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ARTÍCULOS

To dictate melodies in a full or fragmented way: Which one benefits the students' performance? Exploratory analysis

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ENG **Abstract:** Melodic dictation is an essential activity that is assiduously carried out in Music Theory classes. The objective of the present study was to compare the students' performance when transcribing two melodies that were dictated either in a full or fragmented way. An exploratory analysis with a quasi-experimental design was tackled. The study sample was composed of 60 first-cycle students of professional grade in Music (distributed in two groups), with an average age of 13.8 years old (SD = 1.7 years old). The durations, pitches and intervals of the transcribed melodies were analyzed. The results pointed out: (1) the nonexistence of statistically-significant differences between melodies when they were dictated in a full or fragmented way (both considering the combination of the three analyzed parameters and for each of them separately), (2) the performance decay during the course of the melodies, regardless of how they were dictated (both considering the combination of the three analyzed parameters and for each of them separately), and (3) the existence of statistically-significant differences in favor of the first of the two fragments in the melodies when they were fully (except for the durations of one of the two melodies) and fragmentarily (only for the intervals of one of the two melodies) dictated. In front of two similar melodies, both procedures led to similar performances; displaying in all cases a decreasing evolution of the performance during the transcriptions. It can be extracted that it is advisable to provide the students with appropriate strategies depending on the observed difficulties when carrying out a melodic dictation. The fact of having appropriate strategies could probably enable students to improve their attention focus, their attitude and their motivation, thus obtaining a benefit when transcribing the dictated melodies and, consequently, developing their aural skills.
Keywords: Melodic dictation; Aural Skills; Pitches; Melodic Intervals; Music Theory; Music Education.

ES Dictar melodías de forma completa o fragmentada: ¿Cuál de ellas beneficia el rendimiento del alumnado? Análisis exploratorio

ES **Resumen:** El dictado melódico es una actividad esencial que se realiza asiduamente en las clases de lenguaje musical. El objetivo del presente estudio fue comparar el rendimiento del alumnado al transcribir dos melodías dictadas de manera completa y fragmentada. Se realizó un estudio exploratorio con diseño cuasi-experimental. La muestra de estudio estaba formada por 60 estudiantes de primer ciclo de grado profesional de música (distribuidos en dos grupos), cuya media de edad era de 13,8 años (DE = 1,7 años). Se analizaron las duraciones, las alturas y los intervalos de las melodías transcritas. Los resultados indicaron: (1) la inexistencia de diferencias estadísticamente significativas entre las melodías dictadas de manera completa y fragmentada (tanto en el conjunto de los tres parámetros analizados como en cada uno de ellos por separado), (2) el decrecimiento del rendimiento durante las melodías independientemente de cómo se dictaron (tanto en el conjunto de los tres parámetros analizados como en cada uno de ellos por separado) y (3) la existencia de diferencias estadísticamente significativas a favor del primero de los dos fragmentos en las melodías dictadas completas (excepto en las duraciones de una de las dos melodías), y fragmentadas (únicamente en los intervalos de una de las dos melodías). Ante melodías de características parecidas, ambos procedimientos presentaron una eficacia similar, detectándose en todos los casos una evolución decreciente del rendimiento durante las transcripciones. De los resultados obtenidos se desprende que es recomendable proporcionar al alumnado estrategias adecuadas en función de las dificultades observadas al

realizar un dictado melódico. El hecho de disponer de unas estrategias apropiadas, probablemente permitiría al alumnado mejorar su foco de atención, su actitud y su motivación beneficiándose así la transcripción de las melodías dictadas y, consecuentemente, el desarrollo de sus habilidades auditivas.
Palabras clave: Dictado Melódico; Habilidades Auditivas; Alturas; Intervalos Melódicos; Lenguaje Musical; Educación Musical.

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1. Introduction

Melodic dictation is an activity that involves transcribing a melody while listening to it, usually for a limited time and number of repetitions. This activity is regularly performed in Music Theory classes at elementary and professional levels of music education. Various authors highlight its importance, noting that it is the best indicator of students' overall musical development (Foulkes-Levy, 1997) and that it also contributes to the development of skills that play an essential role in music education (Buonviri, 2014; Karpinski, 1990; Paney & Buonviri, 2017), such as listening, memory, and music comprehension (Karpinski, 2000; Klonoski, 2006; Rogers, 2004), inner musical hearing (Klonoski, 2006; Rogers, 2004), and the assessment of cognitive transfer capacities between aural and visual domains (Buonviri, 2014). However, other authors question whether this activity achieves the desired effect (Hedges, 1999; Klonoski, 2006), since it actually only evaluates the transcription of heard durations and pitches, and not the true musical understanding of the students (Klonoski, 2006; Rogers, 2004). Baker (2019) points out that, despite the frequent presence of melodic dictation in the Music Theory curricula, research on how students learn when carrying out the melodic dictation is limited. Moreover, the author adds, despite the research studies in the fields of music theory, cognitive psychology and music education, there is still no clear understanding of what truly contributes to the process of learning a melody.

1.1. The melodic dictation: a complex musical activity

In general terms, the melodic dictation is a complex musical activity (Buonviri, 2015a; Foulkes-Levy, 1997; Karpinski, 1990, 2000) both for the students (Andreu et al., 2021; Paney & Buonviri, 2014; Ponsatí et al. 2022) and for teachers (Buonviri & Paney, 2015; Paney & Buonviri, 2014) as highly-developed perceptive and cognitive skills are required, as well as their coordination (Foulkes-Levy, 1997; Karpinski, 2000; Klonoski, 2006). In this regard, Karpinski (1990, 2000) distinguishes four consecutive stages in the process of the melodic dictation: hearing (reception of the sounds and attention of the listener), short-term memory (extractive listening of the information [selective remember and identification of specific musical events] and fragmentation of the information [re-encoding of small units into larger units]), understanding (application of the learnt theoretical knowledge) and notation (transcription of durations and pitches on the stave). In addition to estimating such four stages, Baker (2019) points out the need of considering individual (cognitive and environmental) and musical (structural and experimental) factors because, despite in a hidden manner, they can considerably influence during the process of the dictation. For instance, some of such factors are: (1) cognitive: the capacity of the working memory (Cowan, 2010, 2014); (2) environmental: the employed strategies (Buonviri, 2014, 2017, 2019; Cruz de Menezes, 2010; Dowling, 1986; Lake, 1993; Paney, 2016; Pembrook, 1986; Potter, 1990); (3) structural: the standardization of the musical content of the aural tests (Paney & Buonviri, 2014) and (4) experimental: the number of plays of the dictated melody (Cornelius & Brown, 2020; Hofstetter, 1981; Pembrook, 1986). Baker (2019) highlights the importance of understanding the factors that contribute to the capacity of an individual when performing a melodic dictation, not only to guarantee the equity in the assessment of the students' work, but also to let teachers focus on the improvement of the students' aural skills. Furthermore, everything could act against the anxiety that, according to Balo et al. (2015), activities related to aural education usually generate.

1.2. Evolution of the performance of the listeners during the transcriptions

On the one hand, previous studies conclude that the performance is higher for durations than for pitches (Beckett, 1997; Cornelius & Brown, 2020; Hoppe, 1991; Pembrook, 1986; Ponsatí et al., 2022) and intervals (Pembrook, 1986; Ponsatí et al., 2022), thus committing less mistakes on ascending than descending intervals (Hoppe, 1991; Ponsatí et al., 2022) and less for steps than leaps (Hoppe, 1991; Pembrook, 1986; Ponsatí et al., 2022). On the other hand, studies show that the performance does not keep constant during the transcriptions. When examining the strategies employed by 75 college students and professional musicians, Hoppe (1991) detected that the scores tended to decrease when the dictated melody moved forward. Similarly, when analyzing the performance obtained by 50 candidates that undertook the access examination to professional Music grade, Ponsatí et al. (2022) detected statistically-significant differences in favor of the first of the two fragments of the dictated melody. In both studies (Hoppe, 1991; Ponsatí et al., 2022), the results

revealed that the recency effect, as stated by Vila et al. (2010), was contradicted, as the most recent information was remembered worse than the initial one.

There are plenty of variables that might affect on the scores and decrease them during the transcriptions. Various previous studies about the melodic dictation focused on the strategies employed (Buonviri, 2014, 2015b, 2019, 2021; Pembrook, 1986, 1987), the length of the melody (Long, 1977; Pembrook, 1986), the tonality (Pembrook, 1986), the number of plays of the melody (Cornelius & Brown, 2020; Hofstetter, 1981; Pembrook, 1986), the *tempo* (Long, 1977) and the absolute pitch (Dooley & Deutsch, 2010). Furthermore, it should be noted that some of the students' most common difficulties during the dictation is the lack of repetitions of the melody and the time to do the transcription (Killian & Henry, 2005), which justifies why students have to learn to synthesize the knowledge and coordinate their skills (Foulkes-Levy, 1997) by developing strategies that let them be more efficient in such a task (Buonviri, 2015a; Foulkes-Levy, 1997; Karpinski, 2000). Moreover, it must be highlighted that the lack of a quiet place during the dictation (Karpinski, 2000) can lead to distractions, either internal or external, which disrupt the precise perception of the aural stimuli (Flowers & O'Neill, 2005).

1.3. The present study

The present study is contextualized in the first cycle of the professional grade of a professional Music conservatory in Catalonia (Spain). The students of such educational level have already begun their professional studies after passing an access examination to the professional Music grade which are annually organized by the *Departament d'Educació de la Generalitat de Catalunya*. In a previous study, the objective of which was to analyze the scores of the activities corresponding to the Music Theory part of such examinations, Andreu et al. (2021) concluded that melodic dictation was one of the tasks that reported the lowest scores during the period elapsed between 2013 and 2018. It must be noted that the design (structure and length) and the musical content (rhythm, melody and harmony) of the dictated melodies of such tests are similar every year. Nevertheless, there is a difference in the procedure followed: the melodies can be dictated either in a full or fragmented way. In addition to that, either in the Music Theory lessons or in several pedagogical materials, it is quite common to observe that the dictated melodies can be presented either in a full or fragmented way.

Owing to the diversity of factors –individuals and musical– taken into account by Baker (2019), which can contribute in an underlying way to the students' performance during the melodic dictation, the authors of the present research realized that the fact of dictating a melody in one or the opposite way could be a factor that influenced the success of the dictation. After carrying out a wide review of the literature, the lack of research found in this regard promoted the proposal of the current study, which was born by formulating the two following research questions: In front of melodies with similar features, (1) are there any differences between the students' performance if the melodies are dictated in a full or fragmented way? and (2) how does the students' performance evolve when the melodies are dictated in a full or fragmented way? To answer such questions, the following objective was set: To compare the performance of students of the first cycle of professional Music grade when transcribing two melodies dictated in a full or fragmented way.

2. Method

In order to accomplish the present research, an exploratory-type methodological approach was chosen. Such approach is considered to be suitable to increase the knowledge about a specific topic that has not been extensively studied for a specific context (Hernández et al., 2006). A quasi-experimental design was employed.

2.1. Participants

An intentioned sample was selected (Hernández et al., 2006), which consisted of 60 students of first cycle of professional grade belonging to a professional Music conservatory in Catalonia (Spain). The criteria to determine the sample were based on the selection of students of first cycle in the professional grade that belonged to a center that already had a previously-established relationship with the researchers to thereby facilitate the progress of the study. The students (34 girls and 26 boys) had an average age of 13.8 years old (*SD* = 1.7 years). None of them declared having absolute pitch. The research took place after obtaining the informed consent of the participants' parents.

2.2. Research instruments

For the purpose of the current study, researchers elaborated two melodies (Figure 1) with similar features with respect to their design (structure and length) and musical content (rhythm, melody and harmony): written in *D major* and in 3/4 metric, based on the I-IV-V7-I chords sequence (one chord per measure) and structured in two fragments of similar length, rhythmic and melodic features (1st: measures 1-2; 2nd: measures 3-4). Each melody contained a total of 24 durations, 24 pitches and 23 intervals.

The melodies were designed by following the criteria established in previous studies with respect to their length (Hoppe, 1991; Ponsatí et al., 2022), *tempo* (Ponsatí et al., 2022) and time lapse between plays (Cornelius & Brown, 2020; Karpinski, 2000; Ponsatí et al., 2022). With regards to the number of plays of the dictated melodies (both full and fragmented), the researchers chose to follow the criteria suggested by the center where the research was carried out to avoid hindering the usual reality of the participants. Furthermore, in accordance with Cornelius and Brown (2020), it is very difficult to recommend a correct number of plays for a melody, since it relies on its difficulty and the students' skills.

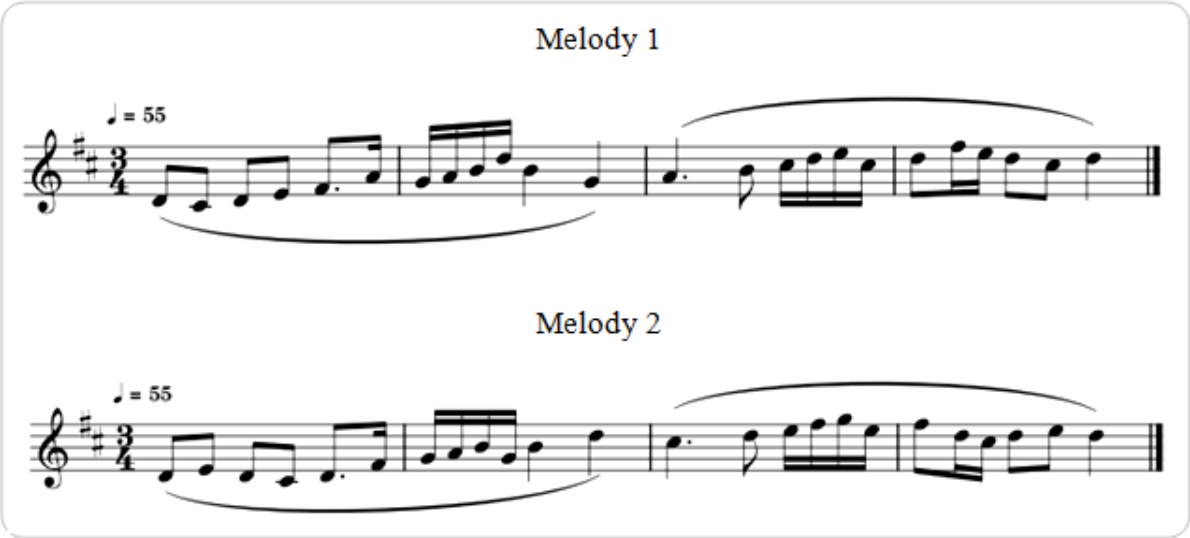

Figure 1. Dictated melodies.

After that, the melodies were validated by three teachers with 35 – 40 years of experience in Music Theory teaching. Also, a reliability analysis was carried out by applying the Cronbach's alpha coefficient on each item of the dictated melody (full and fragmented), both overall and separated for each parameter of the study (durations, pitches and intervals). In all cases, the results reveal a high internal consistency (Table 1). In addition to this, in all cases and along the whole scale, stability in the measurement was observed when removing each of the items.

Table 1. Reliability coefficients (Cronbach's alpha).

Parameters (items)	Melody 1		Melody 2	
	Full	Fragmented	Full	Fragmented
Durations (24 items)	0.943	0.915	0.956	0.958
Pitches (23 items)*	0.922	0.921	0.917	0.918
Intervals (23 items)	0.933	0.903	0.916	0.896
Total (70 items)	0.973	0.950	0.964	0.961

* The initial pitch of the melody was not included in the analysis because students already knew it. Self-made table.

2.3. Procedure

To compare the students' performance depending on how the melody was dictated (in a full or fragmented way) and to avoid it to be remembered, two melodies with similar features were considered to be necessary. The experiment was designed in the following way (Table 2):

1. The 60 participants of the sample were randomly distributed in two groups of 30 students each (GA and GB).
2. Each group transcribed two melodies in two separated sessions separated by a time lapse of one week: in the 1st session, GA transcribed melody 1 and GB melody 2, both played in a full way; in the 2nd session, GA transcribed melody 2 and GB melody 1, both played in a fragmented way.

Table 2. Design of the experiment.

Groups (n)	1st session	2nd session
GA (n = 30)	Melody 1 full	Melody 2 fragmented
GB (n = 30)	Melody 2 full	Melody 1 fragmented

Self-made table.

Both groups undertook the dictation simultaneously, which was played by two teachers of the center, in two spacious and quiet classrooms, and using acoustic pianos with similar characteristics and following the established indications (Table 3). Students had a piece of paper with a stave where the clef had been written, as well as the key signature, meter, number of measures and the first pitch of the melody. The process took approximately 30 minutes.

Table 3. Process followed during the dictation.

Previous information	**Explanation of the procedure to be followed during the dictation.**	
Metric and tonal contextualization	1. Interpretation of the *D major* scale and the I-IV-V7-I chords sequence. 2. Presentation of the *tempo* for a 3/4 meter.	
Interpretation 60 seconds of silence between the plays	Full melodies	Fragmented melodies
	12 times	1. Full: Once 2. 1st fragment (measures 1-2 and 1st note of the 3rd): 4 times 3. Full: Once 4. 2nd fragment (measures 3-4): 4 times 5. Full: Twice

Self-made table.

2.4. Data analysis

In order to perform the statistical analyses, *IBM Statistical Package for the Social Sciences* (SPSS for Windows, 15.0 version) was employed. To determine the significance of the differences on the students' performance, the Wilcoxon signed-rank and Mann-Whitney U tests (both non-parametric) were applied, since the Shapiro-Wilk test rejected the existence of normality in the study sample. The significance level was fixed at p = 0.05. To calculate the effect size, the Rosenthal correlation r was applied, which was interpreted as: small = 0.1; medium = 0.3 and large = 0.5 (Field, 2009). Furthermore, in some specific contexts, the Pearson r and Spearman r_s correlation coefficients were applied. In such cases, the correlation effect between the variables was interpreted as: perfect = 1; strong = 0.9; moderate = 0.6; weak = 0.3 and null = 0 (Akoglu, 2018).

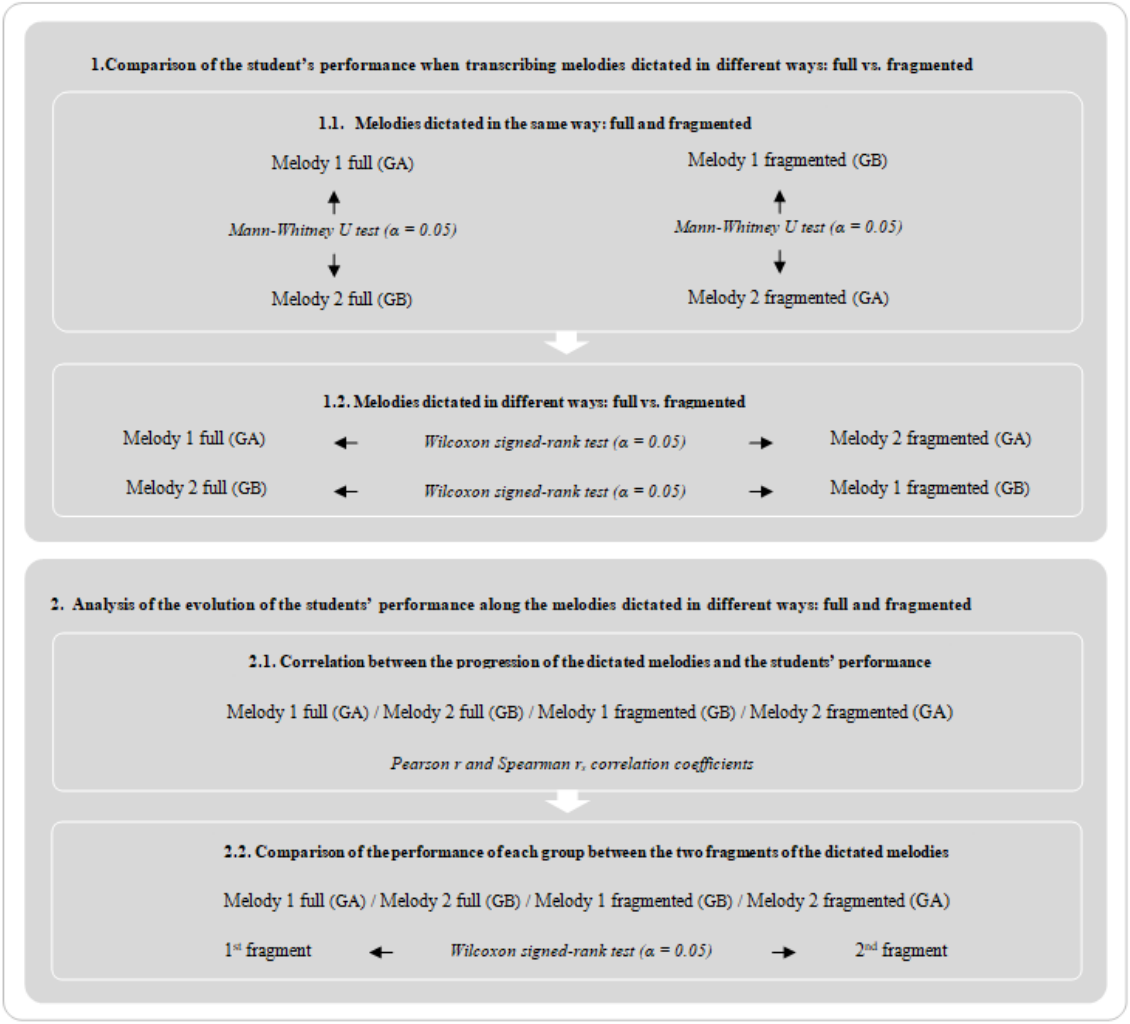

Figure 2. Process followed to analyze the students' performance.

The transcriptions were rated by following the criteria established by Cornelius and Brown (2020) and Ponsatí et al. (2022), which consisted in assigning 1 point or 0 points to each item depending on whether they were correct or not. To sum up: to be considered correct and depending on the analyzed parameter, each item must fulfill two conditions: (1) duration: its duration and location in the measure, (2) pitch: its pitch and octave, and (3) interval: its direction and size (measured in semitones). Therefore, the maximum scores for each

parameter were: 24 for durations, 23 for pitches (the 1st pitch was not considered because students already knew it) and 23 for intervals (Figure 1). With the aim of facilitating its interpretation, the scores were expressed as percentages (%). Last, the scores of the durations, pitches and intervals were unified by calculating a global count by means of an arithmetic mean.

3. Results

The results are exposed in the same order as the research questions formulated at the introduction section. As a summary, Figure 2 presents the analyses that were carried out on both groups of students (GA and GB) when melodies 1 and 2 were dictated, both in a full or fragmented way.

3.1. Comparison of the students' performance when transcribing melodies dictated in the same way: full vs. fragmented

To answer the first research question, the analyses were divided into two consecutive stages (Figure 2).

3.1.1. Melodies dictated in the same way: full and fragmented

By means of this preliminary comparison, the two groups (GA and GB) were verified to be statistically equivalent, which was an essential condition to be able to continue with the subsequent analyses. The performance between the two groups was compared (Mann-Whitney U test, $\alpha = 0.05$) when dictation was carried out in a full way (melody 1 [GA] vs. melody 2 [GB]) or fragmented way (melody 1 [GB] vs. melody 2 [GA]). The results obtained indicated that (Figure 3):

- When comparing melody 1 (GA) and melody 2 (GB), both dictated in a full way, no statistically-significant differences were appreciated for the global count of the three analyzed parameters ($Z = 549.0$; $p = 0.146$) nor for any of them separately: durations ($Z = 442.5$; $p = 0.924$), pitches ($Z = 555.0$; $p = 0.123$) and intervals ($Z = 555.0$; $p = 0.130$).
- When comparing melody 1 (GB) and melody 2 (GA), both dictated in a fragmented way, no statistically-significant differences were detected for the global count of the three analyzed parameters ($Z = 434.0$; $p = 0.820$) nor for any of them separately: durations ($Z = 521.0$; $p = 0.300$), pitches ($Z = 408.0$; $p = 0.542$) and intervals ($Z = 416.5$; $p = 0.633$).

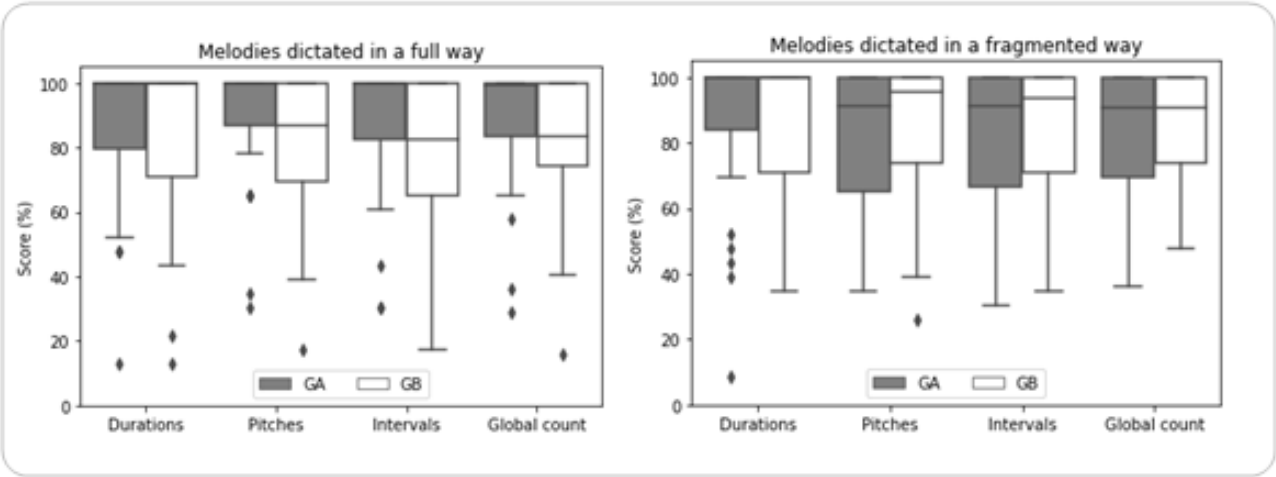

Figure 3. Comparison of the performance of both groups: Melodies dictated in the same way (full and fragmented).

These results point out that both groups are statistically equivalent, since no improvement was detected in the scores of the two dictated melodies, either in a full or fragmented way. The verification of the lack of significant differences made it possible to continue with the rest of the initially-planned analyses.

3.1.2. Melodies dictated in different ways: full vs. fragmented

The performances of each group (Wilcoxon signed-rank test, $\alpha = 0.05$) when dictating the two melodies in different ways were compared: melody 1 full (GA) vs. melody 2 fragmented (GA), and melody 2 full (GB) vs. melody 1 fragmented (GB). The results obtained indicated that (Figure 4):

- GA: No significant differences were appreciated between melody 1 dictated in a full way and melody 2 dictated in a fragmented way with respect to the global count of the three analyzed parameters ($Z = 84.0$; $p = 0.100$) nor for any of them separately: duration ($Z = 57.5$; $p = 0.887$), pitches ($Z = 67.0$; $p = 0.053$) and intervals ($Z = 72.0$; $p = 0.130$).

- GB: No significant differences were appreciated between melody 2 dictated in a full way and melody 1 dictated in a fragmented way with respect to the global count of the three analyzed parameters (Z = 124.5; p = 0.466) nor for any of them separately: durations (Z = 92.0; p = 0.904), pitches (Z = 67.5; p = 0.267) and intervals (Z = 70.0; p = 0.113).

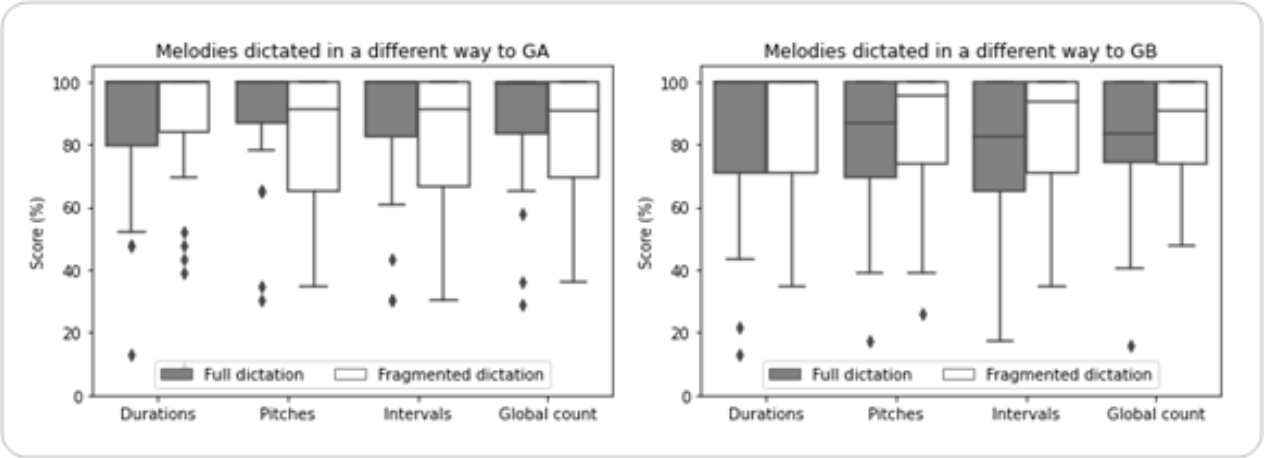

Figure 4. Comparison of the performance of each group between the melodies dictated in different ways: Full vs. fragmented

The results suggest that there is no evidence of significant improvement of the melodies scores depending on how they are dictated (full or fragmented). Such results are reproducible for both groups (GA and GB).

3.2. Analysis of the evolution of the students' performance along the melodies dictated in different ways: full and fragmented

In order to answer the second research answer, the following analyses were carried out in two consecutive stages (Figure 2).

3.2.1. Correlation between the progression of the dictated melodies and the students' performance

The absence of significant differences between the scores of the melodies depending on how they were dictated encouraged us to analyze the evolution of the number of correct answers along the dictated melodies more in depth. The Pearson r and Spearman r_s correlation coefficients between the number of each item of the melodies and the corresponding percentage of correct answers were calculated, thus obtaining the following results (Figure 5):

- Melody 1 dictated in a full way (GA): A strong descending correlation (r = -0.932/r_s = -0.909) was detected for the global count of the three analyzed parameters. For each of the parameters separately, the correlation was strong as well: durations (r = -0.918/r_s = -0.912), pitches (r = -0.841/r_s = -0.840) and intervals (r = -0.789/r_s = -0.807).
- Melody 2 dictated in a full way (GB): A strong (r = -0.731)/moderate (r_s = -0.661) descending correlation was detected for the global count of the three analyzed parameters. For each of the parameters separately, the correlation was: strong for the durations (r = -0.746/r_s = -0.802), moderate for pitches (r = -0.611/r_s = -0.617) and strong for the intervals (r = -0.707/r_s = -0.706).
- Melody 1 dictated in a fragmented way (GB): A strong descending correlation (r = -0.730/r_s = -0.705) was detected for the global count of the three analyzed parameters. For each of the parameters separately, the correlation was: strong for the durations (r = -0.755/r_s = -0.721) and moderate for pitches (r = -0.619/r_s = -0.585), and strong (r = -0.745)/moderate (r_s = -0.698) for the intervals.
- Melody 2 dictated in a fragmented way (GA): A moderate descending correlation (r = -0.455/r_s = -0.424) was detected for the global count of the three analyzed parameters. For each of the parameters separately, the correlation was: moderate for the durations (r = -0.644/r_s = -0.538) and weak for pitches (r = -0.288/r_s = -0.269) and intervals (r = -0.277/r_s = -0.241).

The previous values point out that the performance corresponding to melodies dictated in a full way decreases in a rather steady and constant manner along the transcriptions. Contrary, for the melodies dictated in a fragmented way, the performance decreases more rapidly at the beginning and, later on, it becomes stable.

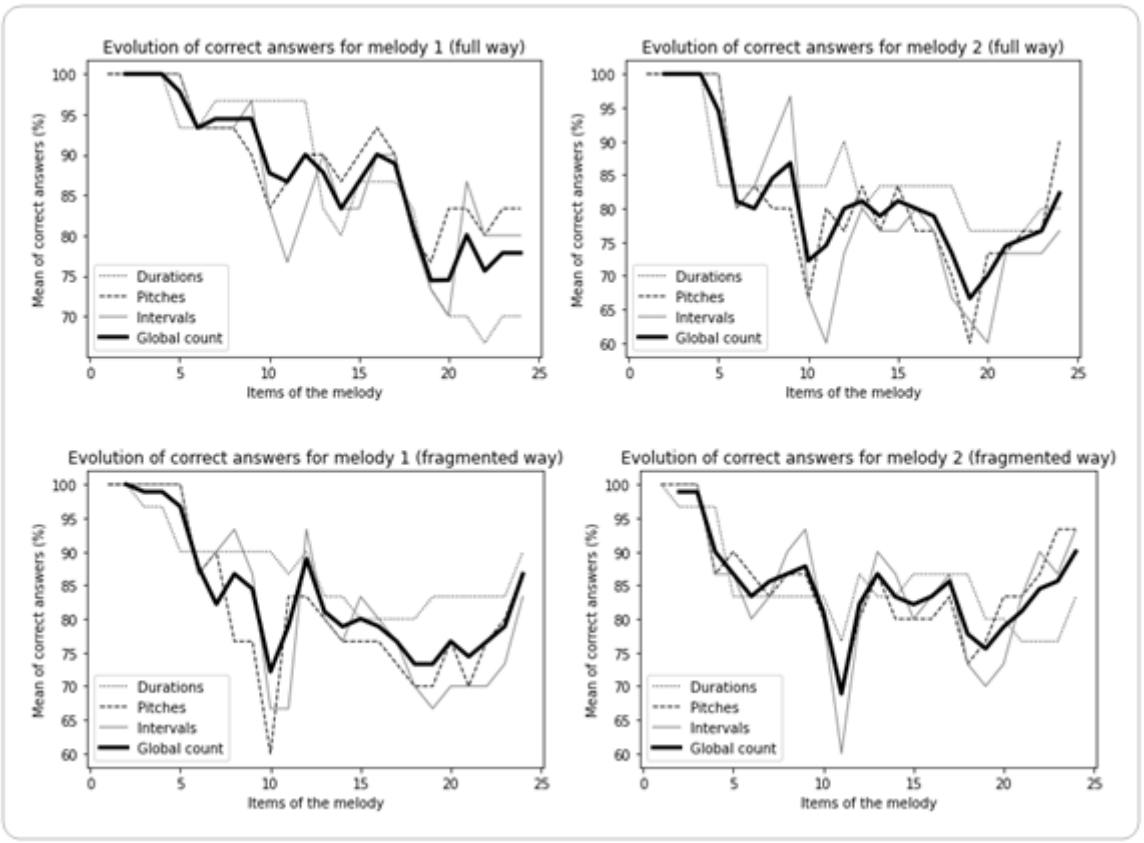

Figure 5. Evolution of the mean scores along the melodies.

The results imply that when the melody dictated in a full way moves forward, mistakes tend to gradually increase in a more or less regular manner. Whereas when the dictation is produced in a fragmented way, mistakes are located at the final part of the melody. Such observations were reproduced for all the transcriptions and took us to compare the performance between the two fragments of the melodies by means of inferential statistics with the aim of certifying it from a more rigorous point of view.

3.2.2. Comparison of the performance of each group between the two fragments of the dictated melodies

The performance of each group was compared (Wilcoxon signed-rank test, α = 0.05) by considering the first (measures 1-2) and the second fragment (measures 3-4) of each melody, either when dictated in a full (melody 1 [GA]; melody 2 [GB]) or fragmented way (melody 1 [GB]; melody 2 [GA]). Taking into account the process followed when dictating in a fragmented way, the interval located between the two fragments was computed as part of the first one. The results indicated that (Figure 6):

- Melody 1 dictated in a full way (GA): Significant differences were appreciated in favor of the 1st fragment, both for the global count of the three analyzed parameters (Z = 12.0; p = 0.006) and for all of them separately: durations (Z = 2.0; p = 0.004), pitches (Z = 14.0; p = 0.049) and intervals (Z = 7.0; p = 0.012) with a medium effect size in all cases (r = 0.402, 0.490, 0.274 and 0.324, respectively).
- Melody 2 dictated in a full way (GB): Significant differences were appreciated in favor of the 1st fragment, both for the global count of the three analyzed parameters (Z = 40.5; p = 0.016) and for most of them separately: pitches (Z = 39.5; p = 0.045) and intervals (Z = 27.0; p = 0.011) with a medium effect size in all cases (r = 0.306, 0.282 and 0.357, respectively). However, no significant differences were detected for the durations (Z = 17.0; p = 0.284).
- Melody 1 dictated in a fragmented way (GB): Significant differences were appreciated in favor of the 1st fragment, both for the global count of the three analyzed parameters (Z = 56.0; p = 0.039) and for the intervals (Z = 33.0; p = 0.007), with a medium effect size (r = 0.320 and 0.419, respectively). Contrary, no differences were detected for the durations (Z = 8.0; p = 0.161) and pitches (Z = 60.0; p = 0.093).
- Melody 2 dictated in a fragmented way (GA): No significant differences were appreciated between the two fragments, neither for the global count of the three analyzed parameters (Z = 88.0; p = 0.339) nor for any of them separately: durations (Z = 45.0; p = 0.637), pitches (Z = 79.5; p = 0.530) and intervals (Z = 73.0; p = 0.375).

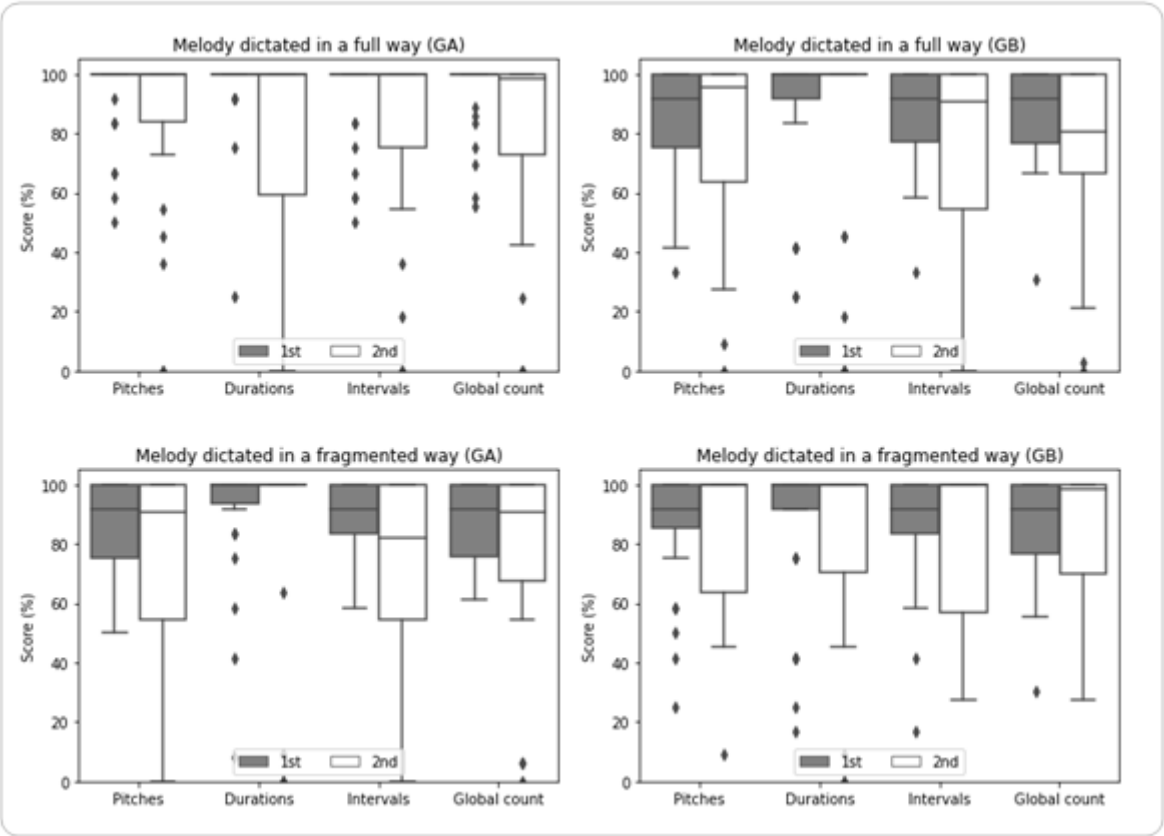

Figure 6. Comparison of the performance between the two fragments of the dictated melodies.

The results point out that, in general terms, the students' scores were higher in the 1st fragment than for the 2nd one in the melodies dictated in a full way. Such result did not reproduce when the dictation was carried out in a fragmented way, as significant differences were only detected for some parameters. In accordance with the evolution of the scores presented in the previous section (3.2.1), when the melodies are dictated in a full way, mistakes tend to gradually increase when the dictation moves forward, whereas when it is dictated in a fragmented way, mistakes are committed in a more disperse way.

4. Discussion

The discussion of the results is exposed to give an answer to the research questions formulated at the beginning.

4.1. Are there any differences between the students' performance if the melodies are dictated in a full or fragmented way?

The results suggest that there is no evidence of significant improvements between the scores of the melodies depending on how they are dictated (in a full or fragmented way).The absence of significant differences is observed both for the global count of the three analyzed parameters (durations, pitches and intervals) and for each of them separately. Such results, which were reproduced in both groups (Figure 4), reveal that the employed procedures when dictating the melodies present a similar efficacy when the melodies have similar features related to (1) the design (structure and length) and musical content (rhythm, melody and harmony); (2) the interpretation (*tempo*, lapse of time between plays and number of plays) and (3) the metric and tonal contextualization before the transcription.

With these results in hand, it can be hypothesized that, probably, participants have used flexible strategies capable of getting used (Buonviri, 2015a; Foulkes-Levy, 1997; Karpinski, 2000) to both procedures, either when writing the dictated melody while it is being listened or during the lapse of time between established between plays (Buonviri, 2017; Pembrook, 1986) or, maybe, a combination of both strategies depending on the demands of the melody (Buonviri, 2017).

4.2. How does the students' performance evolve when the melodies are dictated in a full or fragmented way?

The results suggest that the performance tends to decrease meanwhile the transcriptions move forward (both for the global count of the durations, pitches and intervals, and for each of them separately) regardless of the employed procedure (Figure 5), thus reporting significant improvements in favor of the first of the two fragments (both with similar rhythmic and melodic densities), mainly in the melodies dictated in a full way. Regarding the latter, the results confirm the findings of previous studies (Hoppe, 1991; Ponsatí

et al., 2022), in which the recency effect is contradicted, as stated by Vila et al. (2010), since the final information is remembered worse than the initial one. No studies have been located to find precedents on the comparison of the participants' performance between the fragments of the melody dictated in a fragmented way.

The results of the present study point out that the scores decrease during the transcriptions but, however, such a decrease is distinct depending on how the melodies are dictated (Figure 6): (1) for those dictated in a full way, the significant differences in favor of the first fragment were produced in both groups except for the durations of one of them and (2) for those melodies dictated in a fragmented way, the significant improvements were solely appreciated for some of the analyzed parameters of one of the groups. Even though the causes that promote the evolution difference in the performance depending on the employed procedure are unknown, such behavior could be attributed, among other factors, to the fact that when dictating in a full way, the amount of accessible information at the same time is the double amount compared to that when dictated in a fragmented way. Especially for the melodies dictated in a full way and, in accordance with Karpinski (2000), this fact could made it difficult to retain one part of the melody due to the aural distraction of the other one, thus progressively increasing mistakes along the transcriptions. As stated by Karpinski (2000), the maintenance of the focused listening is key to be able to successfully continue with the dictation during the memory, understanding and notation stages. Actually, among other factors, the precise perception of the aural stimuli depends on the relationship between the mental concentration and the distractions, either internal or external (Flowers & O'Neill, 2005). As a consequence, the process of extractive listening might be hindered, that is, the selective remembering and identification of the musical information being listened (Karpinski, 2000; Klonoski, 2006) and, subsequently, the retention of the *tempo* and the tonal center in conjunction with the rest of sounds that constitute the tonality. However, according to Nichols and Springer (2022), the role that memory plays in the maintenance of the tonal center in the dictation is still unclear.

5. Conclusions and educational implications

The objective of the present exploratory study was to compare the performance of students of the first cycle of professional Music grade when transcribing two melodies dictated in a full or fragmented way. Based on the exposed results, the following can be concluded: (1) considering the global assessment of the students' performance, the two evaluated procedures (to dictate the melodies in a full or fragmented way) seem to present a similar efficacy, as no evidences were found that suggested any significant improvement depending on how they were dictated, and (2) considering the performance progress during the melodies, the results supply relevant evidence, though not the causes, of the decreasing evolution of the students' performance along the dictated melodies, thus observing different behaviors depending on whether the dictation was carried out in a full or fragmented way.

Even though the aspects that contribute to the learning progress of melodies are still unclear (Halpern & Barlett, 2010) and, furthermore, that there are many factors that might influence on the students' performance during the course of a melodic dictation (Baker, 2019), the results of the present study suggest the following recommendations:

- To provide the students with strategies capable of getting used to the length and musical features of the dictated melody. In this regard, and according to Buonviri (2017), teachers should help students in choosing the most suitable strategy for each situation and promote their use. The fact of establishing an attention focus seems to be an essential aspect to attain a good musical hearing (Madsen & Geringer, 2008) thus powering concentration and avoiding possible distractions (Flowers & O'Neill, 2005). Furthermore, the availability of strategies can be a perfect means to fight against the students' lack of motivation (Ponsatí et al., 2014) as well as the anxiety that, as stated by Balo et al. (2015), aural tasks usually generate.
- To provide the students with strategies to have a more efficient memory when designing activities devoted to developing the following skills: (1) extractive listening, since, as mentioned by Karpinski (2000) and Klonoski (2006), it contributes to improving the retention and identification of musical stimuli while the rest of stimuli keep sounding and (2) fragmentation, as the grouping of information into significant fragments reduces the cognitive charge (Karpinski, 2000) so that the work memory becomes more efficient (Cowan, 2010, 2014).
- To provide the students with strategies that gradually develop the inner singing of pitches and intervals (Ponsatí et al., 2022) as well as the retention of the *tempo* and the tonal center along the dictated melodies. In this regard, it would probably be more efficient to design strategies that improved subvocalization (Klonoski, 2006).

As a whole, the fact of providing with suitable strategies depending on the difficulties observed when carrying out a melodic dictation would probably let the students improve their attention focus, their attitude and their motivation, thus benefitting the transcription of the dictated melodies and, consequently, the development of their aural skills.

Finally, considering the limitation of the relatively reduced size of the sample, as a future action line, the authors are encouraged to obtain a larger sample of students with the aim of evaluating the reproducibility of the results and thus the generalization of the final conclusions of the study.

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