Effects of the Listening Context on the Audience's Perceptions of Artistry, Expressiveness, and Affective Qualities in the Piano Performance

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ABSTRACT

According to the previous studies, visual information enhances the audience's perception of the performer's expressivity, but no such effects are evident in their affective impressions of late Romantic pieces. Moreover, our previous study suggests that the pianist's affective interpretations can be communicated successfully to the audience only through the sound. The purpose of the present study was to investigate whether the performer's visual information plays similar roles during a "live" concert. We arranged 13 separate concerts in which each of 13 professional pianists performed the same set of six pieces (2-4 minutes)—three slow and three fast, each from Bach, Schumann, and Debussy—in front of different groups of the audience consisting of 11-23 university students ($N = 211$). Ten weeks later, the same audience listened to the live recording (i.e., only the sound) of the same pianist's performances in the same auditorium. In both contexts, the audience evaluated each performance in terms of artistry, expressiveness, and affective qualities (measured by 11 adjectives) on 9-point Likert scale, which each pianist also rated after his or her concert. The results revealed that the performances were perceived more artistically and expressively in the concert than in the recorded context regardless of the piece. A three-mode positioning analysis also showed that the audience could perceive the pianist's affective interpretations more successfully in the concert than in the recorded context. These results suggest that sharing the common time and place enhances the communication of information from the performer to the audience.

I. INTRODUCTION

Previous studies consistently showed that visual presentation of a music performance enhances the audience's perception of expressiveness (Broughton & Stevens, 2009; Davidson, 1993, 1994, 2002; Shoda & Adachi, 2012b; Wanderley, Vines, Middleton, McKay, & Hatch, 2005). Visual information also facilitates communication of a performer's intended emotions that are described by single adjectives (e.g., happiness, sadness) (Ohgushi & Hattori, 1996). In our previous study (Shoda & Adachi 2012b) using a pianist's performances of Rachmaninoff's pieces (Shoda & Adachi, 2012a) as acoustical and visual stimuli, the pianist's affective interpretations, manifested in his evaluation of multiple adjectives, were communicated well via acoustical information. Added visual information of the performance on a video screen did not affect the audience's perceptions of the affective qualities. Thus, the visual effects in musical performance differ as a function of information transmitted to the audience: the performer's intended level of expressivity and his/her affective interpretations, at least in a laboratory setting. Visual information in a live performance may contribute something different from that found in the laboratory.

To investigate the effect of visual information on the audience's perception of a piano performance in a more ecologically valid setting, we replicated our previous studies in two realistic contexts, in which the audience experienced first live music ("live") and then its recorded music ("recorded"). We predicted that the audience would perceive artistry and expressiveness more strongly in the live than in the recorded context, due to expressive power of visual information indicated by previous studies (e.g., Broughton & Stevens, 2009; Davidson, 1993, 1994, 2002; Shoda & Adachi, 2012b). Regarding the affective qualities of the performance, we held two contrasting predictions. Visual information available at the live context might not contribute anything more than what auditory information contribute to the audience's perception of affective qualities, in line with our finding with the video presentation of the performance (Shoda & Adachi, 2012b), or it may enhance the audience's affective impressions of the performance.

II. METHOD

A. Participants

Thirteen pianists (4 men, 9 women, 24-40 years old, $M = 30.46$, $SD = 4.41$), who held a music degree either in an undergraduate or graduate level, participated in this study as performers. They were a concert pianist ($n = 1$), lecturers at a university or a vocational college ($n = 4$), piano teachers at private music institutions ($n = 7$), and a music therapist at a hospital ($n = 1$). They started to play the piano between ages 4 and 6. Each pianist is identified as P1-P13 in this paper.

Total of 211 undergraduate and graduate students (98 men, 113 women, 18-59 years old, $M = 21.55$, $SD = 4.50$) participated as members of the audience, assigned randomly to each of 13 performances in the present study. Each of them participated in both the live and the recorded contexts.

B. Musical Pieces

We used six pieces as our experimental material: b minor Prelude (Well-Tempered Clavier, Book I, No. 24, BWV869) and G major Prelude (Well-Tempered Clavier, Book II, No. 15, BWV884) by J. S. Bach; *Träumerei (Kinderszenen, Op. 15-7)* and *Aufschwung* (*Phantasiestüke,* Op. 12-2) by R. Schumann; *La fille aux cheveux de lin (Préludes* Book 2, L. 123-4) and Arabesque No. 1 (Two Arabesques for Piano, L. 66-1) by C. Debussy. We shall call these pieces as "B24," "B15," "Dreaming," "Soaring," "Girl," and "Arabesque," respectively. The composers (i.e., Bach, Schumann, Debussy) were selected, based on our previous studies (Shoda & Adachi, 2010a, 2010b), in which pianists chose these composers' pieces the most frequently as compared with the other composers' pieces in each historical period. Based on the tempo instruction on the

score, faster (B15, Soaring, and Arabesque) and slower (B24, Dreaming, and Girl) pieces—were selected for each composer. The duration of each performance ranged approximately from 2 to 4 minutes.

C. Apparatus

Experiments took place in a small auditorium (with the maximum capacity of 114), equipped with a grand piano (GP-193, Boston). The piano was tuned professionally one week before the live-context experiment. The performances in the live context were recorded onto a multi-track recorder (R24, Zoom) using a microphone (NT4, Rode). In the recorded-context experiment, we presented the sound of each performance recorded in the live context by means of a stereo speaker (WS-AT30, Panasonic) using a computer (MC505J/A, Apple) and an amplifier (RX-V603, Victor).

D. Procedure

Each participant was tested first in the live-context experiment. Approximately 10 weeks later, the recorded-context experiment was conducted. Each of the live-context experiments was conducted in a group of 11 to 23 participants, so that they could have a good view of the pianist. The recorded-context experiment was conducted either individually or in a group of 2 to 13 participants. We asked participants to attend to both the sound and the performer in the live context and to the sound in the recorded context.

To determine the presentation order, we adopted a block design in each context. Namely, two pieces of one composer's were presented first, followed by two pieces of another composer's, and two pieces of the other composer's. In addition, the order of the pieces was determined by the tempo of the pieces. If the pianist performed the faster piece first, the third and the fifth pieces were also the faster ones, and vice versa. Both the presentation order of the composer and that of the tempo were counterbalanced among the pianists in the live context; the same presentation order was used in the recorded context.

After each piece, the audience rated *artistry* and *expressiveness* of each performance on 9-point scale, with 1 being "Not at all" and 9 being "Extremely." In addition, the audience rated their affective impressions of the performance on 9-point scale, with 1 being "Not at all" and 9 being "Extremely," for the Japanese equivalent of 11 adjectives (see Figure 1). Each pianist also used the same set of adjectives in rating his/her performance after all the performances in the live-context experiment ended. At the end of the live-context experiment, the audience provided demographic information, including the years of musical training and daily experiences in listening to music. The live-context experiment lasted approximately 60 minutes and the recorded-context experiment lasted approximately 40 minutes.

III. RESULTS

Since the preliminary analysis did not show any significant effects of the pianist on the ratings of artistry and expressiveness, the pooled data were used in the following analyses.

A. The Audience's Perceptions of Artistry and Expressiveness

Table 1 shows how artistic and expressive each performance sounded to the audience in each context. For all the pieces, impressions appeared to be higher in the live than in the recorded context. In addition, the audience appeared to find greater *artistry* in performances of Arabesque, Girl, and Dreaming than in those of B15, B24, and Soaring. Furthermore, the audiences appeared to find greater *expressiveness* in performances of Arabesque and Soaring than in those of B24 and Dreaming.

To verify these tendencies, we performed a 2 (context) × 6 (piece) general multivariate analysis of variance for each scale. For the *artistry* scale, the main effects of context and piece were significant, Wilks' $\Lambda = .78$, $F (1, 210) = 59.79$, $p < .001$, multivariate $\eta_p^2 = .22$ (context) and Wilks' $\Lambda = .47$, $F (2, 206) = 46.67$, $p < .001$, multivariate $\eta_p^2 = .53$ (piece). Two-way interaction was not significant, Wilks' $\Lambda = .96$, $F (5, 206) = 1.67$, $p = .14$, multivariate $\eta_p^2 = .04$. For the significant effect of piece, we conducted post-hoc paired t-tests using Bonferroni's correction (overall $\alpha = .10$, subset $\alpha = .007$). The ratings for Girl and Arabesque were significantly higher than that for any other piece. The rating for Dreaming was significantly higher than those for B24, B15, and Soaring. There were no significant differences among B24, B15 and Soaring, as well as between Girl and Arabesque. These results indicate that participants found stronger artistry in the live than in the recorded context. Moreover, the tempo and/or the composer of the piece did not determine the audience's perception of the artistry. Perhaps, a sense of artistry in a piano performance may be elicited in conjunction with the affective quality of the piece (see Discussion).

For the *expressiveness* scale, the main effects of context and piece were significant, Wilks' $\Lambda = .86$, $F (1, 210) = 33.44$, $p < .001$, multivariate $\eta_p^2 = .14$ (context) and Wilks' $\Lambda = .43$, $F (2, 206) = 54.13$, $p < .001$, multivariate $\eta_p^2 = .57$ (piece). Two-way interaction was not significant, Wilks' $\Lambda = .96$, $F (5, 206) = 1.77$, $p = .12$, multivariate $\eta_p^2 = .04$. For the significant

Table 1. The audience's perceptions of artistry and expressiveness for each performance in each context.

Piece	Artistry		Expressiveness	
	Live	Recorded	Live	Recorded
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
B24	6.01 (1.90)	5.37 (2.04)	5.09 (2.19)	4.61 (1.96)
B15	5.72 (1.71)	5.43 (1.94)	6.05 (1.90)	5.73 (2.02)
Dreaming	6.80 (1.79)	6.22 (1.83)	5.89 (2.05)	5.41 (2.11)
Soaring	6.10 (1.75)	5.57 (1.95)	6.98 (1.76)	6.40 (1.84)
Girl	7.12 (1.55)	6.46 (1.83)	6.21 (1.88)	5.78 (1.92)
Arabesque	7.21 (1.50)	6.47 (1.78)	7.23 (1.55)	6.46 (1.77)

Note. B24: b minor Prelude (Well-Tempered Clavier, Book I, No. 24, BWV869); B15: G major Prelude (Well-Tempered Clavier, Book II, No. 15, BWV884); Dreaming: *Träumerei* (*Kinderszenen*, Op. 15-7); Soaring: *Aufschwung* (*Phantasiestüke*, Op. 12-2); Girl: *La fille aux cheveux de lin* (*Préludes* Book 2, L. 123-4); Arabesque: Arabesque No. 1 (Two Arabesques for Piano, L. 66-1)

effect of piece, we conducted post-hoc paired *t*-tests using Bonferroni's correction (overall $\alpha = .10$, subset $\alpha = .007$). The ratings for Soaring and Arabesque were significantly higher than that for any other piece, as well as the rating for B15 was significantly higher than that for B24. For the slower pieces, Girl was rated as significantly more expressive than Dreaming, and B24 was rated as significantly less expressive than any other piece. In other words, interactions between the tempo and the composer of the piece determined the current audiences' perception of expressiveness: Schumann's and Debussy's faster pieces were perceived as the most expressive, and Bach's slower piece was perceived as the least expressive.

B. Communicability of the Pianists' Affective Interpretations

To examine the effects of the context on the audience's perceptions of affective qualities, we conducted a three-mode exploratory positioning analysis, which was developed originally in Toyoda (2001) and later was applied in Shoda and Adachi (2012b). The purpose of this analysis was to visualize relationships between "scale" (e.g., happy, sad) and "target" (e.g., Schumann's Dreaming in the concert context) on the same plane of coordinates (x, y). In the present study, we conducted a three-mode exploratory positioning analysis by using Calis procedure in SAS (SAS Institute Inc., 2009) with the following three-mode data: participants ($N = 211$) × scales ($l_1 = 11$ adjectives) × targets ($l_2 = 12$, i.e., combination of six pieces and two contexts). The fit indices were .82 both by GFI

(goodness-of-fit index) and by AGFI (adjusted goodness-of-fit index); this seemingly low fit indices often occur when the degree of freedom is large, such as $df = 8699$ in the present analysis (Toyoda, 2001). In fact, RMSEA (root mean square error of approximation), which indicates the fitness for one degree of freedom, was .09, revealing the fitness of the present analysis to be adequate and reliable.

We mapped 11 scales and 12 targets on the same two-dimensional plane of coordinates (Figure 1). Then, we calculated the centroid of the pianist's affective interpretations for each piece as the standard (i.e., the representative values of the pianist's affective interpretations). We shall demonstrate how we calculated the centroid by taking P1's ratings for B24 as an example.

P1's ratings for 11 adjectives were represented as a vector:

P1
= (*Dreamy Serene Happy Sad Vigorous Exciting Graceful Dignified Angry Whimsical Fearful*)
= (3 7 2 5 8 2 5 9 1 1 1)

The factor loadings for dimensions 1 (D1) and 2 (D2) for these adjectives were as follows:

D1
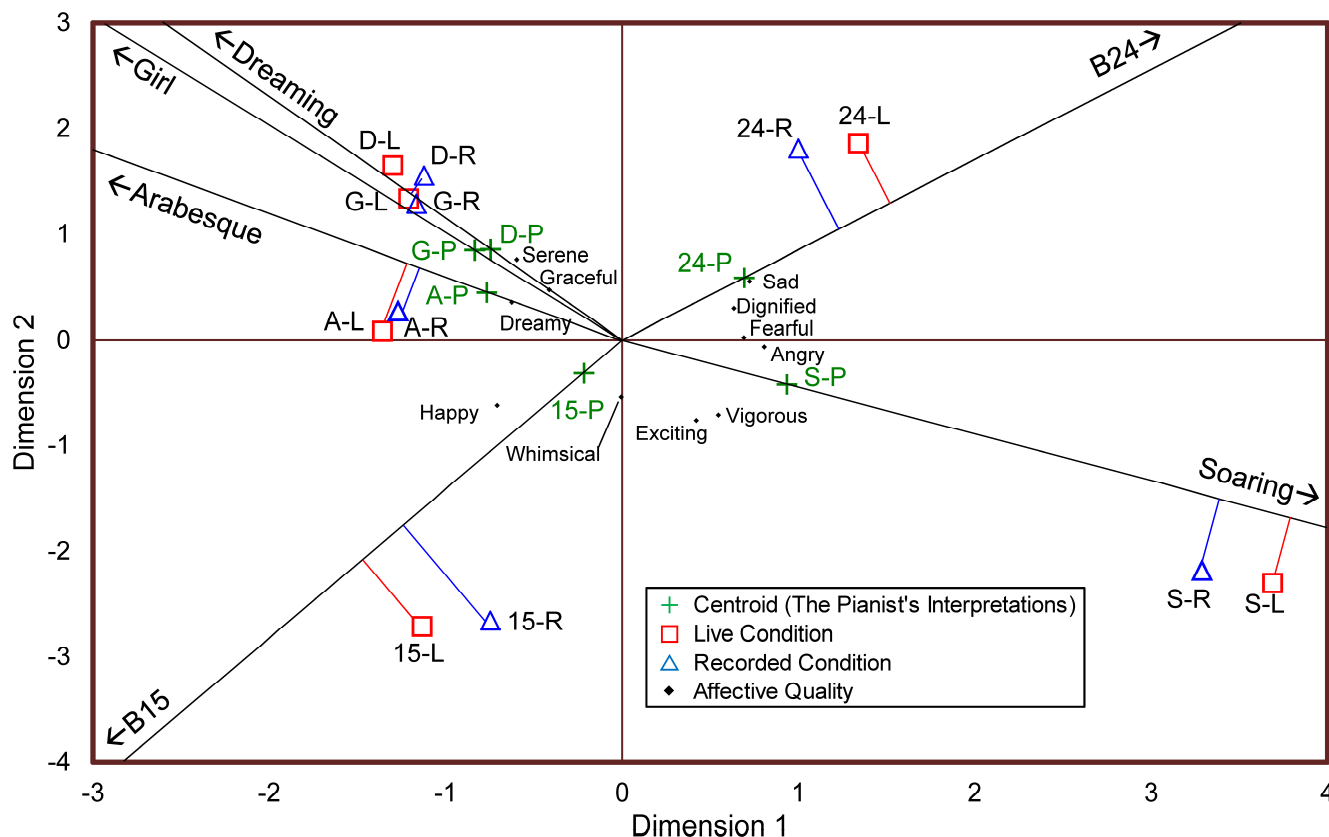= (*Dreamy Serene Happy Sad Vigorous Exciting Graceful Dignified Angry Whimsical Fearful*)

Figure 1. The two-dimensional plot representing the relative positions of the audience's impressions of each piece as compared with the centroid of the pianist's affective interpretations, as obtained from three-mode exploratory positioning analysis. Each target is indicated by the combination of the name of the piece and the context. The abbreviations in the plot are as follows: **L = live context, R = recorded context, P = the pianist's affective interpretations, 24 = B24, 15 = B15, D = Dreaming, S = Soaring, G = Girl, and A = Arabesque.**

= (-0.63 -0.60 -0.71 0.72 0.55 0.42 -0.41 0.63 0.81 -0.01 0.69)

D2

= (*Dreamy Serene Happy Sad Vigorous Exciting Graceful Dignified Angry Whimsical Fearful*)

= (0.36 0.76 -0.62 0.56 -0.71 -0.76 0.47 0.30 -0.06 0.54 0.02)

The pianist's rating for each adjective was multiplied by the factor loading of the corresponding adjective for each dimension. The multiplied values for all the adjectives were summed up for each pianist. In other words, the inner product of the pianist's ratings and the factor loadings was calculated for each dimension.

P1·D1

= (-1.88) + (-4.18) + (-1.42) + 3.61 + 4.37 + 0.84 + (-2.06) + 5.71 + 0.81 + (-0.01) + 0.69 = 6.48

P1·D2

= 1.07 + 5.33 + (-1.24) + 2.78 + (-5.67) + (-1.52) +2.37 + 2.69 + (-0.06) + (-0.54) + 0.02 = 5.23

Finally, those inner products were divided by the number of the adjectives (i.e., 11).

The centroid (Dimension 1) = 6.48/11 = <u>0.59</u>
The centroid (Dimension 2) = 5.23/11 = <u>0.48</u>

Thus, the coordinate of the centroid for P1's performance of B24 was (0.59, 0.48). We calculated the mean coordinate of the centroid for each piece (indicated by + in green in Figure 1). Each centroid represents the pianist's overall affective interpretations for the corresponding piece that were reconstructed by the audience's impressions.

Figure 1 illustrates that the positions for the audience's impressions and the pianist's interpretations were on the same quadrant for each piece, indicating that the affective qualities of each piece perceived by the audience were concordant with those interpreted by the pianist. More specifically, for both the audience and the pianist, B24 was a *sad*, *dignified*, and *fearful* piece; B15 was a *happy* but *whimsical* piece; Soaring was an *angry*, *vigorous*, and *exciting* piece; and the remaining three pieces were *serene*, *graceful*, and *dreamy* pieces.

Note that a diagonal line passing through the centroid (indicated by +) and the origin of the coordinates (0, 0) represents an axis determining the degree of concordance between the audience's and the pianist's ratings. By intersecting the axis with the orthogonal line deriving from each target (i.e., the performance of each piece presented to the audience in two contexts, depicted as a red square and a blue triangle), we can capture the relative distances between the targets directly on the corresponding axis. The furtherer away the intersecting points are from the origin of the coordinates, the more successfully the pianist's affective interpretations of the corresponding piece are communicated to the audience. In Figure 1, the positions of the live contexts for all six pieces were furtherer away from the origin of the coordinate than those of the recorded contexts. However, this tendency was much clearer for B24, B15, and Soaring than Dreaming, Girl, and Arabesque. This appears to indicate that the effect of

context on the audience's perception of the pianist's affective interpretation may interact with the type of piece.

IV. DISCUSSION

Audience perceived artistry and expressiveness more powerfully in a live context. We also demonstrated that, in general, the pianist's affective interpretations were communicated more successfully in the live than in the recorded context, by means of a three-mode exploratory positioning analysis. These results suggest that the availability of the acoustical and the visual information in a *live* performance can enhance the perception of artistic, expressive, and affective information transmitted by the performer, unlike our findings in a video-recorded performance (Shoda & Adachi, 2012b). Perhaps, a variety of factors associated with a live performance (e.g., the pianist's body movement, the pianist's facial expressions, the audience's pre-performance expectation or excitement, socio-cultural rules in a classical music concert) successfully kept the audience's attention toward the performance.

The positive effect of live performance, however, appeared to differ as a function of musical piece. For Dreaming, Girl, and Arabesque, in particular, whether the audience was experiencing these performances in live did not appear to affect the degree of concordance between the pianist's affective interpretations and the audience's affective impressions. This means that, for those three pieces, the sound by itself could sufficiently transmit the pianist's affective intentions to the audience, in line with Shoda and Adachi (2012b). Since the audience perceived the greater artistry in the performances of these pieces as compared with those of the others, the sense of artistry and affective impressions elicited in the audience may be inseparable; these confounding elements may have resulted in differential effects of listening context.

Hence, the *artistry* and the *expressiveness* may be induced differently in the audience's mind even though these two words can often be used interchangeably. The present results appear to suggest that the *expressiveness* may be determined by the tempo and/or the musical style (i.e., Baroque, Romantic, Modern), that is, the external (or objective) aspects in the audience's experience of musical performance. On the other hand, the *artistry* may be associated with the perceived affective quality of the piece, that is, the internal (or subjective) aspects of the audience's experience. These conjectures need to be examined along with the acoustical and the physical properties of the performances in a future study.

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REFERENCES

Broughton, M., & Stevens, C. (2009). Music, movement and marimba: An investigation of the role of movement and gesture in communicating musical expression to an audience. *Psychology of Music*, *37*(2), 137-153.

Davidson, J. W. (1993). Visual perception of performance manner in the movement of solo musicians. *Psychology of Music*, *21*(2), 103-113.

Davidson, J. W. (1994). Which areas of a pianist's body convey information about expressive intention to an audience? *Journal of Human Movement Studies*, *26*, 279-301.

Davidson, J. W. (2002). Understanding the expressive movements of a solo pianist. *Musikpsychologie*, *16*, 9-31.

Lindström, E., Juslin, P. N., Bresin, R., & Williamon, A. (2003). 'Expressivity comes from within your soul:' A questionnaire study of music students' perspectives on expressivity. *Research Studies in Music Education*, *20*(1), 23-47.

Ohgushi, K., & Hattori, M. (1996). Emotional communication in performance of vocal music. In B. Pennycook & E. Costa-Giomi (Eds.), *Proceedings of the Fourth International Conference on Music Perception and Cognition* (pp. 269-274). Montreal, Canada: McGill University.

SAS Institute Inc. (2009). *SAS/STAT® 9.2 user's guide.* Cary, NC: SAS Institute Inc.

Shoda H., & Adachi, M. (2010a). Effects of the musical period on the pianist's body movement: Its time-series relationships with temporal expressions. In S. M. Demorest, S. J. Morrison, & P. S. Campbell (Eds.), *Proceedings of the 11th International Conference on Music Perception and Cognition* (pp. 843-848). Seattle, WA: ICMPC11.

Shoda, H., & Adachi, M. (2010b). Piano senkosei no shintai dosa ni okeru gakkyoku yoshiki no koka [Effects of the musical period on piano-major students' body movements]. *Proceedings of the 2010 Spring Meeting of the Japanese Society for Music Perception and Cognition*, pp. 65-70.

Shoda, H., & Adachi, M. (2012a). The role of a pianist's affective and structural interpretations in his expressive body movement: A single case study. *Music Perception*, *29*(3), 237-254.

Shoda, H., & Adachi, M. (2012b). *Interactions among expressivity, affective qualities, and presentation modality of a piano performance in the performer-to-audience communication.* Manuscript submitted for publication.

Toyoda, H. (2001). Tansaku teki positioning bunseki: Semantic differential data no tame no 3 so tahenryo kaisekihou [An exploratory positioning analysis: Three-mode multivariate analysis for semantic differential data]. *The Japanese Journal of Psychology*, *72*(3), 213-218.

Wanderley, M. M., Vines, B. W., Middleton, N., McKay, C., & Hatch, W. (2005). The musical significance of clarinetists' ancillary gestures: An exploration of the field. *Journal of New Music Research*, *34*, 97-113.