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SCIENTIFIC ARTICLE

Discernment of Shades of Sadness in Guarnieri´s *Ponteios*: An Interpreter Perspective

Discernimento de nuanças de tristeza em Ponteios de Guarnieri: uma perspectiva do intérprete

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Abstract: Four of Guarnieri's *Ponteios* for piano (numbers 11, 31, 36, and 41) bearing the expressive indication of sadness were prepared and performed live before audiences of graduate and undergraduate students (N = 63) or students belonging to a university music theory and perception extension course (N = 65). Two emotional terms were chosen by the interpreter that better described his/her conception of sadness in the piece. Categorical and prototype models were selected for guiding the selection of these terms. Sound wave profile analysis and interpretative choices by the interpreter were employed to classify the assigned emotions in terms of the bidimensional categorical model of emotion, i.e., arousal polarized (flow of the events) and valence polarized (intensity of the signal). Differences in timing highlighting (or not), dynamic contrast levels and the presence or not of a climax were shown to be characteristics that contributed to these distinctions into two groups: those bearing the composer's indication of *Triste* (Sad) – *Ponteios* 11 and 21; and those bearing the indication of *Tristemente* (Sadly) – *Ponteios* 36 and 41, with the latter provoking relatively higher (more negative) arousal and valence.

Keywords: emotion communication; music perception; live performance; *Ponteios*; Guarnieri.

Resumo: Quatro *Ponteios* para piano de Guarnieri (nos. 11, 31, 36 e 41), dotados de indicação expressiva de tristeza foram preparados e executados ao vivo perante uma plateia de estudantes de graduação e pós-graduação em Música (N = 63) ou de estudantes pertencentes às oficinas de extensão de teoria e percepção musical (N = 65). Dois termos foram escolhidos pelo(a) intérprete que melhor descrevessem sua concepção de tristeza em cada peça. Modelos categoriais e de protótipos foram selecionados para a seleção desses termos. Análise do perfil da onda sonora e as escolhas interpretativas do(a) intérprete foram empregadas para classificar as emoções atribuídas em termos do modelo categórico bidimensional de emoção, ou seja, polarizado na atividade (fluxo dos eventos) e polarizado na valência (intensidade do sinal). Diferenças na valorização (ou não) do timing, nos níveis de contraste de dinâmica e presença ou não de clímax foram características que contribuíram para distinção desses *Ponteios* em dois grupos: aqueles dotados da indicação do compositor de Triste – *Ponteios* 11 e 21; e aqueles com a indicação Tristemente – *Ponteios* 36 e 41, esses últimos suscitando maior atividade e valência (mais negativa).

Palavras-chave: comunicação de emoções; percepção musical 2; performance ao vivo; *Ponteios*; Guarnieri.

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1 – Introduction

Despite the many decades devoted to research on the relationships between music and emotion, this subject still provokes great interest. The spectrum of approaches employed in the investigation of the phenomenon is broad. For instance, in the domain of artificial intelligence, ENDRUJKAITE and KIYOKI (2017) investigate an automatic emotion recognition system for acoustic data by means of essential musical features, based on a human's perception of music. The use of music-guided imagery and music-assisted relaxation has been proposed in the intervention of dental anxiety (BRADT and TEAGUE, 2017). Research on cross-cultural anger communication in music among different participants (Korean, American, Canadian, Indian, Japanese and Swedish) has shown that listeners filter the emotion that they perceive according to the stereotypes of the encoding cultures (SUSINO and SCHUBERT, 2017). Features extracted from electrocardiography, from respiration and from several synchronization aspects of both have been employed to investigate the recognition of emotions elicited by watching music video clips (MIRMOHAMADSADEGHI, YAZDANI and VESIN, 2017). These are only a few examples of the variety of approaches recently adopted in research on emotion in music.

Among the models employed in the investigation of emotion, one prominent conception is the dimensional view, in which all emotions are characterized by two (or three) dimensions. Based on several theoretical and empirical studies, the dimensions include some measure of arousal or valence. Arousal is a measure of the perceived energy level, ranging from low (calm) to high (excited), whereas valence is the polarity of the perceived emotions and ranges from negative (sad) to positive (happy). Within the dimensional view, the circumplex model (RUSSELL, 1980; BARRET and RUSSELL, 1998) considers that emotions are distributed in space with dimensions of arousal and valence in a circular pattern centered on medium arousal and neutral valence.

The correlations between arousal and valence in music have been discussed in the literature from several perspectives. For instance, ESCHRICH et al. (2008) investigate whether musical pieces that induce high arousal and very positive valence are remembered better by non-musicians than unarousing and emotionally neutral musical pieces. Arousal ratings are not predictive for recognition performance, meaning that only emotional valence is related to musical memory. On the perception of a dance, the valence of music and dance and the dynamics of arousal interact to create the strongest affective experience from a dance piece (CHRISTENSEN et al. 2014). The results have shown that cross-modal bias (i.e., the ability of a visual signal to influence the auditory perception) is more pronounced for sad than for happy movements whereas it is equivalent when contrasting high- versus low-arousal movements. In addition, the researchers conclude that the movement's valence does not affect the participants' emotional response whereas movement's arousal does: the response is potentiated in the case of low-arousal movements with sad music and when high-arousal movements are paired with happy music. DROIT-VOLET et al. (2014) investigate the effect on the time estimation of some musical parameters (tempo: fast-slow; instrumentation: orchestral-piano; harmonic structure: tonal-atonal) associated with emotional changes in affective valence and arousal. The results show that the effect of tempo in music, which is associated with a subjective arousal effect, is the major factor that produces time distortions: time is considered longer for fast than for slow tempi. Emotional valence affects the perception of time, with pleasant music being judged to be shorter than unpleasant music. Through multidimensional scale (MDS) studies, BIGAND et al. (2005) show that valence and arousal are separable measures, that can be independently

manipulated under experimental conditions. Russell's bidimensional model is employed by RAMOS and BUENO (2012) to classify short excerpts (approximately 36 s) of Western repertoire music in terms of valence and arousal, perceived as basic emotion by the musician and the non-musician. In a study involving the rating of valence and arousal in familiar songs, LOUI et al. (2013) concludes that vocal content affects perceived arousal, independent of the familiarity of the song.

From the perspective of musical structure, for instance, GOMEZ and DANUSER (2007) have demonstrated that the mode, harmonic complexity, and rhythmic articulation best differentiate between negative and positive valence whereas tempo, accentuation, and rhythmic articulation best discriminate high from low arousal. JAQUET, DANUSER and GOMEZ (2014) focus on the role of pitch in both valence and arousal. In a within-subjects design (N = 49), the authors employ four 1-minute classical piano excerpts, presented in three pitch levels (the original version and one octave higher (+ 1) and one octave lower (-1) than the original version). Pleasantness (valence) is significantly lower for the -1 octave variant. A significant, but smaller, negative relationship between the pitch level and arousal is also observed: A lower pitch is associated with higher arousal (for the male participants). KAWAKAMI, FURUKAWA and OKANOYA (2012) find that valence is associated with high note density melodies in both minor and major keys.

Among the so-called basic emotions, the conveying of the emotion of sadness in music has been investigated in the literature. For instance, spontaneous facial expressions associated with sadness are recorded in a group experiencing sadness during an emotion-elicitation task in which the participants are requested to recall neutral and sad memories while listening to music (NAMBA et al. (2017)). The authors conclude that parts of these facial actions are related not only to sad experiences but also to other emotional experiences such as disgust, fear, anger and happiness. VAN DEN TOL, EDWARDS and HEFLICK (2016) investigate the reason why people listen to sad music when they feel sad. The results suggest that listening to sad music serves the function of promoting acceptance, coping and consolation during aversive life situations. Such results may have implications for improving mental health and music therapy. A similar approach is adopted by TARUFFI and KOELSCH (2016), who conclude that the emotional responses to sad music are multifaceted, are modulated by empathy, and are linked to a multidimensional experience of pleasure. Nostalgia rather than sadness is the most frequent emotion evoked by sad music. Memory is rated at the most important principle through which sadness is evoked. PELTOLA (2017) investigates how music and music-related emotions are experienced between individuals. When exposed to different types of music and musical expression, the participants distinguish various types of sadness with distinct meanings. Shared experiences are affected by expectations of the musical style, structure, and performance, in addition to the expectations of the emotional content of music. Additionally, social norms and cultural conventions play important roles in these negotiations. In the same direction, PELTOLA and EEROLA (2016), in the thought-provoking paper entitled *Fifty shades of blue* (…), discuss the underlying affective experience of music-related sadness. After thematic content analysis of open-ended answers from 363 participants, the range of emotions is classified into three main themes: grief, melancholia and sweet sorrow. These themes differ, depending on the valence of the overall experience. Variations in the ways in which people conceptualize sadness and music lead to differences in the process of affective regulation.

In the Brazilian piano literature, Camargo Guarnieri (1907-1993) was a composer who explicitly indicated the emotional character of his works in his piano music scores. His work *Ponteios*, composed over the course of 30 years and published in five volumes totaling 50 piano pieces, represents a rich ensemble of emotions to be expressed during performance. Some of these scores contain indications of basic emotions, and more specifically, eight out of 50 pieces express sad emotions (*Sad*, *Sadly*, *Nostalgic*, etc.). The literature has noted the nuances in sadness evoked by music. Most of these studies employ recorded commercial stimuli. To the best of our knowledge, none has investigated these different types of sadness from the performer perspective. Thus, our research question lies in the possibility of conveying different types of sadness in the *Ponteios* by Camargo Guarnieri through live performance. We have opted to work with real music stimuli played live. This approach entails good ecological validity, although it may lead to some inaccuracy regarding the objective control of the musical parameters. Nevertheless, it is closer to the real-life situation of a performer. Furthermore, we have opted for the performance of entire pieces instead of excerpts. Music unfolds over time, and some mostly expressive qualities of music are most likely related to structural change over time, such as timing, *accelerando* to *ritardando*, and the transition from the minor to the major mode, to note only a few.

The present research describes a tentative classification of nuances in the sadness content of four *Ponteios* by Guarnieri marked with the emotion of sadness by the composer himself, taking into account the interpretative decisions made by the interpreter and by the perception of an audience consisting of music undergraduate and graduate students and music extension university students.

2 – Method

2.1 – Selection of the material

Among the 50 *Ponteios*, six contain the explicitly expressive indication of sadness. Considering that the entire piece would be played, the selection within this set of six *Ponteios* was dictated by: (i) extension (the number of measures); (ii) sound level contrast (intensity/dynamics); and (iii) rhythmic pattern contrast. Figure 1 shows the characteristics of these 6 *Ponteios*.

Ponteio	Expressive indication[a]	Measure (number)	Tempo (bpm)
11	*Triste* (Sad)	20	66[b]
22	*Triste* (Sad)	16	72[b]
31	*Triste* (Sad)	29	60[c]
36	*Tristemente* (Sadly)	46	80[c]
41	*Tristemente* (Sadly)	24	60[b]
50	*Lentamente e Triste* (Slowly and Sad)	88	60[b]

[a]: Expressive indication on the score demanded by the composer; [b]: time unity: eighth note; [c]: time unity: quarter.

Figure1: Table with tempo and measures numbers in Guarnieri´s *Ponteio* bearing the expressive indication of sadness.

Ponteio 50 was eliminated due to the larger number of measures. Then, the following criterion was adopted to keep the *Ponteios* with higher contrast within the piece. A low sound level, without greatly intense oscillations, is a clue for the emotion of sadness (GABRIELSSON, 1996). Nevertheless, in these *Ponteios* bearing markings of sadness, Guarnieri employed several different intensity oscillations, suggesting a distinct atmosphere within the same emotional state indicated by the composer. Figure 2 depicts all of the dynamic levels present in each *Ponteio*.

Ponteio	Expressive indication	Dynamic level
11	*Triste* (Sad)	***ppp***, ***pp*** and ***p***
22	*Triste* (Sad)	***pp*** and ***p***
31	*Triste* (Sad)	***pp*** and ***p***
36	*Tristemente* (Sadly)	***p***,***pp***, ***pf*** up to ***ff***
41	*Tristemente* (Sadly)	***pp***, ***p*** up to ***f***

Figure 2: Table with dynamic levels in Guarnieri´s *Ponteios* bearing expressive indication of sadness.

According to Figure 2, the *Ponteios* differ from each other in terms of the alternation and sequence of dynamic levels. For instance, in *Ponteio* 11, the dynamics alternate nuances in ***p*, *pp*** and ***ppp***, staying at a low level of intensity. Conversely, *Ponteios* 36 and 41 are articulated in opposite directions, bearing more variation in the degree of dynamics and intensity. *Ponteios* 22 and 31 are more uniform (***p*** and ***pp*)** in terms of sonority. Then, the contrast in rhythmic patterns was evaluated. *Ponteio* 41 is based on semiquaver groupings, in a contrapuntal line between both hands. In *Ponteio* 11, initially, there is a constant rhythmic figuration in the bass, composed of syncopation (quaver-crochet-quaver) and regular four-quaver groups that dialogue with the melodic line presented in the right hand. *Ponteios* 22 and 36 are similar from the rhythm perspective (figuration based on dotted quavers) in the left hand, the latter bearing more contrasting intensity. Thus, *Ponteio* 22 was discarded. In summary, the studied *Ponteios* were: 11, 31, 36 and 41.

2.2 – Interpretative decisions and selection of terms

Each *Ponteio* was analyzed and a written report of the metaphors evoked within and in each piece. One corroborate with Meyer, which considers that the performance of a musical piece is an analytical act, even if this analysis is intuitive or not systematic (MEYER, 1973, p. 29). In order to seek the most reproducibility among the performances, a detailed performance plan was established. The performer situation was analogue to that described by SLOBODA and DAVIDSON (1996) who comment the absence of specialized vocabulary and repertoire of expressive strategies, rather emotional intuition (procedures resulting from many performances, mostly from non-systematic experimentations). The identification of adjectives/nouns correlated to sadness were based on subjective and metaphoric impressions acquired during practice.

Three pilot studies were initially carried out aiming to evaluate: (i) the stimuli duration (whole piece) and (ii) comprehensibility of the collecting grid, which was a sequence of contrasting terms (happy, sad; simple/complex; lightful/dark, etc) within a seven point Likert scale. The performance of the whole piece seemed to be feasible. Nevertheless, the use of the terms was shown to be misleading, resulting in a broad dispersion of terms.

In the quest of theoretical foundation, the choice of the terms employed in the description of the intended sadness emotions were marked out by two models: the categorical one proposed by HEVNER (1938) and updated by SCHUBERT (2003) and the prototype model proposed by SHAVER et al. (1987). Figure 3 depicts a schematic representation of these two approaches. It is worth mentioning that Russell´s bidimensional mode was limited for the options of sadness emotional terms.

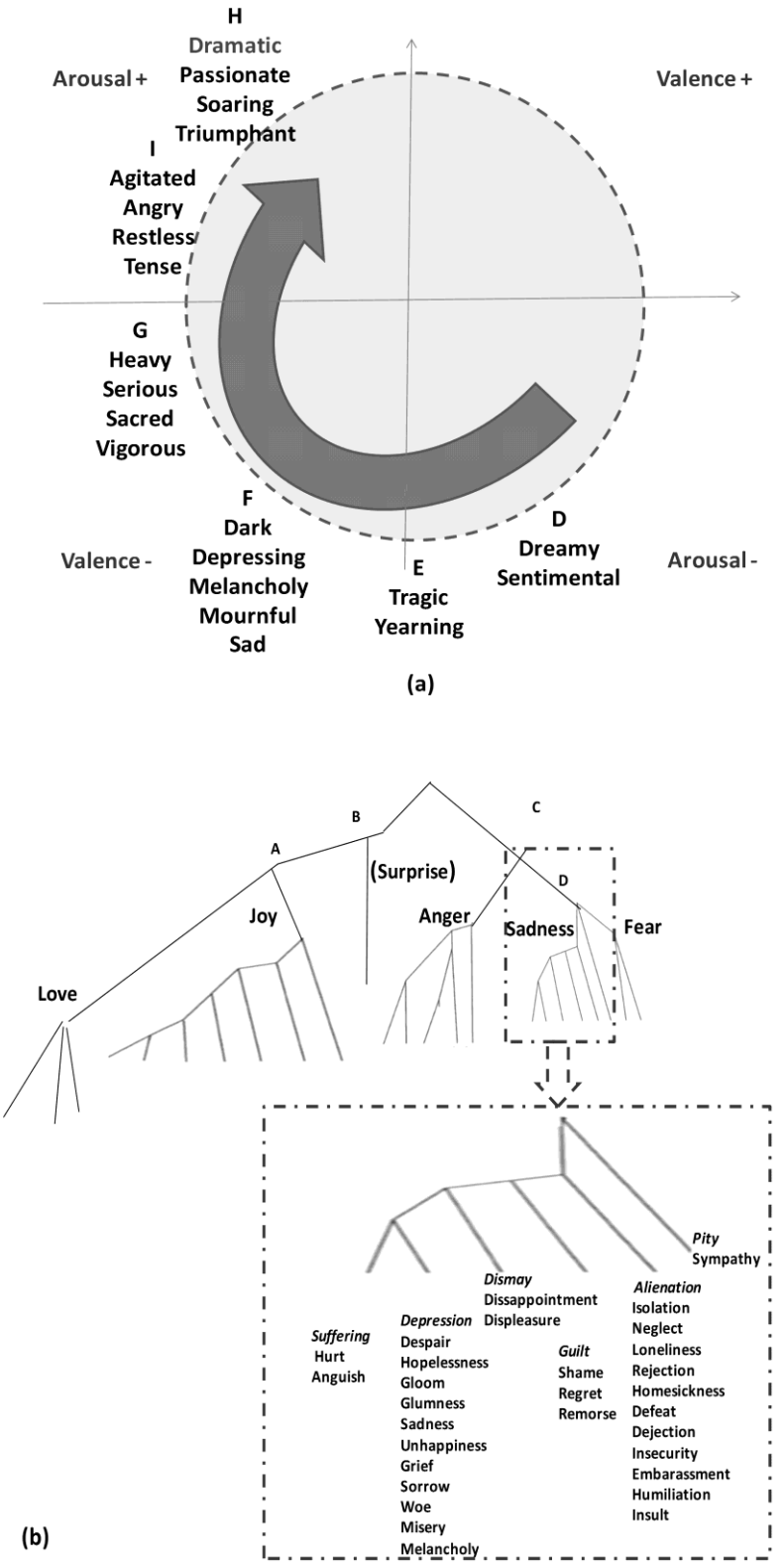

Figure 3: Terms presented (a) in the HEVNER (1938)/SCHUBERT (2003) categorical emotion classification disposed within the bidimensional model; and (b) partial representation of terms presented in the prototype emotion model proposed by SHAVER et al. (1987).

According to Figure 3a, built based on the categorical proposition by Hevner/Schubert, and disposed in the bidimensional emotion model design, it is observable that sadness lies in a quadrant of negative valence and negative arousal. From this proposition, two emotions were selected: *nostalgic* (*nostalgia*), chosen for *Ponteio* 31, and *sorrow*, chosen for *Ponteio* 41. As a supplement, the other terms came from the prototype emotion model proposed by SHAVER et al. (1987) and its six subcategories (agony, depression, dismay, guilt, alienation, and pity) associated with sadness (Figure 3b). From this set of vocabulary, the following terms were chosen: *gloom*, *sorrow*, *isolation*, *loneliness*, *regret* and *rejection*. In this context, the term *resignation* was included since it better intimated the conception of the interpreter.

Based on the literature, Figure 4 depicts several structural and expressive parameters categorized into valence and arousal domains associated with the conveying and perception of sadness that served to guide the interpretative decisions.

Valence-domain	**Arousal-domain**
Articulation in legato (JUSLIN, 1997)	Articulation (small variation) (JUSLIN, 2003)
Dissonant harmony (HEVNER, 1936; WATSON, 1942)	Low sound level (GABRIELLSON; JUSLIN, 1996)
Low register (COSTA; BITTI; BONFIGLIOLI, 2000)	Timing (big variation) (GABRIELSSON; JUSLIN, 1996)
Melodic intervals (2nd minor) (MAHER, 1980)	Final *ritardando* (GABRIELSSON, 1999)
Melodic direction (descendent) (GERARDI; GERKEN, 1995)	Gloomy timbre (JUSLIN, 2000)
Minor mode (HEVNER, 1936; LINSTRÖM, 2006)	
Tempo (slow) (THOMPSON ; ROBITAILLE, 1992; GAGNON ; PERETZ, 2003)	
Timbre (few harmonics) (SCHERER; OSHINSKY, 1977)	

Figure 4: Table with structural and expressive characteristics in sadness communication/perception classified in terms of valence and arousal domain.

The detailed description of the interpretative decisions is reported elsewhere (RODRIGUES, 2015). Figure 5 depicts the main characteristics concerning each *Ponteio*.

Ponteio	Relevant structural and expressive parameters	Interpretative decisions	Chosen emotion terms
31	Melody	A more pedalized **timbre** was sought in the melody for creating a more distant and remote sonority	Nostalgia
	Left hand dynamics/harmony	During all the piece, a more precise and restrained temporal – rhythmic flow was maintained. Variations took in a few moments (e.g. in the development in m. 13), which oncoming is more sustained by **timing** rather through oscillations in the dynamics.	Resignation
36	Melody/Tempo	Melody directed by **timing**, being more loaded and stretched to create a feeling of regret	Regret
	Dynamics/Harmony	Changes in **dynamics**, creating a strong and fast crescendo for the *ff* (m. 22), reached also with the aid of **timing**	Rejection
41	Melody	Melodic lines interweaved, stretched by the **timing** to create a grief ambience	Sorrow
	Register/Harmony	Creation of a darker **timbre** in the parts bearing *pp* and *p* dynamic indications aiming at suggesting a more closed environment	Gloom
11	Dynamics/Sonority/Tempo	**Dynamics** more concentrated in the nuances of *p* and *pp*. In some moments, **timing** was controlled to retard the phrases resolution, affording a calmer, quasi static ambience	Isolation
	Register/Sonority	Creation of a cold and lonely sonority. Therefore, one opted for a shining **timbre**, pedalized, resulting a kind of echo.	Loneliness

Figure 5: Main relevant structural and expressive parameters taken into account in the interpretative decisions and proposed emotional terms. The main expressive/structural parameters highlighted by the interpreter are marked in bold.

2.3 – The sample

A first group of participant consisted of subjects (N = 66) belonging to a preliminary music theory and ear training course in a university extension (**ES**) program. Music students (**MS**) (N = 63) formed the second group, composed of 56 undergraduate students and 7 graduate students studying at the same university. The average age of the **ESs** was 27.4 (between 16 and 59 years old), with 57% being male and 43% female. The average age of the **MSs** was 24.4 (between 17 and 53 years old), with 73% being male and 27% female. The population was primarily composed of piano students but also included some string, wind, voice and conducting students.

2.4 – Data collection

A forced-choice questionnaire containing a single set of questions and that was repeated for each performance was employed. Each question provided eight alternative emotions (see Figure 5) and the option “others”, with a blank space to be completed by the participant. For each question, the participant was instructed to choose two emotions.

Five data collection sessions, two with **ESs** and three with **MSs**, with live performances were held using a Steinway piano. The influence of body and facial expression was not explored. The audience observed the side view of the performer, as in a concert situation. Considering the time of explanation of the questionnaire and the performance itself (twice for each stimulus), the sessions lasted approximately 30 min. The order of the stimuli was changed in each session so that the performer would not become habituated to interpreting the pieces in a specific sequence.

Concerning ethical procedures, participation in the research involved informed consent by the students, who were aware of the aims, procedures and steps involved in the research. The participants' anonymity was guaranteed.

An approximately 30-minute interview was conducted with **MS** volunteers (N = 7), which was video and audio recorded and transcribed. A recorded live performance of the interpreter was shown as a recall device stimulus. The aim of this interview was to deepen the participants' perception regarding the vocabulary (chosen emotional terms) and the nature of the expressive and structural parameters, considered to be relevant to convey a given emotion.

2.5 – Data analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS)®, version 18.0. The performance recordings were converted initially into the wave format using Soundforge Pro 10.0® software, then into data files (.dat extension) using Origin 9.0® software to allow the plotting and exploration of the sound wave representation in two dimensions.

The performance was analyzed through the sound wave curve profile of segments, selected as fundamental for the communication of the intended interpretation. Based on several studies in the literature and considering that neither valence nor arousal can be analyzed in isolation, we opted to consider the alterations observed in the *y*-axis to be related to the valence domain/polarized (intensity) and considered the propagation (flow of the events) of the sound wave along time (*x*-axis) to be related to the arousal domain/polarized, as depicted in Figure 6.

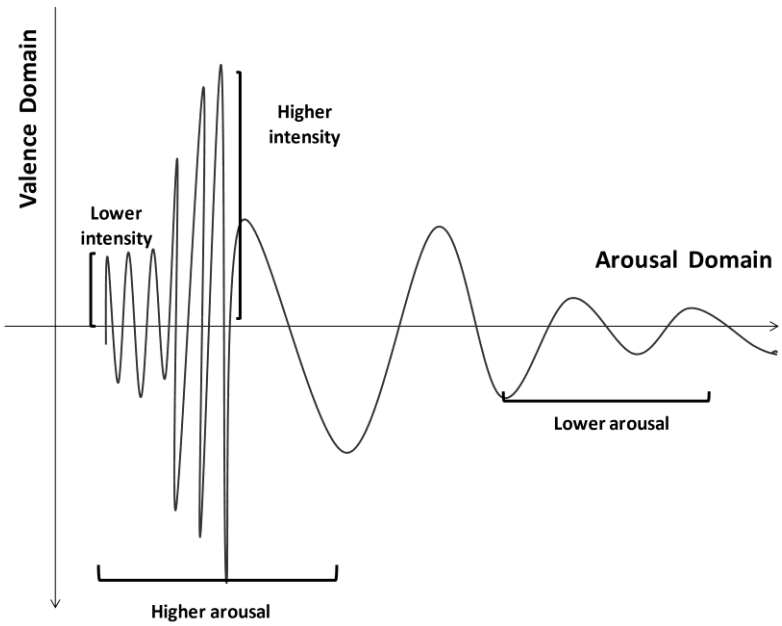

Figure 6: Schematic representation of information extracted from the sound wave profile, interpreted as valence and arousal polarized.

MAZZOLA (2011) considers that there are three fundamental values of reality involved in music: (i) the physical reality of the acoustic phenomenon, substantiated by the spectrum of the sound wave; (ii) the mental or symbolic reality, present in the mathematical descriptions in music theory and (iii) the psychological reality, which is distinct from the mental reality, by demonstrating a type of transformation (or explanation) of the musical phenomenon by analogies or extra-musical references (metaphors). From this perspective, the author stresses the existence of three constituents of the sign: expression, content and signification. Expression relates to the surface of the sign, which, in turn, sustains signification and content. The interpretation content highlights (or confirms) contrapuntal aspects of the events of the musical structure. Signification comprises the relationships among events and addresses an analytical and/or symbolic dimension (MAZZOLA, 2011). In the present study, these two pillars, i.e., the fundamental realities of music (physical, mental and psychological) and the relationship regarding expression, content, and signification, ground the present discussion. Thus, the sound wave spectra are considered to contain the information related to the musical representation of the interpreter, which, in turn, may be related to aspects of expression and content assigned to the events. The selection of the terms by the interpreter was specific for each *Ponteio* and brings the psychological reality, translated by metaphors, thus highlighting aspects from the content of the musical structure, with a personal meaning that is intended to be communicated through the performance.

2 – Results and Discussion

The feasibility of conveying the intended emotion assigned for the interpretation of each *Ponteio* was initially measured through the live performance before two audience groups, namely, the **MS** group, i.e., undergraduate and graduate students, and the **ES** group, i.e., students belonging to a university extension music theory class. Figure 7 shows the incidence of the communicated emotions among those in the **ES** group.

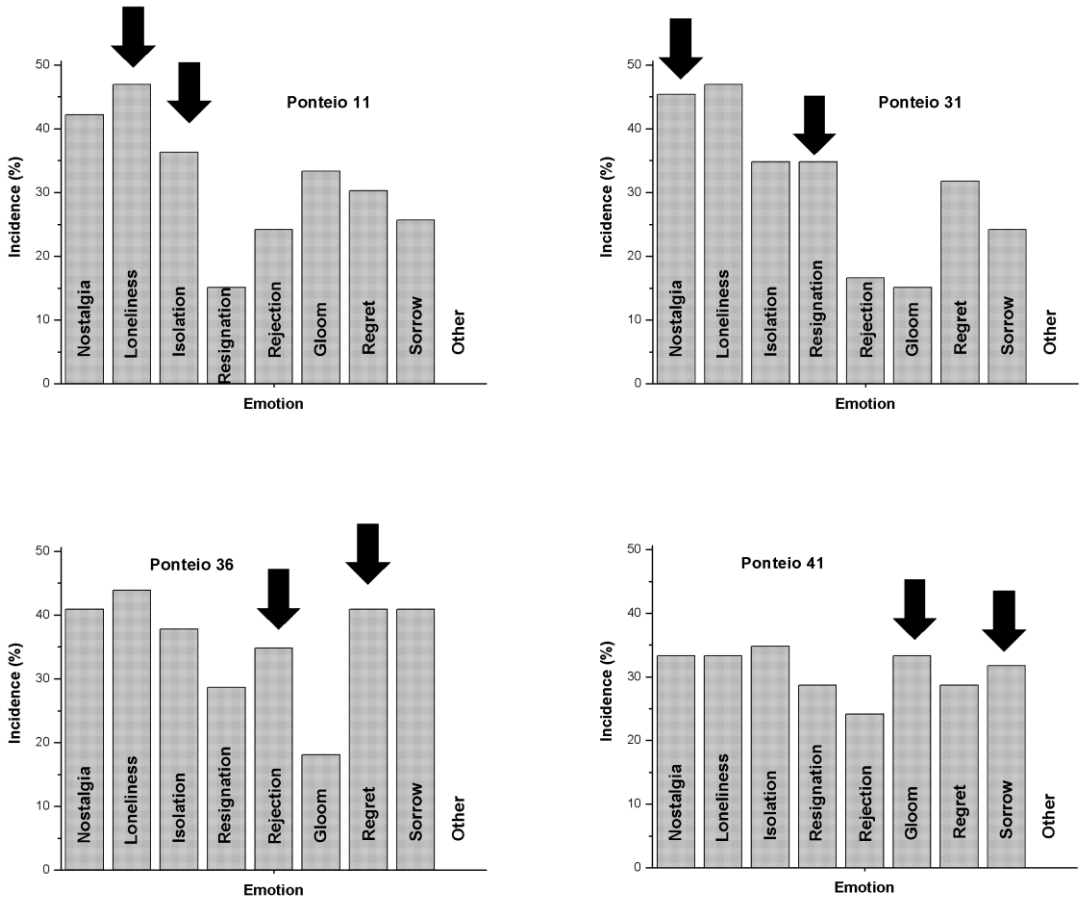

Figure 7: Incidence of emotions chosen by the **ES** group for the live performance of Guarnieri´s *Ponteios*. The arrows indicate the intended emotion by the performer N = 65.

According to Figure 7, there is a broad chosen emotional assignment. No clear trend can be established, even though the intended emotion of the performer lies among the most assigned emotions. Figure 8 shows the results regarding the **MS** population.

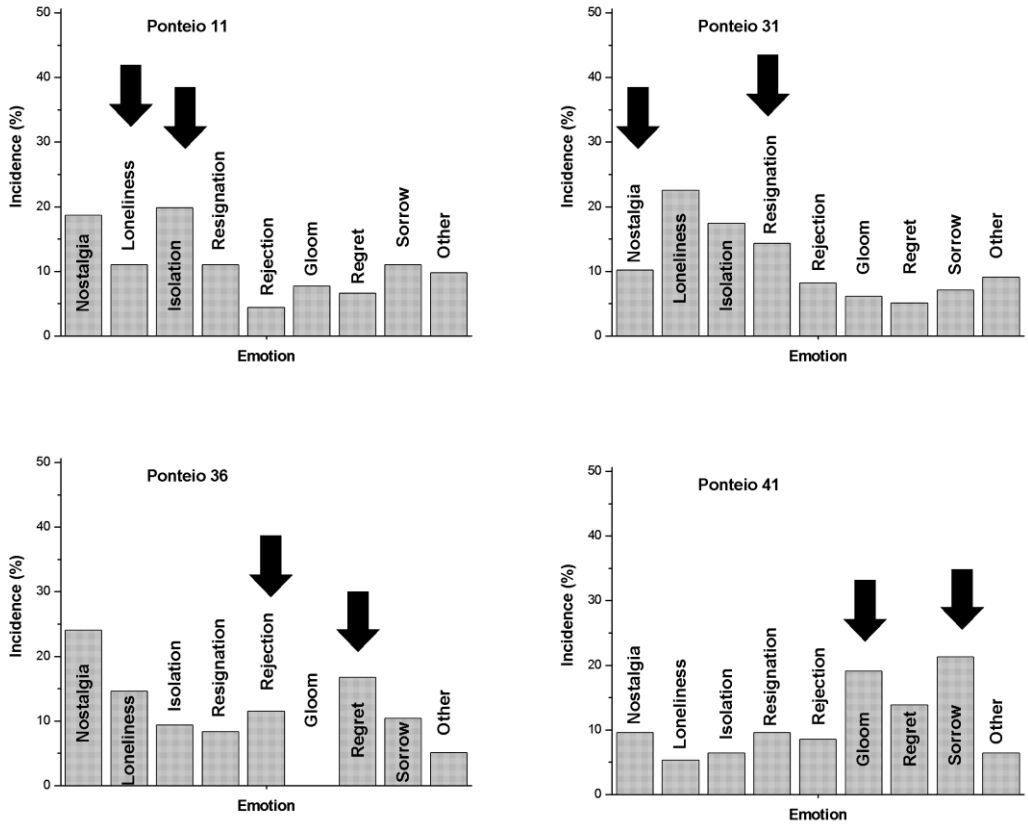

Figure 8: Incidence of emotions chosen by the **MS** group for the live performance of Guarnieri´s *Ponteios*. The arrows indicate the intended emotion by the performer N = 63.

As shown in Figure 8, in general, the assigned emotions also exhibit a dispersion across the four *Ponteios*, although the distribution of emotions is different from that observed in the case of the **ES** population. Furthermore, in the **MS** case, the "others" category has been chosen in three out of the four *Ponteios*. A comparison of the assignments between both populations shows that a higher degree of coherence between the intended emotion (performer) and perceived emotion (audience) is found for the **ES** population, as depicted in Figure 9.

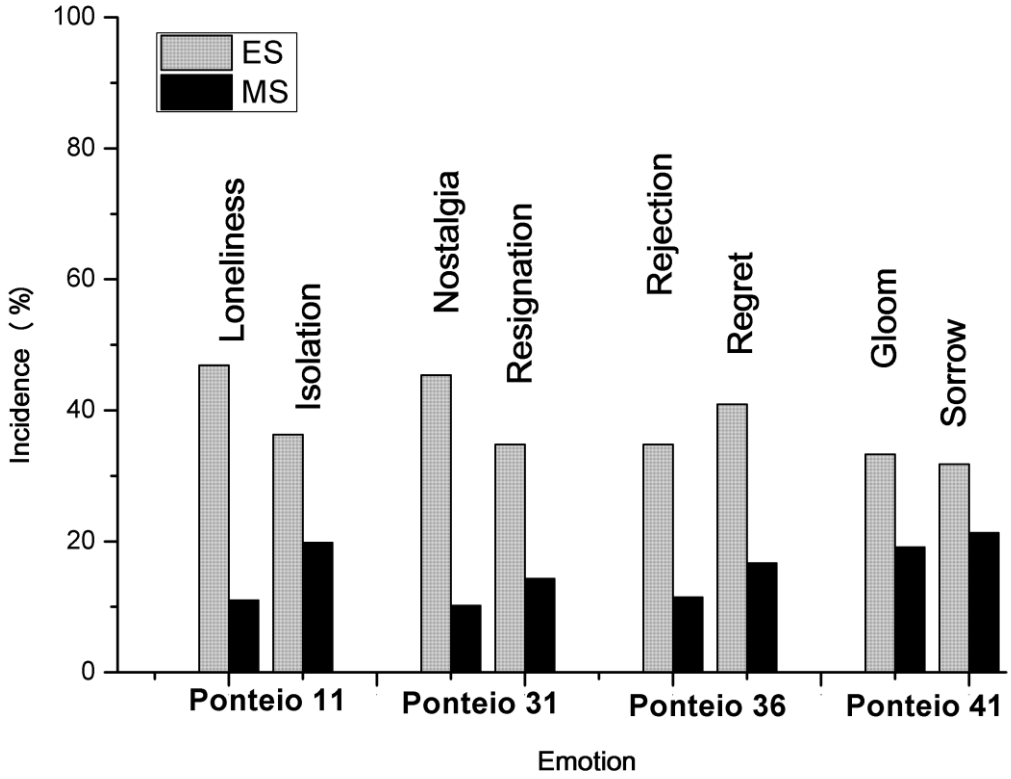

Figure 9: Incidence of emotions chosen by ES (N = 65) and MS (N = 63) in agreement with the intended emotion of the performer for Guarnieri´s *Ponteios*.

As shown in Figure 9, the performer's intended emotion seemed to be better recognized by the **ES** population compared to the **MS** population. Part of these results may be due to the choice of "others" by the latter. Nevertheless, these results obtained by the forced-choice questionnaire signal the subjectivity in the chosen terms related to sadness. In an attempt to better understand the chosen emotion, seven piano students (graduate and undergraduate level) who participated in the data collection were interviewed to comment on their choices. The participants from the **MS** population were chosen, considering that they could better justify their choices in terms of expressive and structural parameters. For these sessions, the recorded video of the performance during the data collection (questionnaire) session was shown. Figure 10 illustrates some comments made by the students, categorized by the magnitude of the event or melodic intensity/oscillation (valence polarized) and in terms of flow in the propagation of the events (arousal polarized).

Ponteio	Participant	Magnitude of the event	Flow in the event propagation
		Melodic oscillation/intensity	
11	P1	[Isolation] "the melody has no climax, it is a little descendent, interrupted (...)"	"(...) It [melody] is thoroughly interrupted and shorty"
	P2	[Isolation] "Everything in *piano*, light. All on a plane without many sudden changes of expression. And the timbre (...) half opaque in the high register (...) without thinking ... in projecting the sound, more restrained. "	
	P4	[Nostalgia/Nonchalant] The "resigned" may have a bit of tension throughout the narrative. (...). It did not have big ups and downs. "	
31	P1	[Isolation and Regret] "(...) the upper register is like when things seem to be evaporating. With the dynamics with more *pp* in this high pitch gives this sensation of more fragility, ethereal, not palpable, it is not concrete (...) "	"(...) this rhythm more drawn back ... [timing] This thing that seems to be dragging one's feet, it is not something incisive, active, it is something that seems to harmonize with this distancing. This thing of that constancy, of that same thing (...)
	P2	[Loneliness] "(...) I think first of not having this [little] variation of dynamics, all in the same plane (...)"	
	P5	[Isolation and Resignation] "(...) I think it's almost the same thing as not having many dramatic peaks, neither of dynamics nor of harmony that is very linear in the matter of drama."	
	P7	[Nostalgia] "... sonority so ... *piano* dynamics, no trace of dynamics .... equal in dynamics"	
36	P1	[Loniless and Rejection] "I think in this song what gave me the idea of" rejected "was the question of dynamics, of climaxes. I think it was the densification of dynamics, of melody, of rhythm. This climax gave this sense of rejection and not at all times, so much did I give a lower frequency, but it was more in relation to the climax. "	(...) "Today I would speak of rhythm, this slow back pulled over [*rallentando*]. This accelerated [harmony], this flexibility gives an impression of agitation "
	P2		[Nostalgia and Rejection] "The slower passages, after the whole affliction, the slow situation returned me to the beginning of the song .... gave me a nostalgic feeling"
	P4	[Unresigned] " (...) The narrative of dynamics, form, texture creates an idea that there is a movement that has a process that goes to the maximum of contestation and returns .... "	
	P6		[Nostalgia and Regret] "It seems that there is an insistence sometimes on the flow and from the beginning to the middle, something continuous, insistent."
	P7		[Loneliless and Regret] "I think first the tempo ... often seems to go nowhere and there are some moments some of dynamic traits ..... "
41	P1	[Sorrow] "This song is very much associated with the lower register, something that is denser, which demands more effort."	[Unresigned] "What I felt most in relation to the "unresigned" was this densification in the tense sense and with all these elements: energy, rhythm of harmony, texture, dynamics, all of that accumulated there."
	P2		[Gloom and Sorrow] "The rubato, first because drama for me has everything to do with rubato and of not being able to hold .... more the variation of the timing... "
	P4	[Gloom and Regret] "Sonority of the piece, harmony, dynamics, although it grows at a given moment, this closer relationship between sounds..."	
	P7	[Gloom and Sorrow] "(...)The bass region of the piano, sudden dynamics, dissonant harmonies ..."	"(...) it was this slow tempo, but very heavy"

Figure 10: Table with illustrative examples of aspects noted by the participants in the justification of their choice for the emotion assigned for the appraisal of the performance of *Ponteios* 11, 31, 36 and 41, classified in terms of melodic oscillation/intensity or flow in the event propagation.

According to Figure 10, the participants' comments seem focus more on aspects addressing melodic features rather than on those concerning the propagation of the events. It seems that melodic aspects are very important in the assignment of the perceived emotion: intensity,

melodic contour, and dynamic changes. In particular, observations concerning tempo, timing and agogic addressed the flow of the events. To better understand the participants' comments, sound wave curve profiles of segments, selected as fundamental for the communication of the intended interpretation, were graphically analyzed through the bidimensional representation of the sound wave. In the following, some extracts are depicted and discussed.

Figure 11 illustrates segments of *Ponteio* 11 and the resulting sound wave of one performer's interpretation. For purposes of comparison, the *x*-axis was kept the same scale for the three excerpts.

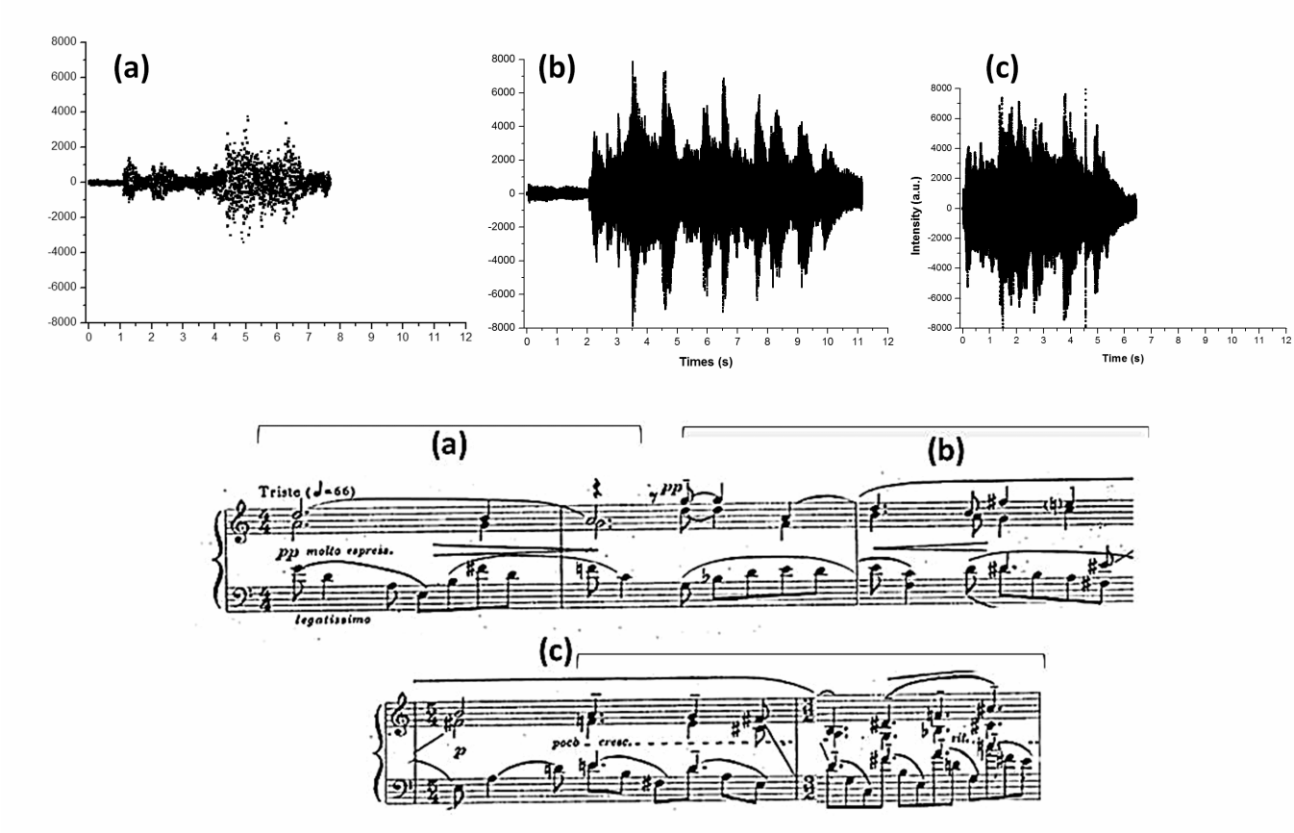

Figure 11: Bidimensional representation of the sound wave for the interpretation of *Ponteio* 11 from Guarnieri (audio recording, collecting no.4) and score events (m.1-5).

According to Figure 11, one can observe a densification on the sound wave within the first five measures. The low sound wave variation may be due to the articulation (*legatissimo*) of the melodic line, which has no climax (as noted by participant P1 – see Figure 10), in addition to the accompaniment in the bass line, in a tortuous manner, which is one of the aspect that provides the interpreter the sensation of wandering. Allied to this, the low dynamic levels (*pp* and *p*) suggest the impression of *distance* for this segment of the piece. In segment (**b**), the intensity level is relatively higher, and the wave sound propagated along time is more fragmented. P2 (see Figure 10) highlights the dynamics in the piano and the timbre, which is "half opaque in the higher register". However, the wave profile is intensified in fragment (**c)**, in terms of both arousal (rhythmic intensification in the bass and more variation within a shorter time period (6 s)) and valence due to the intensification of dynamics, in a *crescendo*. According

to P4 (Figure 10), there is a nonchalant atmosphere, most likely due to a "bit of tension throughout the narrative", as in this segment. Figure 12 shows other segments of *Ponteio* 11.

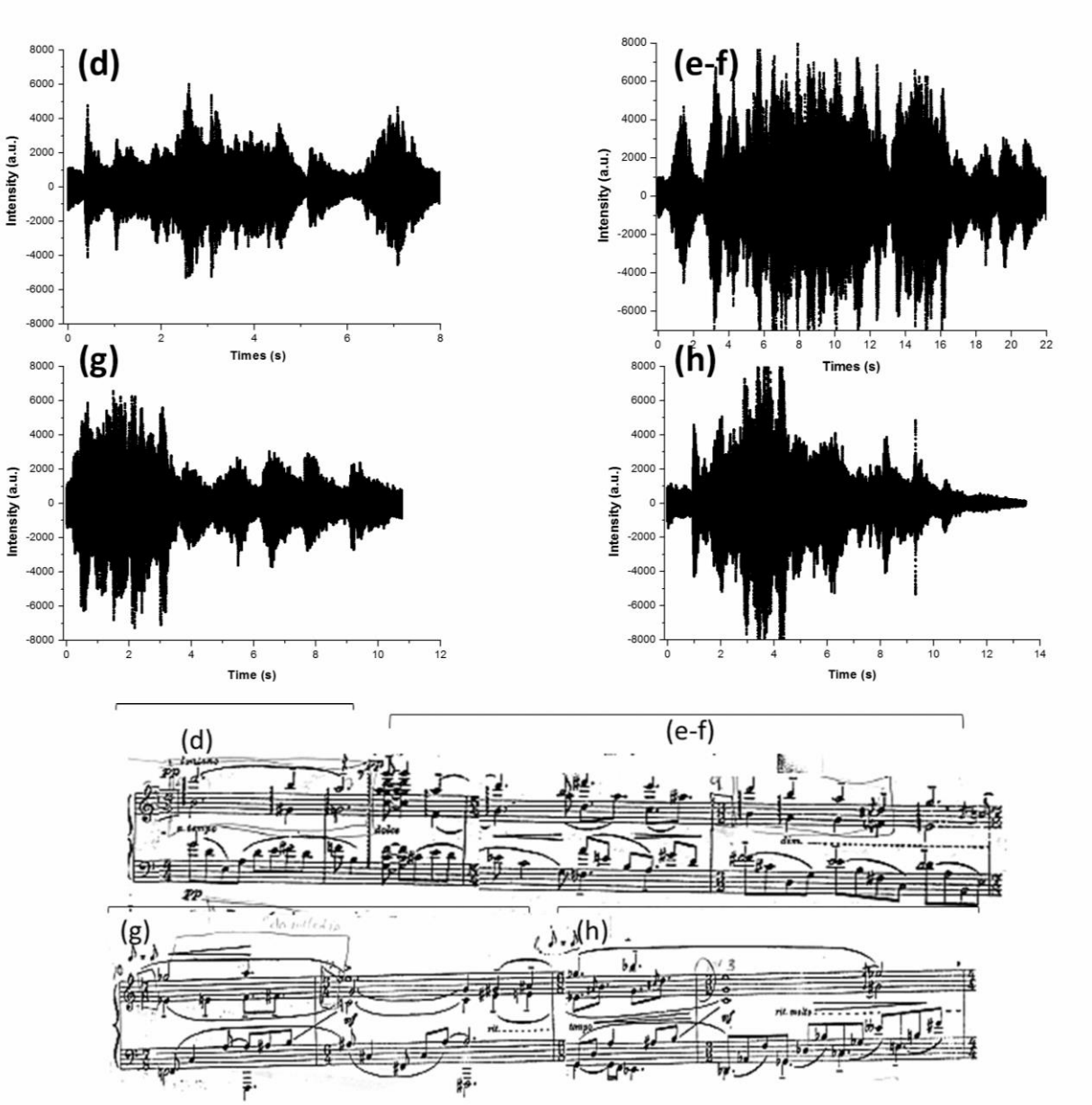

Figure 12: Bidimensional representation of the sound wave for the interpretation of *Ponteio* 11 from Guarnieri (audio recording, collecting no.4) and score events (m.6-12).

In Figure 12, segment (**d)** shows the beginning of segment **a´** (m. 6-12, one 8ª higher) in a denser texture due to the bass movement, still in *pp*. The rhythmic intensification present in the bass line guarantees a higher variation in the arousal polarized dimension. It is worth noting that in the valence polarized dimension, one can observe a lower variation in intensity (dynamics). Texture and register provide a peculiarity to this part, again presenting **a'**, which sounds similar to a souvenir. In this sense, the dynamics of *pp* suggested by Guarnieri and the higher register

in the melodic line are associated with a colder and lonely sonority (the "half opaque" timbre, as noted by P2 – see Figure 10), which are associated with the term *loneliness*.

In Figure 12, the representation (**e-f)** corresponds to a condensation of the fragments **b-c**. One observes that **e-f** are one 8ª higher, which affords a significant alteration on the valence level. This relative alteration level is reduced for fragments **g** and **h**, although both still contains peaks of dynamic variation. It is worth noting the clear effect of the *decrescendo* in **h**. After m. 6, the fact that the composer explores leaps and higher registers affords, in the interpreter's conception, an even more distant sensation, which confirms the loneliness, something isolated in a gray and lonely ambience.

Finally, Figure 13 represents the recapitulation of the ideas of **a** and **b**, now in the same register in which they were initially presented. This recapitulation is marked by a small alteration in the valence variation. The performer opts for a broader alteration in the valence (compared to Figure 11), with a higher sound intensity, since the ***ppp*** written on the score has been played with a louder sound level. The segment (**b´**) presents lower variation, in both arousal and valence, leading to the conclusion of *Ponteio* 11.

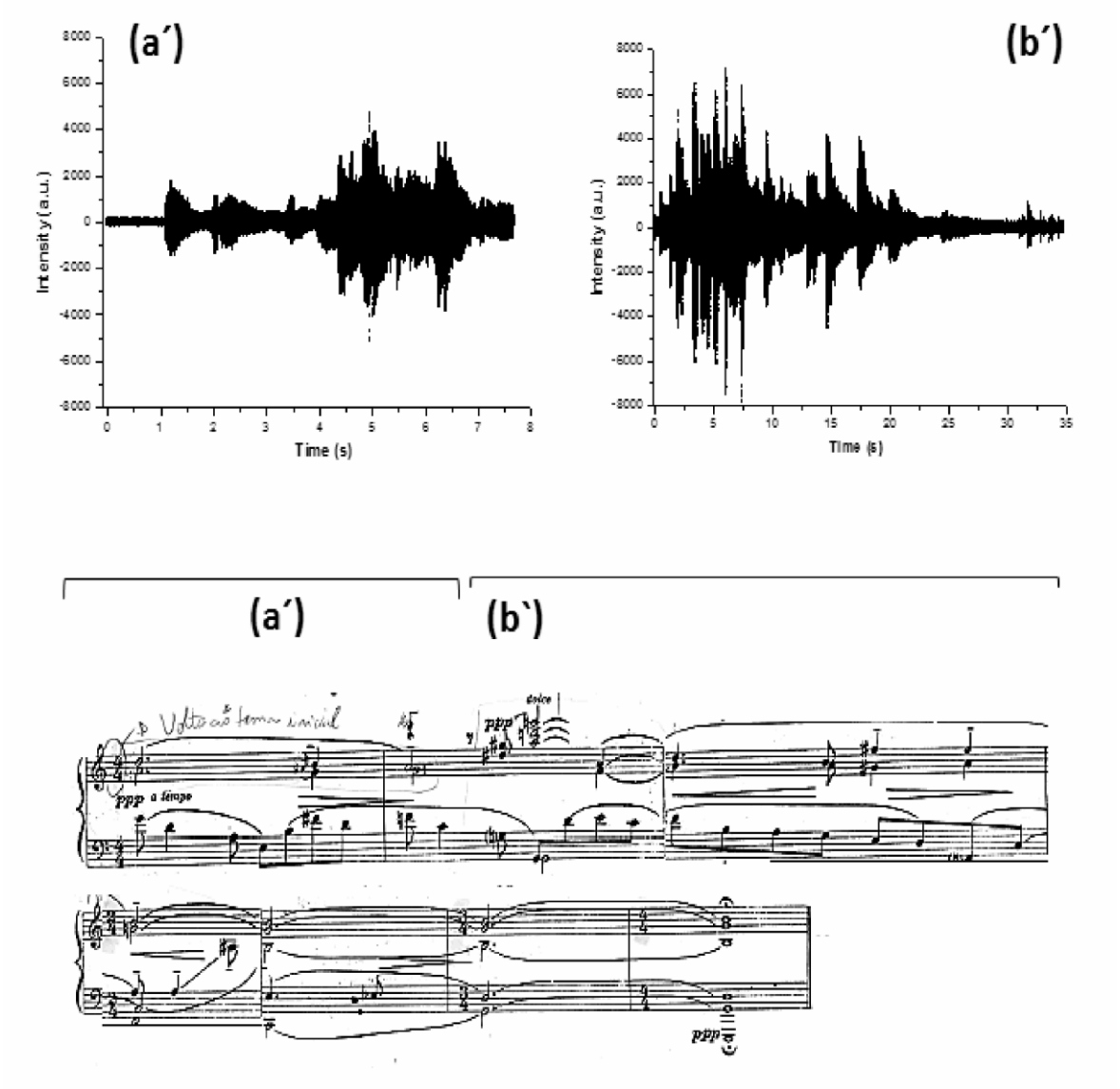

Figure 13: Bidimensional representation of the sound wave for the interpretation of *Ponteio* 11 from Guarnieri (audio recording, collecting no.4) and score events (m.13-19).

A similar analysis was conducted on the three other *Ponteios*. It is worth noting that, in analogous to verbal speech, the acoustic and prosodic features can be used to encode the affective states of a speaker (GUNES and PANTIC, 2010). The prosodic features, which seem to be reliable indicators of basic emotions, are the continuous acoustic measures, particularly pitch-related measures (range, mean, median and variability), intensity and duration (COWIE et al., 2001) extracted from the sound wave profile. Then, the set of wave fragments, associated with each of the two terms, in each *Ponteio* was rated on a ten-point Likert scale in terms of valence polarized (ordinate) and arousal polarized (abscissa). The results are depicted in Figure 14.

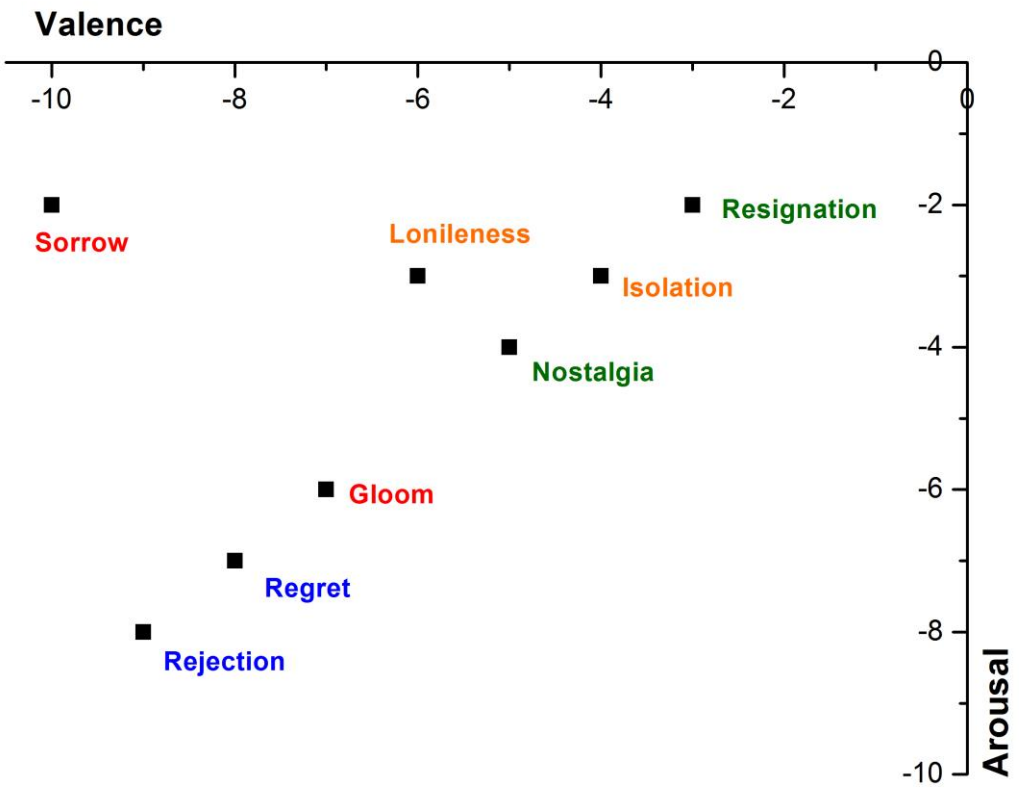

Figure 14: Bidimensional distribution of the emotions assigned by the interpreter to the performance of *Ponteios* nos.11 (loneliness and isolation), 31 (nostalgia and resignation), 36 (rejection and regret) and 41 (gloom and sorrow). The relative levels of arousal and valence rated by the performer.

In *Ponteio* 11 (Figure 14), the two emotions, loneliness and isolation, are classified at the same level of arousal, i.e., low arousal, differing only in terms of valence. The arousal may be because the piece presents rhythmic structures with a more retained, more halting propagation. The assigned valence to isolation was made due to the sonority, highlighted not only by the modal coloring but also by the leaps and higher pitches. The soft timbre, as noted in the literature, is also a characteristic of sadness. Finally, isolation was felt due to the slow variation in the valence (small dynamic variation, articulated with attacks) and arousal (more restrained timing) dimensions.

In the case of *Ponteio* 31 (Figure 14), nostalgia is chosen by the interpreter specially due to the melodic line that passes through the entire piece and in which he/she tries to produce a timbre with much resonance (with pedaling), aiming to create a more distant and soft sonority that would correspond to a non-intense valence, as in the case of a "lighter" sadness, reaffirmed by the fact that the timing is restrained, which, in turn, would produce a relatively low arousal. The emotion of being resigned (resignation) was also chosen, thinking of the more restrained timing in the melody and mainly for bearing nuances of the intensity of the planar blocks, eventually with larger chords, symbolizing a type of resignation on the resentful sadness, a hopeless

feeling; hence, the relatively lower classification of this *Ponteio*, in terms of both valence and arousal.

In *Ponteio* 36 (Figure 14), both assigned emotions, regret and rejection, are very close in both dimensions. Rejection is placed in a more intense (negative) valence since this term was chosen considering the moment when the piece presents its major dynamic contrast, allied to some timing changes. Nevertheless, in the interpreter's conception, timing is more associated with the emotion of regret since the melodic line is loaded, in most parts of the piece, with rhythmic-temporal manipulations, as though it was moaning.

In *Ponteio* 41 (Figure 14), the emotion of sorrow achieves the lowest (most) negative valence compared to the other emotions. According to the interpreter's conception, this emotion is emotionally more charged based on the interweaving melodic lines and the dynamic contrasts. This same emotion is placed in a relatively low level of arousal; this rating may be due to the timing changes and the insistence on a four-semiquaver rhythmic-melodic cell of arpeggios, which are prolonged and rhythmically intensify this *Ponteio* movement, especially in m. 9-18. On the emotion of gloom, the valence and arousal levels are lower. Despite being the same piece, the choice of this emotion is because the piece is written in a lower register, contributing to the general character of the piece. This fact was commented on in the interviews conducted with the pianist volunteers.

According to Figure 14, from the perspective of the performer, the proposed emotions can be gathered into two groups: Group I (*Ponteios* 36 and 41) – high arousal and low valence – and Group II (*Ponteios* 11 and 31) – low arousal (more negative value) and high (negative) valence. Despite the dispersion of assigned emotions for both populations in the live performance data collection sections, reanalyzing the data according to these classifications, i.e., considering each set of four emotions as Group I or II, one observes that the performer communicates these emotions for *Ponteios* 36 and 41 for 58 % and 41 % of the participants, respectively. A higher degree of communication can be observed in the case of the assigned emotions belonging to Group II: *Ponteio* 11 (68 %) and *Ponteio* 31 (66 %).

It is worth noting that the two *Ponteios* belonging to Group I are characterized by more contrasting dynamics, more alteration in timing, a more dramatic melodic line and a clear climax. Such pieces have the indication of *Tristemente* (Sadly). On the other hand, those belonging to Group II are characterized by a low level of dynamics, a soft timbre and retained timing. Such *Ponteios* are marked *Triste* (Sad). Although no linguistic justification, to the best of our knowledge, can justify the degrees of sadness based on the use of the adjective or the adverb, in the present set of four *Ponteios*, those bearing the adverb indication (sadly) seem to be slightly sadder than the other two pieces marked sad.

3 – Final remarks

The diversity and complexity of variables involved in studies that address emotion in music are vast, encompassing the specificities of the interpreter, the composer and the audience.

As an interpreter, one of the challenges is the abstraction, the identification and the pursuit of potential structural and expressive key parameters for the communication of the different nuances of sadness. In the case of the **MS** population, despite the dispersion of the perceived emotions found in the results from the forced-choice questionnaire, the interviews revealed a good perception of the intended expressive resources manipulated by the interpreter. There was a good consensus among the musical structure, expressive resources and interpretative choices, particularly those concerning manipulation of the temporal structures (timing) and dynamic level. In the case of the **ES** population, the use of the prototype model, although providing a broad gamma of sadness nuances, seemed to be unsuitable, perhaps due to the intrinsic idiosyncratic meaning of each term.

The analysis of the sound wave profile decomposed in an axis associated with valence-polarized and another assigned to arousal-polarized seemed to be a potential tool for classifying the degree of a given basic emotion. Interestingly, in the set of four investigated *Ponteios*, the interpretation of the *Ponteios* marked *Triste* (Sad) could be discriminated from those marked *Tristemente* (Sadly) in the case of the music student population. Such results suggest that the interpreter was capable of capturing the subtlety implicitly indicated by the composer and that was perceived by the music students. The differences in timing highlighting (or not), dynamic contrast levels and the presence or not of a climax were noted in terms of the characteristics that contributed to these distinctions in two groups of *Ponteios*.

Guarnieri wrote eight *Ponteios* that are explicitly associated with sadness, five with happiness and seven with calmness. Would one be able to relatively classify them in terms of nuances in each basic emotion? Tuning expressive and structural parameters seems to one potential key to provide the nuances of a given emotion. Furthermore, live emotional communication seems to be a rich research field, especially considering that it is very close to the reality of a musician.

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