmtp/vol4/iss1/3/>.

26. Rogers, M. R. 2004. *Teaching approaches in music theory: An overview of pedagogical philosophies*. Carbondale: Southern Illinois University Press.

27. Styles, E. A. 2006. *The Psychology of Attention*. London: Psychology Press.

28. Telesco, P. 1991. Contextual ear training. *Journal of Music Theory Pedagogy*, v. *5*, p. 179–190. Available at <https://drive.google.com/file/d/1osQaCtEZoyl7avfK_ZUmyvZ__c438Iwo/view>.

29. Vargas, G.; López, I. 2008. Las acciones explícitas que acompañan el proceso de transcripción de melodías [The explicit actions that accompany the process of melodies transcription] [Paper presentation]. *VII Reunión de la Sociedad Argentina para las Ciencias Cognitivas de la Música: Objetividad - Subjetividad y Música*, Rosario. SACCOM. Available at <http://www.saccom.org.ar/2008_reunion7/actas/37.Vargas_Lopez.pdf>.

30. Vargas, G.; López, I.; Shifres, F. 2007. Modalidades en las estrategias de la transcripción melódica [Modalities in melodic transcription strategies] [Paper presentation]. *VI Reunión de la Sociedad Argentina para las Ciencias Cognitivas de la Música: Música y Bienestar Humano*, Entre Ríos. SACCOM. Available at <http://www.saccom.org.ar/2007_reunion6/actas/08VargasLopezyShifres.pdf>.