Dimensions of Emotion in Expressive Musical Performance

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ABSTRACT: This paper explores the dimensions of emotion conveyed by music. Participants rated emotion terms after seeing and/or hearing recordings of clarinet performances that varied in expressive content. A factor analysis revealed four independent dimensions of emotion. Changes to the clarinetists' expressive intentions did not significantly affect emotions conveyed by sound. It was largely through the visual modality that expressive intentions influenced the experience for observers.

KEYWORDS: crossmodal interactions; music cognition; emotion; performance

BACKGROUND

Multisensory Integration in Music

Musical performance involves both auditory and visual communication between musicians and observers. Body movements and postures convey a person's mental states and emotions.[1,2] Past research revealed that musicians' physical gestures convey their expressive intentions more accurately than the musical sound,[3] and that seeing a musician has a significant impact on the temporal dynamics of the experience for observers.[4] Additionally, music and dance can induce similar experiences of emotion and structural form.[5] Thus, the visual aspect of musical performance contributes information that is relevant to the audience's emotional response.

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Ann. N.Y. Acad. Sci. 1060: 1–5 (2005).
doi: 10.1196/annals.1360.052

TABLE 1. Factor analysis solution

Factor no. and name	Variance accounted for	Emotion terms
I. Active positive	24%	expressivity (.86), intensity (.81) movement (.81), quality (.75) surprise (.70), interest (.68), amusement (.59)
II. Active negative	16%	disgust (.76), anxiety (.76), anger (.75), contempt (.75), fear (.66)
III. Passive positive	14%	contentedness (.77), pleasantness (.67), relief (.62), happiness (.61), familiarity (.56)
IV. Passive negative	8%	embarrassment (.80), sadness (.66)

NOTE: The numbers in parentheses are correlation values for the emotion terms and their most closely related factor dimension.

METHODS

Stimuli

Stimuli were audio–video recordings of two professional clarinettists playing a Stravinsky piece for solo clarinet in three different manners: immobile, standard, and exaggerated.[6]

Participants

Thirty musically trained members of the McGill University community were divided randomly into three treatment groups: auditory only, visual only, and auditory + visual.

Task

For each stimulus, participants rated how much they experienced 19 emotions, using a five-point Likert scale, ranging from 1 (“not at all”) to 5 (“very much”). The emotion terms (see TABLE 1) were drawn from the emotion and music cognition literatures.[5,7,8]

RESULTS AND DISCUSSION

Factor Analysis

We applied a factor analysis to identify major independent dimensions of emotion. A principal component analysis extraction method with varimax rotation produced a four-factor solution, accounting for 62% of the total variance.

TABLE 1 shows the factors (with names based on past research[9]), total variance accounted for, and the associated emotion terms. Note that the dimensions corresponding to positive and negative emotions are orthogonal to each other, not bipolar.

These data provide preliminary evidence that musical emotions are like complex real-life experiences that can involve ambivalent states with both positive and negative emotions.[10,11]

Repeated Measures ANOVA Results

We applied repeated-measures ANOVAs to the factor loadings (Z-scores for each participant on each emotion dimension). We focus here on important significant effects of the independent variables.

Active Positive Valence

The immobile condition induced significantly lower ratings overall ($P < .001$, $\eta^2 = .46$), primarily because of participants who could see the performances (see FIG. 1). Thus, the musicians' restriction of body movement tended to dampen active positive emotions when performances could be seen.

Auditory-only ratings changed very little across performance manners. Variation in the musicians' expressive intentions did not have an emotional impact by means of sound.

Only the auditory + visual group registered a linear increase in emotion from the standard manner to exaggerated. This is evidence of an emergent emotional intensity when performances can be both seen and heard (FIG. 1).

Passive Positive Valence

In contrast with ratings for performer R, passive positive emotion increased for performer W's immobile performance. There was a significant interaction between

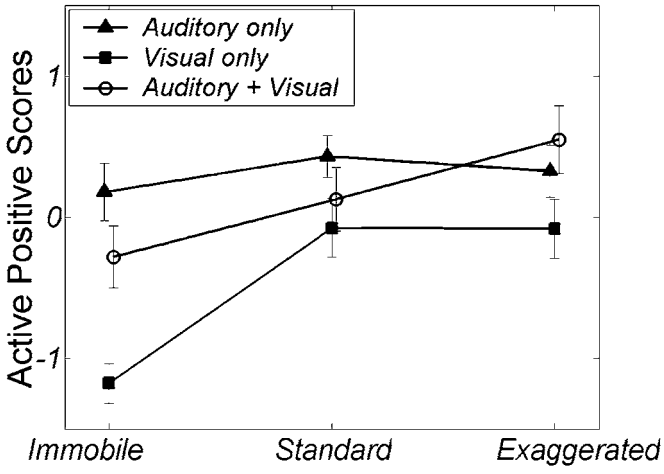

FIGURE 1. Factor loadings for the active positive dimension, with the mean and standard error of the mean shown for each presentation group and performance manner.

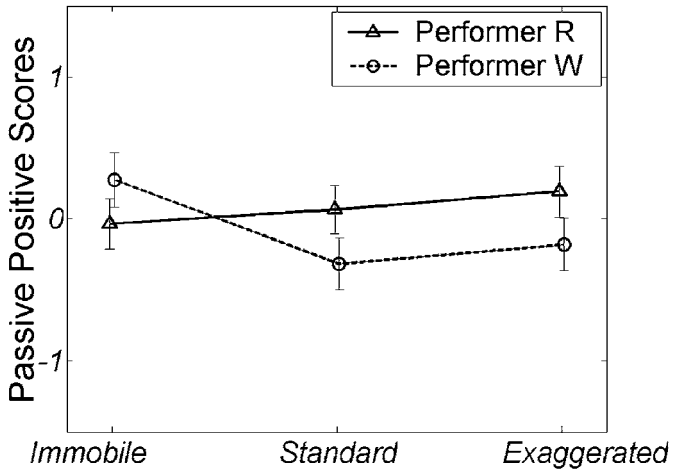

FIGURE 2. Factor loadings for the passive positive dimension, showing the mean and standard error of the mean for each performer and performance manner.

the performer and performance manner variables ($P = .015$, $\eta^2 = .14$). The relationship between induced emotion and performance intention is nonlinear (i.e., a decrease in movement does not necessarily induce a decrease in amount of emotion conveyed), and it depends on the movement pattern of each performer (FIG. 2).

Active and Passive Negative Valence

Analyses did not reveal significant effects for the negative emotions. We posit that negative valence depends largely on the musical composition itself, and not on variations in the manipulated variables.

CONCLUSIONS

Visual experience was the primary channel through which variation in the clarinetists' performance intentions influenced the emotions of observers.

Depending on the performer, a restriction in movement can actually increase positive emotions for the audience.

These data suggest that, like complex real-life emotions, musical emotions can involve ambivalent states involving both positive and negative emotions at once.

ACKNOWLEDGMENTS

Thanks go to the clarinetists and to research assistants in the Levitin Laboratory: Nora Hussein, Sawsan M'birku, Hadiya Roderique, and Laura Morris.

This work was supported by the J.W. McConnell Foundation and the CIRMMT Doctoral Fellowship and travel award (B.W.V.); a Guggenheim Fellowship and the National Science Foundation (C.L.K.); FQRNT Strategic Professor award (M.M.W.); and Valorisation Recherche Québec, the Natural Science and Engineering Research Council of Canada, and the Canadian Foundation for Innovation (D.J.L.).

[Competing interests: The authors declare that they have no competing financial interests.]

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