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Making sense out of taste: A study on listeners' preferences of performed tonal music

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Prior investigation by the author shows Lerdahl's concepts of tension and attraction to be an efficient tool for understanding performed expressive deviations. This paper reports a follow-up perceptual investigation of that study in which listener's preferences are examined in the light of the performance expressive strategies previously identified. University students were asked to rate on a seven-point scale the coherence, control of timing, control of dynamics, expressivity, tension, fluency, and global evaluation of recorded interpretations of Beethoven's Op. 53 (nine initial measures of the second movement) in which the existence or not of significant correlations between timing and dynamics as well the existence or not of significant correlations between expressive deviations and music structure had been identified in prior research. Results show that interpretations in which such correlations occur are rated systematically higher than interpretations in which such correlations are not the case.

Keywords: attraction; dynamics; musical preferences; tension; timing

Available research shows Lerdahl's (2001) concepts of tension and attraction developed in Tonal Pitch Space (TPS) to be an efficient tool for understanding perceived tension and attraction (Smith and Cuddy 2003) as well as performed expressive deviations (timing and dynamics) in tonal music (Martingo 2005, 2006, *in press*). In fact, when conducting a study on 23 commercially available recorded interpretations by world-class pianists of the nine initial measures of the second movement of Beethoven's *Waldstein* sonata (Op. 53), it was found that average dynamics correlated significantly to attraction values assigned by Lerdahl's model (Martingo *in press*). When considered individually, a panoply of expressive strategies emerged so that in 15 out of the 23 recordings analyzed, either timing or dynamics (or both, at

times) correlated to attraction or tension values (or both, at times) as predicted by Lerdahl's model (Martingo *in press*). From that study, Lerdahl's theory of tension and attraction appears to be an important instrument for understanding performed expressive deviations, especially at the local level, where structural boundaries and expressive models fail to explain satisfactorily performer's expressive irregularities (e.g. Windsor and Clarke 1997, Repp 1992a). The research now reported consists of a perceptual analysis of the expressive strategies identified in that study. In particular, listeners' preferences were investigated according to the existence or not of significant correlations between expressive deviations (timing and/or dynamics) and music structure (represented by Lerdahl's concepts of tension and attraction), which forms Experiment 1, and according to the existence or not of significant correlations between timing and dynamics, which forms Experiment 2.

METHOD

Participants

Experiment 1

For this experiment, 67 university music students participated. On average, the participants were 25 years old, had 11 years of aural training, and 10 years of instrument training. Regarding sex, 33% of the sample consisted of women and 67% of men.

Experiment 2

This experiment involved 60 university music student-participants. On average, they were 24 years old, had 10 years of aural training, and 9 years of instrument training. Regarding sex, 33% of the sample were women and 67% were men.

Materials

Experiment 1

A set of six recordings of the initial nine measures of Beethoven's Waldstein Sonata (second movement). Two presented a correlation between dynamics and tension and/or attraction (Kempff, Deutshe Grammophon DG 429306-2, Recording B; and Barenboïm, EMI C25762863-2, Recording F). Two presented a correlation between timing and tension and/or attraction: Guilels (Deutshe Grammophon DG 419162-2, Recording D) and Gieseking (Philips

456790-2, Recording E). Finally, two presented no significant correlations between expressive deviations and tension: Solomon (EMI Testament SBT1190, Recording A) and Genov (Chamber CH-CD 106, Recording C).

Experiment 2

A set of three recordings of the same musical fragment were used: one presenting a significant positive correlation between timing and dynamics (Tipo, EMI 74788625 PM518, Recording A), one presenting no significant correlation between timing and dynamics (Genov, Chamber CH-CD 106, Recording B), and one presenting a negative significant correlation between timing and dynamics (Horowitz, Sony 518802-2, Recording C).

Procedure

Subjects were briefly informed of the purpose of the experiment, asked to listen sequentially to each of the interpretations of the musical fragment, and were then provided with an answer sheet and asked to successively listen and rate on a seven-point scale (1=minimum, 7=maximum) each one of the interpretations according to seven parameters: coherence, control of timing, control of dynamics, expressivity, tension, fluency, and global evaluation. Data analysis was carried out using Factor Analysis.

RESULTS

Exploratory Factor Analysis was applied to the data using the Principal Components method to reduce the original parameters (seven criteria per recording) into factors. Factor Analysis was found to be of an excellent applicability to the data, according to kmo (>0.87 and <0.91 in Experiment 1; >0.88 and <0.92 in Experiment 2) and *Bartlett* test of sphericity ($p<0.05$ in both studies). In fact, the data suggests that for each recording the best solution results from the extraction of one factor only (eigenvalues >1 and significant loadings >0.5). The total percentage of variance explained by each one of the factors extracted in each recording was good (>70%, <75% in Experiment 1; >66%, <76% in Experiment 2). Internal consistency/reliability of each extracted factor was tested using Cronbach Alpha and proved to be excellent ($\alpha>0.90$ in both studies: >0.92, <0.95 in Experiment 1; >0.91, <0.95 in Experiment 2). Once verified, the internal consistency of each factor and index for each recording was arrived at corresponding to the arithmetic average (unweighted) of the scores for each recording (between 1 and 7).

Table 1. Experiment 1: Descriptive statistics and Wilcoxon tests. For each index (recording), average values exhibiting the same superscript letter are not significantly different, according to Wilcoxon test ($p<0.05$).

Recordings	*N*	*Mean (±SD)*	*Mode*	*Min.*	*Max.*
Recording B*	67	4.78 (±1.10)[a]	5.0	1.3	7.0
Recording E**	67	4.61 (±1.12)[a,b]	4.3	1.7	6.6
Recording F*	67	4.38 (±1.30)[b,c]	3.9	2.1	7.0
Recording D**	67	4.32 (±1.25)[c]	5.0	1.3	7.0
Recording C***	67	4.25 (±1.22)[c]	4.9	2.0	6.7
Recording A***	67	4.19 (±1.09)[c]	3.7	2.0	6.9

Key. *Recording exhibiting a significant correlation between dynamics and structural factors (attraction and/or tension). **Recording exhibiting a significant between timing and structural factors (attraction and/or tension). ***Recording exhibiting no significant correlation between expressive deviations and structural factors.

Table 2. Experiment 2: Descriptive statistics and Wilcoxon tests. For each index (recording), average values exhibiting the same superscript letter are not significantly different, according to Wilcoxon test ($p<0.05$).

Recordings	*N*	*Mean (±SD)*	*Mode*	*Min.*	*Max.*
Recording A*	60	4.7 (±1.1)[a]	5.7	2.1	6.9
Recording C**	60	4.5 (±1.0)[a]	3.7	2.3	6.4
Recording B***	60	4.1 (±0.9)[b]	3.3	2.3	6.1

Key. *Recording exhibiting a positive significant correlation between timing (duration) and dynamics (a *crescendo* is accompanied by a *ritardando*). **Recording exhibiting a negative significant correlation between timing (duration) and dynamics (a *crescendo* is accompanied by an *accelerando*). ***Recording exhibiting no significant correlation between timing (duration) and dynamics.

Regarding Experiment 1, in which listener's preferences were investigated based on the existence or not of a correlation between expressive deviations and music structure, it was found that the recordings in which either timing or dynamics correlated at a significant level to structural factors (recordings B, E, F, and D) presented higher values than recordings exhibiting no correlation between expressive deviations and music structure (recordings A and C). In particular, recording B presented values significantly higher ($p<0.05$) than recordings F, D, C, and A, and recording E presented values significantly higher ($p<0.05$) than recordings D, C, and A. The recordings in

which there was no correlation between expressive elements and music structure (recordings C and A) presented values which, although lower than all the others, were not significantly lower than recordings F and D (Table 1).

Regarding Experiment 2, which focused listener's preferences based on the existence or not of correlations between expressive deviations (timing and dynamics), it was found that the recordings in which timing correlated to dynamics (either positively as in recording A or negatively as in recording C) presented significantly higher values ($p<0.05$) than the recording in which no correlation between expressive deviations existed (Recording B) (Table 2).

DISCUSSION

From the factorial analysis of data, it becomes apparent that participants do not discriminate among factors but rather rate the parameters of each recording according to a global assessment. Regarding listener's preferences, results indicate that higher ratings are assigned to recordings in which expressive deviations correlate to music structure—as represented by Lerdahl's concepts of tension and attraction (Experiment 1), as well as to interpretations in which expressive factors correlate to each other (Experiment 2)—than to recordings in which no such correlations exist. This would indicate that the systematization of expressive deviations as well as their relation to music structure constitutes a rationale for listener's preferences. However, it remains to be ascertained whether the same results would be obtained from a larger sample of participants and materials. Regarding Experiment 1, further investigation is needed to determine whether the lower ratings of interpretations exhibiting no significant correlation turn out at a significant level, as well as to determine additional factors explaining differentiated ratings of interpretations in which such correlations occur. Regarding Experiment 2, the clear-cut significantly lower rating of the recording in which timing does not correlate to dynamics is in need of further investigation in order to rule out the hypothesis of other characteristics of the recording being responsible for the result arrived at. Notwithstanding, results are consistent with prior investigation showing music structure to be of primary importance in the shaping of musical interpretations and listener's expectations (Repp 1992b) as well as with studies showing the operationality of Lerdahl's theory as a cognitive framework and research tool (Smith and Cuddy 2003). In sum, the research now reported is expected to contribute to an understanding of taste and musical preferences as a structured and rationally determined phenomenon.

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