A pilot study in the ear training class
Um estudo piloto na aula de formação auditiva

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Abstract

This study aims to measure the impact of a multidisciplinary and multidimensional proposal on the auditory recognition of the rhythmic/metrical structure, melodic/harmonic organization, expressive elements and stylistic/instrumental diversity. Given the characteristics and the aims of the study was developed an experimental design of a control group with pre-test and post-test. Forty-two students of a higher education institution were involved in the study (n=21 experimental group and n=21 control group), their ages ranging from 18 to 49 years. The data were collected in the beginning and at the end of the implementation period (40 sessions of 30 minutes duration) through the application of the Individual Knowledge Test and the Auditory Recognition Test. The results reveal the existence of significant differences between the performance results of the experimental group and the control group regarding the auditory recognition of the rhythmic/metric structure and the melodic/harmonic organization. In the case of the remaining variables, there were no significant differences between the performance results of the experimental and control groups.
Keywords: *Musical hearing; auditory recognition; music; musical training.*

Resumo

Este estudo pretende aferir o impacto de uma proposta pluridisciplinar e multidimensional no reconhecimento auditivo da estrutura rítmica/métrica, organização melódica/harmónica, elementos expressivos e diversidade estilística/instrumental. Face às características e objetivos do estudo, foi desenvolvido um design experimental de grupo de controlo com pré-teste e pós-teste. Participaram quarenta e dois alunos de uma instituição de ensino superior (n=21 grupo experimental e n=21 grupo de controlo), com idades compreendidas entre os 18 e 49 anos. Os dados foram recolhidos no princípio e no final do período de implementação (40 sessões de 30 minutos de duração) através da aplicação do Teste de Conhecimento Individual e do Teste de Reconhecimento Auditivo. Os resultados revelam a existência de diferenças significativas entre os resultados de desempenho do grupo experimental e grupo de controlo relativamente ao reconhecimento auditivo da estrutura rítmica/métrica e organização melódica/harmónica. No caso das restantes variáveis, não existem diferenças significativas entre os resultados de desempenho dos grupos experimental e de controlo.
Palavras-chave: *Audição musical*; *reconhecimento auditivo*; *música*; *formação musical*.

Introduction

The ear training is a preponderance factor in the formation of a musician. This connection is manifest in various academic discourse and empirical studies related to teaching and musical practice (Cook, 1990; Elliot, 1995; Gromko, 1993; Karpinski, 2000; Kerchner, 2014; Shifres & Burcet, 2013). In this particular case, Malbrán (1996) considers hearing as a multiple and simultaneous model of information processing that allows the constitution of a mental representation of what heard, predicts the continuity of the musical discourse and compares with what heard. This perspective places the hearing as an activity that crosses a set of components that contribute to the establishment and sense of the sound relations existing in a

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musical work. It represents an intricate art that involves intellect, memory and apprehension sensitivity (Meyer, 1956; Kerchner, 2014). In this particular, Elliot (1995) describes hearing as a specific human activity that represents a form of thinking and knowing in action. The author argues that the hearing should be worked in a direct relationship with the musical practice, where learning to listen *deeply and intelligently for the music of a particular practice requires that students learn music from inside musical practices, from the perspective of reflective musical practitioners* (p. 101). This pragmatic perspective highlights the actions and results produced in a specific context. In this line, Gromko (1993) suggests the auditory training as a priority in the teaching of music, since without this ability to perceive components of musical discourse the *listener is necessarily left with highs and lows, louds and softs, and the general character of the sound. With training, listeners can evaluate the music's artistic shape based on the structure of its musical sounds* (Gromko, 1993, p. 46). In this development of the auditory competences, Karpinski (2000) considers necessary the involvement of other indispensable elements of the musical practice. We speak of auditory recognition of texture, timbre, time, dynamics and articulation. All aspects associated with the performance and musical composition that a musician must be able to identify and to discriminate aurally (Karpinski, 2000). For example, in the structural hearing proposed by Subotnik (1996) musical understanding is achieved through trial establishing relationships within the music.

Based on the phenomenological thought of Merleau-Ponty (1996), Caznok (2008) presents the idea that the perception of the musical work does not only occur through the auditory organs but by an intercommunication, crossing and transference between the different sensorial domains (visual, tactile, corporal and kinesthetics sensations). This multi-sensoriality leads to an outcropping of its totality. This thought is also reinforced by Kerchner (2014) who places musical hearing as a multisensory experience.

The simultaneity and complexity of the numerous cognitive processes that occur in auditory activities (comparison, anticipation, fusion, prediction, remembrance) are another factors that we must consider (Levitin, 2011; Stern, 2010; Tan, Pfordresher & Harré, 2010; Rowell, 1984; Blechner, 1978). In particular, the memory appears as a fundamental tool not only for its fixing ability and storage but also as a factor of evocation and cognitive persistence in the reconstruction of thought and musical knowledge (Baremboim, 2009; Damásio, 1995; Sacks, 2008). The understanding of hearing as an active cognitive process has been demonstrated in many ways by music theorists and researchers (Bamberger, 2006; Baroni, 2009; Addessi & Pachet, 2005; Serafine, 2013; Reybrouck, 2006). This circularity between thinking and listening is an element present in the work Teaching Approaches in Music Theory (2004). The author

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puts the hearing as a fundamental element to reach the heart of the music. This interpretation carries the idea that a better understanding of the music also represents a better hearing. For Rogers (2004) *we do not learn how to hear just to make analysis easier. We also do analysis to make listening easier, and it is this second possibility that is so often overlooked in the ear training class* (p. 103). This relationship had already been highlighted by Hindemith (1984), stating that during the hearing process of the musical structure, the listener mentally built a parallel image. At the same time as there is a register of the compositional components reaching the sphere of the subject (listener), he tries to match these elements with the parts of the mental construction. Regardless of the definition that we can create, the central fact that we must retain is that the auditory recognition of different constituent elements of the musical context will allow a considerable improvement of the musical practice in all its amplitude.

Establishing a bridge with pedagogical practices carried out in the context of music teaching, mainly in the domain of the curricular units associated to the construction and development of the musical formation of the individuals, we verified that the auditory work is associated with a conception of music and musician that predominates in the western world: (1) the development of the musical ear is dependent on the abilities and strategies associated with the viability of the translation of sound sets to musical notation; (2) the professional training of a musician is marked by a model that is based on the development of instrumental technique and the acquisition/mastery of musical notation. This perspective reduces the development of musical hearing to two sequential chains: (1) listening to sound series, linking to theoretical concepts and their translation into musical notation; or (2) the reading of musical signs, their association with theoretical concepts, association with series of sounds and the execution of these sonorities. Circumscribing and centralizing the practice of listening in this perspective is, in our view, limiting and even contradictory to the diversity of musical experiences that are characteristic of the profession or that form the academic and professional path of a musician.

With the objective of forming a body of knowledge that makes it possible to renew the existing pedagogical practice in the field of musical education, a multidisciplinary and multidimensional proposal has been developed that values and explores not only the hearing, but also the expression[1], through the development of competencies that integrate fundamental concepts, methods and instruments for knowing and doing in context. The understanding of musical experience as the set of implications that result from the involvement of the human being (as a psychological subject), allows a holistic view of the development and construction

[1] In this context, the *expression* is understood as synonymous with action and musical act, and can encompass other musical activities, such as singing, improvising, composing and performing.

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of musical understanding. The multidimensionality of the proposal allows crossing fundamental elements inherent in the experience in music.

This pilot study aims to elaborate, implement and evaluate the impact of a multidisciplinary and multidimensional proposal on the auditory recognition of the rhythmic/ metrical structure, melodic/harmonic organization, expressive elements and stylistic/instrumental diversity. Given the character and objective presented for this course of research, where it is intended to establish relations of chance between variables, with the use of rejection or acceptance of hypotheses concerning these same relations, an experimental research design of control group with pre-test and post-test.

Method

Participants

Participated in this study a total of forty-two students of both sexes, aged between 18 and 49 years old who attend a degree in music (ear training class), belonging to an institution of higher public northern teaching from Portugal. Participants were randomized into two groups: experimental group (N = 21) and control group (N = 21). This strategy allowed controlling and eliminating the effects of parasitic and moderating variables throughout the research process, increasing internal validity and reducing bias (Freixo, 2011). All participants were informed of the content, structure and procedures of the study granting their authorization for the publication of the results. The anonymity and confidentiality of all participants were guaranteed.

Instruments

For this study, we build the following data collection instruments: *Individual Knowledge Test* (IKT); and (2) *Auditory Recognition Test* (ART). The application of the Individual Knowledge Test had the purpose of assessing the level of knowledge of the subjects in the tonal, rhythmic and theoretical dimension. In operational terms, this test is based on recognition, with the use of audition of music recorded in audio, and written record of fundamental aspects of musical discourse. For the correction of the IKT were created a rating scale of numerical criteria (Gordon, 2002; Azzara, 1993) with differentiated quotations for each of the dimensions under evaluation. The Auditory Recognition Test had as objective to evaluate the level of comprehension and auditory recognition of the different categories present in the auditory analysis activities that constitute the proposal: *rhythmic/metric structure* (MRE), *melodic/harmonic organization* (MHO), *expressive elements* (EE) and *stylistic/instrumental diversity* (SID). This test was

applied before and after the intervention period, consisting of twenty questions subdivided by the different categories. This ART is based exclusively on the hearing of excerpts from works of the musical repertoire recorded in audio format. For the evaluation of each one of the categories, we opted for the creation and used a rating scale of five additive criteria (Gordon, 2002; Azzara, 1993).

Procedures

This study is divided into four phases:

1. The first phase of the study combines the definition, constitution and division of the sample into two distinct groups (experimental group and control group) and the collection of the initial data that characterize the levels of individual knowledge and auditory recognition of the participants in the categories under evaluation. In addition to the importance of defining reference levels (fundamental for the entire empirical course), its application allowed the participants to become familiar with the whole process of instruction.
2. The second phase of the study corresponds to the period of application of the proposal, which ran from September to June through a weekly session with a duration of 30 minutes for each of the groups (experimental and control), in a total of 40 sessions. For each of its elements was assigned a number, to maintain the confidentiality and feasibility of the whole process. Regarding the instruction and structuring of the entire methodological procedure, each didactic unit has structured according to three complementary activities: (1) *repertoire activities*; (2) *auditory analysis activities*; (3) *context activities*.
3. After the instruction period, the individual levels of musical performance were assessed in the component defined for this study (auditory recognition). The procedure used for the individual evaluation followed the same methodological line of the initial tests.
4. The last phase corresponds to the treatment and analysis of the data. Thus, the data related to the various tests performed were treated and analysed using descriptive and inferential statistics, in order to conduct the results obtained for the evaluation or refutation of the hypotheses placed at the beginning of the present study.

Analyze

This study used descriptive and inferential statistical techniques (Rovai, Baker & Ponton, 2013; Weinberg & Abramowitz, 2008; Tuckman, 2005; Trochim, 2000). For internal consistency checks were used *Cronbach Alpha* (IKT=0,899; ART=0,843) and the *Spearman-Brown* formula

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(IKT=0,860; ART=0,46). In the case of construct validity, a factor analysis was used (total sample), using the principal component method and varimax rotation for the results obtained in the first administration of the IKT and ART tests. Preliminary tests were carried out, such as the *Kaiser-Meyer-Olkin* (KMO) test and the *Bartlett test*. For the comparative analysis of the results obtained in each of the groups of this study, the t-student parametric test was performed for independent samples. The use of this test allowed, through the comparison of the means, to verify if the probability of the difference between the means will be an effective or occasional difference. Given the particularities of its applicability, at the level of normal distribution and homogeneity of variances, the *Kolmogorov-Smirnov* test and the *Levene* test were also used. At the base of the analysis and discussion of results will be the identification of *means*, *standard deviation*, *t-student* and *p-value* (significance). For processing, analysis and interpretation of the data were used statistical analysis software *Statistical Package for Social Sciences* (SPSS).

Results

Table 1 shows the statistical results obtained by the experimental group (post-test) related to auditory recognition. As can be seen, the minimum values stood at level 2 for the recognition of components *rhythmic/metric structure*, *melodic/harmonic organization* and *expressive elements* and level 3 for *stylistic/instrumental diversity* component. Concerning their maxima, all values increase to levels 5 (*melodic/harmonic organization* e *stylistic/instrumental diversity*) and level 4 (*rhythmic/metric structure* e *expressive elements*). The mean was centred at level 3, with its maximum value in component *stylistic/instrumental diversity* (M=3,61; e SD=0,58), being the minimum value obtained by the component *rhythmic/metric structure* (M=3,19; e SD=0,60).

Variables	Minimum	Maximum	Mean	Standard Deviation
RME	2	4	3,19	0,60
MHO	2	5	3,23	0,70
EE	2	4	3,33	0,57
SID	3	5	3,61	0,58

Table 1: Descriptive results of the experimental group

RME: Rhythmic/Metric Structure; MHO: Melodic/Harmonic Organization; EE: Expressive Elements; SID: Stylistic/Instrumental Diversity.

Regarding the statistical results achieved by the control group, we can see that the results are slightly lower when compared to the experimental group. As we can see in Table 2, the minimum value stood at zero for all components, with the maximum value of 5 for the component *stylistic/instrumental diversity*. Compared to the experimental group, the values of the means show a slight inferiority throughout its amplitude, being the maximum value verified in

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the component *stylistic/instrumental diversity* (M=3,23; e SD=1,04) and the minimum value in component *rhythmic/metric structure* (M=2,52; e SD=0,74) and the *melodic/harmonic organization* (M=2,52; e SD=0,98).

Variables	Minimum	Maximum	Mean	Standard Deviation
RME	0,0	3,0	2,52	0,74
MHO	0,0	4,0	2,52	0,98
EE	0,0	4,0	2,95	0,92
SID	0,0	5,0	3,23	1,04

Table 2: Descriptive results of the control group
RME: Rhythmic/Metric Structure; MHO: Melodic/Harmonic Organization; EE: Expressive Elements; SID: Stylistic/Instrumental Diversity.

By observing the elements provided by Table 3, the high prevalence of levels 3 and 4 in all the components of the cognitive indicator stands out. Level 3 shows a degree of frequency ranging from 9 (42.9%), referring to the component *stylistic/instrumental diversity* and 13 (61,9%) for components of the *rhythmic/metric structure* and *melodic/harmonic organization*. In the case of level 4, it presents a variation of the frequency degree that goes from this 5 (23.8%) of component *melodic/harmonic organization* and 11 (52,9) in the component *stylistic/instrumental diversity*. It should be noted that there were two components where the maximum level (level 5) of the rating scale was reached and also the absence of any degree of frequency in level 1.

Variables	0	1	2	3	4	5	Totals
RME	-	-	2	13	6	-	21
	-	-	9,5%	61,9%	28,6%	-	100%
MHO	-	-	2	13	5	1	21
	-	-	9,5%	61,9%	23,8%	4,8%	100%
EE	-	-	1	12	8	-	21
	-	-	4,8%	57,1%	-	-	100%
SID	-	-	-	9	11	1	21
	-	-	-	42,9%	52,9%	4,8%	100%

Table 3: Distribution and frequency in the 5 ART tests (by score of the experimental group)
RME: Rhythmic/Metric Structure; MHO: Melodic/Harmonic Organization; EE: Expressive Elements; SID: Stylistic/Instrumental Diversity.

In the case of the control group the results (see Table 4) point to a predominance of level 3 of the classification scale for all components of the cognitive indicator, presenting very similar values, with a single exception in the component *melodic/harmonic organization*, the degree of frequency observed in the experimental group. Despite this similarity of results between the two groups participating in the study concerning level 3, there is a differentiation at higher levels (level 4), where the advantage of the experimental group is clear. This distinction can still be observed and verified at lower levels where, unlike the experimental group, there are degrees of frequency at levels 1 and 0.

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Variables	0	1	2	3	4	5	Totals
RME	1	-	7	13	0	-	21
	4,8%	-	33,3%	61,9%	0,0%	-	100%
MHO	1	1	8	8	3	-	21
	4,8%	4,8%	38,1%	38,1%	14,3%	-	100%
EE	1	-	3	12	5	-	21
	4,8	-	14,3%	57,1%	23,8	-	100%
SID	1	-	2	9	8	1	21
	4,8%	-	9,5%	42,9%	38,1%	4,8%	100%

Table 4: Distribution and frequency in the 5 ART tests (by score of the control group)
RME: Rhythmic/Metric Structure; MHO: Melodic/Harmonic Organization; EE: Expressive Elements; SID: Stylistic/Instrumental Diversity.

Considering the tests and inferential statistical procedures performed (see Table 5), we can state that:

1. For all variables, the p-value has a significance level above .05 (p> .05) in the *Kolmogorov-Smirnov* and *Levene* tests, which leads to the conclusion that there are normal distribution and homogeneity of variances.
2. There are significant differences between the results in the level of auditory recognition between the experimental group and the control group regarding the variables *recognize the rhythmic/metric structure* (t = 3.179, calculated with homogeneous variances of F = 1.013 and p = 0.320, is significant at a significance level of 0.003) and *recognize the melodic/harmonic organization* (t = 2.171, calculated with homogeneous variances of F = 2.654 and p = 0.111, is significant at a significance level of 0.010);
3. There were no significant differences between the results in the level of auditory recognition between the experimental group and the control group regarding the variables *recognize expressive elements* (t = 1.606, calculated with homogeneous variances of F = 0.073 and p = 0.788, is not significant at a significance level of 0.116) and *recognize stylistic/instrumental diversity* (t = 1.456 calculated with homogeneous variances of F = 1.795 and p = 0.188, not significant at a significance level of 0.010);
4. The elements of the experimental group showed higher results in the auditory recognition of *rhythmic/metric structure*, *melodic/harmonic organization*, *expressive elements* and *stylistic/instrumental diversity*.

Variables	Group	M	SD	K-S (sig.)	TL (sig.)	t	Sig.
RME	Experimental	3,190	0,601	0,358	0,320	3,17	0,003*
	Control	2,524	0,749				
MHO	Experimental	3,238	0,700	0,095	0,111	2,71	0,010
	Control	2,524	0,980				
EE	Experimental	3,333	0,577	0,983	0,788	1,60	0,116
	Control	2,952	0,920				
SID	Experimental	3,619	0,589	0,983	0,188	1,45	0,153
	Control	3,238	1,044				

Table 5: Inferential statistical results
M: Mean; SD: Standard deviation; K-S: Kolmogorov-Smirnov test; TL: Levene test; t: t-Student; Sig: significance level).
*significance for $p < .05$

Discussion

The results show that both groups (experimental and control) achieved gains in the different variables that constitute the study. Despite the longitudinal gains in the control group, the high performance achieved by the experimental group in all variables allows us to draw strong indicators of the impact of the proposal on the auditory recognition of the different characteristics that make up the musical discourse. This assertion finds support and grounding in the similar experimental conditions and applicability design of the proposal. However, the fact that the impact of the instruction has been statistically significant only in some of the variables allows us to raise some points of reflection. First, the results indicate that the effects of the applicability of the proposal were not felt significantly in some characteristics. In our understanding, one of the aspects that may be the basis of these results is the very sequential process used. In other words, as the whole development of the multidisciplinary and multidimensional proposal is supported by the pedagogical principles of Gordon (2000) and Azzara (2008), guided by a progressive cohesion of cycles and stages (generalization and inference), its full breadth.

On the other hand, the process of hearing a musical work implies the existence of a consistent and complementary articulation between the processes of segmentation and grouping resulting from the collaboration of some elements of music understood by the senses and organized by the mind. A grammatical structure which presupposes the organization and subordination of its elements, depending on the interpretation of the structures underlying the musical interpretation (Lerdahl & Jackendoff, 1983). To these factors is added the total input of information, construction and musical experience of the participants obtained throughout their academic and artistic journey, where the processes of teaching and learning are characterized by considering the musical elements as significant in themselves.

Another point of reflection is the absence of any developments in the expressive elements and stylistic/instrumental diversity. Can be explained by the fact that these elements represent essential resources in the acquisition of auditory competences (Karpinski, 2000). This inference finds closeness in the thinking of Levitin (2011), which invigorates the idea of the ease with which most people can identify the sounds as they recognize a colour, a fact that is due solely to the identification of the timbre and not by the height. This idea is reinforced by Schoenberg (1999) when he states that sound becomes perceptible through timbre of which height is a dimension.

Considering the results achieved in this study, we can affirm that the development and acquisition of hearing skills/abilities contribute to the understanding of fundamental concepts/characteristics of musical discourse. However, given the sequential teaching and learning process, practices and experiences of continuity and regularity are needed so that all skills can be achieved.

Conclusion

The preliminary results allow us to conclude that this multidisciplinary and multidimensional proposal presents indicators of undeniable relevance in the development and understanding of fundamental elements of musical discourse. All the data and reflections on the problematic present in this study represent an essential contribution to the improvement of the practices and pedagogical relations of all the elements present in the educational context of the domain under study. Although it is an introductory study, it is essential to develop in the future other types of approach in different dimensions on the same subject. This study wishes to draw the attention of all to the need for the existence of pedagogical practices that promote, reconfigure and transform the process of teaching and learning in ear training class.

References

Addessi, A., & Pachet, F. (2005). Experiments with a musical machine: Musical style replication in 3 to 5-year-old children. *British Journal of Music Education*, *22*, 21–46.

Azzara, C. (1993). The effect of audiation based improvisation techniques and elementary instrumental student's music achievement. *Journal of Research in Music Education, 41*(4), 328-342.

ISSN 1645-4774

Azzara, C. (2008). Improvisation and choral musicianship. In M. Holt & Jordan (Eds), *The school choral program: Philosophy, planning, organizing, and teaching* (pp. 201-239). Chicago: GIA. Publications, Inc.

Bamberger, J. (2006). What develops in musical development? In G. McPherson (Ed.) *The child as musician* (pp. 69-92). Oxford: Oxford University Press.

Barenboim, D. (2009). *Está tudo ligado: o poder da música*. Lisboa: Editorial Bizâncio.

Baroni, M. (2006). Hearing musical style: Cognitive and creative problems. In I. Deliège & G Wiggins (Eds.) *Musical creativity: Multidisciplinary research in theory and practice* (pp. 78-94). Hove: Psychology Press.

Blechner, M. (1978). Musical skill and the categorical perception of harmonic mode. *Dissertation Abstracts International*, *39*, 1931-B.

Caznok, Y. (2008). *Música: entre o audível e o visível*. São Paulo: Editora da UNESP.

Cook, N. (1990). *Music, imagination & culture*. New York. Oxford University Press.

Damásio, A. (1995). *O erro de Descartes*. Portugal: Publicações Europa América.

Elliott, D (1995). *Music Matters: A new philosophy of music education*. New York: Oxford University Press.

Freixo, M. (2011). *Metodologia científica: Fundamentos, métodos e técnicas*. Lisboa: Instituto Piaget.

Gordon, E. (2000). *Teoria de aprendizagem musical: Competências, conteúdos e padrões*. Lisboa: Fundação Calouste Gulbenkian.

Gordon, E. (2002). *Rating scales and their uses for measuring and evaluating achievement in music performance*. Chicago: GIA Publications.

Gromko, J. (1993). Perceptual differences between expert and novice music listeners: A multidimensional scaling analysis. *Psychology of Music*, *21*(1), 34-47.

Hindemith, P. (1984) *Elementary training for musicians*. London: Schott & Co. Ltd.

Karpinski, G. (2000). *Aural skills acquisition: The development of listening, reading, and performing skills in college-level musicians*. Oxford: Oxford University Press.

Kerchner, J. (2014). *Music across the senses: Listening, learning and making meaning*. Oxford: Oxford University Press.

Levitin, D. (2011). *This is your brain on music: Understanding a human obsession*. Atlantic Books Ltd.

Malbrán, S. (1996) Los atributos de la audición musical: Notas para su descripción. *Euforia: Didáctica de la música, 2*, 55-68.

Merleau-Ponty, M. (1996). *Phenomenology of perception*. Motilal Banarsidass Publishe.

Meyer, L. (1956). *Emotion and meaning in music*. Chicago: University of Chicago Press.

Reybrouck, M. (2006). Musical creativity between symbolic modelling and perceptual constraints: The role of adaptive behavior and epistemic autonomy. In I. Deliège & G. Wiggins (Eds.) *Musical creativity: Multidisciplinary research in theory and practice* (pp. 42-58). Hove: Psychology Press.

Rogers, M. (2004) *Teaching approaches in music theory: An overview of pedagogical philosophies*. USA: Southern Illinois University Press.

Rovai, A., Baker, J., & Ponton, M. (2013) *Social science research design and statistics: A practitioner's guide to research methods and IBM SPSS*. Chesapeake: Watertree Press.

Rowell, L. (1984) *Thinking about music: An introduction to the philosophy of music*. USA: University of Massachusetts Press.

Sacks, O. (2008). *Musicofilia: Histórias sobre a música e o cérebro*. Lisboa: Relógio D'Água Editores.

Schonberg, A. (1999) *Harmonia*. São Paulo: Editora UNESP.

Serafine, M. (2013). *Music as cognition: The development of thought in sound*. Columbia: Columbia University Press.

Shifres, F., & Burcet, M. (2013) *Escuchar y pensar la Música. Bases teóricas y metodológicas*. La Plata: Editorial de la Universidad de La Plata.

Stern, D. (2010). *Forms of vitality: Exploring dynamic experience in psychology, the arts, psychotherapy and development*. Oxford: Oxford University Press.

Subotnik, R. (1996). *Deconstructive variations: Music and reason in western society*. Minnesota: University of Minnesota Press.

Tan, Siu-Lan, Pfordresher, P., & Harré, R. (2010) *Psychology of music: From sound to significance*. New York: Psychology Press.

Trochim, W. (2000). *The research methods knowledge base*. Cincinnati: Atomic Dog Publishing.

Tuckman, B. (2005). *Manual de investigação em educação*. Lisboa: Fundação Calouste Gulbenkian.

Weinberg, S., & Abramowitz, S. (2008). *Statistics using SPSS: An integrative approach*. Cambridge University Press.