The Effect of a Visual Element on Musical Sensitivity

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Abstract. This research is to review sensitivity comparisons between musical rhythm and visual rhythm focused on the kinetic typography that can be utilized as a synesthesia. According to preliminary research, kinetic typography that has visual movement can be measured by AVSM (affective value scale of music), which is one of the "emotional measures for evaluation" used for music. In this research based on the preliminary study, AVSM has been used to find out the emotional difference between music itself and a visual element with musical rhythm. The possibility of musical expression by a moving visual element has been reviewed.

Keywords: Rhythm of visual element, Rhythm, Movement, Emotional value.

1   Introduction

This study is a part of studies that the rhythm made by visual element can be used instead of musical rhythm. These studies were progressed under the hypothesis that the visual element produced by musical rhythm could communicate an emotion similar to the emotion communicated by music. In this study, the emotional values of both, which are investigation 1 'musical rhythm' and investigation 2 'visual rhythm with musical rhythm', were measured. Emotional communication by both measures is similar if there is no difference statistically. And if there is any difference statistically, emotional communication by both measures is concluded to be different. This study investigated how much difference was there between music and visual element information added to music as well as how much effect it made on music.

2   Purpose and Method of Study

In this study, the measured data for emotion, which are 'Musical rhythm' and 'Visual element with musical rhythm', were compared and analyzed by using AVSM (affective value scale of music). AVSM consists of 24 adjectives(scale of 1 to 5) such as 'Gloomy', 'Light', 'Exciting', etc. Each adjective is assigned to 5 factors; 'Uplift', 'Strength', 'Solemnity', 'Affinity' and 'Lightness'. By adding up the measured value

of belonged adjective, the score of each factor's measured value is calculated. In this study, each adjective is reviewed by the criterion score whose standard is factor, rather than is compared, because basic factor of emotion makes an effect on the measured value of each adjective.

In the investigation1 'Musical rhythm', the impression evaluation was conducted with adjectives of 24 items after hearing the 4 instrumentals. In the investigation2 'Visual element with musical rhythm', the impression evaluation was conducted with adjectives of 24 items after seeing and hearing 'visual element with musical rhythm' produced by the investigation1 'Musical rhythm'. The 'visual element' was kinetic typography, which is consist of 5 vowels of Japanese, (A), (I), (U), (E) and (O). The object of research was 31 students (1st graded students of Hokkaido University of Education HAKODATE) and the period was from July to August in 2010.
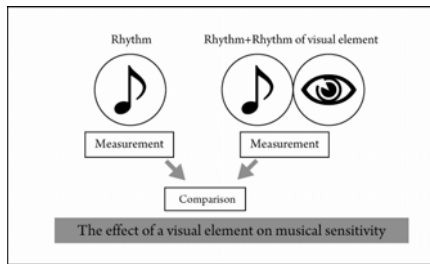

Fig.1. Experimental Composition

Table 1. Instrumentals used to experiment

Suggestion	Instrumentals
Suggestion1	Concerto for solo percussion & chamber orchestra 1st movement
Suggestion2	Sorbet No. 5
Suggestion3	Sorbet no. 7
Suggestion4	Michi

3   The Result of Research

Average score and standard deviation of each of 5 factors for 'musical rhythm' and 'visual element with musical rhythm' of Concerto for solo percussion & chamber orchestra 1st movement were found. For verifying if average value by each factor between the two has a significant difference statistically, 1 factor's ANOVA (analysis of variance), whose factors were 'musical rhythm' and 'visual element with musical rhythm' for each factor, was performed. Firstly, 'Uplift' ($F_{(1,60)}$= 0.03, *ns*), 'Strength' ($F_{(1,60)}$=1.99, *ns*), 'Affinity' ($F_{(1,60)}$=0.00, *ns*) and 'Lightness' ($F_{(1,60)}$= 0.12, *ns*) didn't show a significant difference statistically between two factors. Also, 'Solemnity' showed a marginally significant statistically ($F_{(1,60)}$=3.83, *p<.10*).
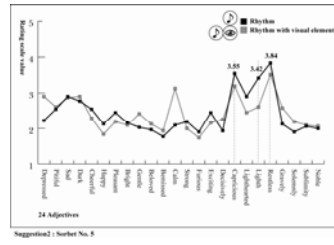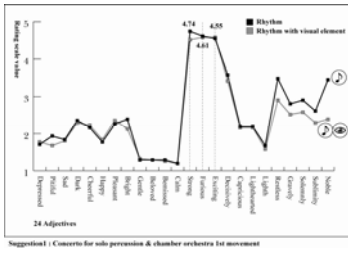
Fig. 2. The AVSM graph comparison for 'Concerto for solo percussion & chamber orchestra 1st movement'

Fig. 3. AVSM graph comparison for 'Sorbet No. 5'

Table 2. Experimental data for Concerto for solo percussion & chamber orchestra 1st movement
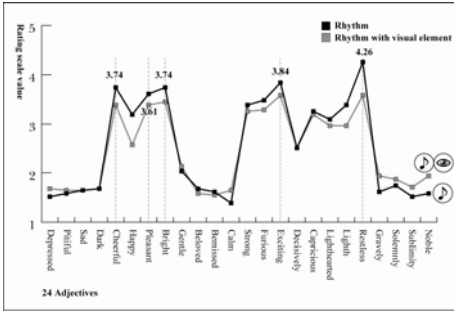
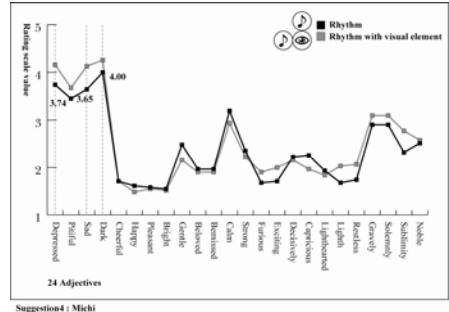| Investigation 1	Total Average	Standard deviation	Investigation 2	Total Average	Standard deviation
Factor 1 'Uplift'	23.26	5.14	Factor 1 'Uplift'	23.00	5.13
Factor 2 'Strength'	25.77	2.24	Factor 2 'Strength'	24.81	3.02
Factor 3 'Solemnity'	11.77	3.47	Factor 3 'Solemnity'	9.77	4.39
Factor 4 'Affinity'	3.87	1.31	Factor 4 'Affinity'	3.87	1.83
Factor 5 'Lightness'	5.77	2.47	Factor 5 'Lightness'	5.55	2.43

Table 3. Experimental data for 'Sorbet No. 5'

Investigation 1	Total Average	Standard deviation	Investigation 2	Total Average	Standard deviation
Factor 1 'Uplift'	25.16	6.45	Factor 1 'Uplift'	26.87	6.64
Factor 2 'Strength'	16.23	4.23	Factor 2 'Strength'	14.55	3.89
Factor 3 'Solemnity'	8.10	3.72	Factor 3 'Solemnity'	8.94	4.61
Factor 4 'Affinity'	5.77	2.76	Factor 4 'Affinity'	6.48	2.53
Factor 5 'Lightness'	9.87	3.66	Factor 5 'Lightness'	8.26	3.47

Average score and standard deviation of each of 5 factors for 'musical rhythm' and 'visual element with musical rhythm' of Sorbet No.5 were found. For verifying if average value by each factor between the two has a significant difference statistically, 1 factor's ANOVA, whose factors were 'musical rhythm' and 'visual element with musical rhythm' for each factor, was performed. Firstly, 'Uplift' ($F_{(1,60)}= 1.02$, *ns*), 'Strength' ($F_{(1,60)}=2.55$, *ns*), 'Solemnity' ($F_{(1,60)}=0.60$, *ns*) and 'Affinity' ($F_{(1,60)}=1.08$, *ns*) didn't show a significant difference statistically. Also, 'Lightness' ($F_{(1,60)}=3.06$, *p<.10*) showed a marginally significant ($F_{(1,60)}= 0.12$, *ns*).

Average score and standard deviation of each of 5 factors for 'musical rhythm' and 'visual element with musical rhythm' of Sorbet No.7 were found. For verifying if average value by each factor between the two has a significant difference statistically, 1 factor's ANOVA, whose factors were 'musical rhythm' and 'visual element with

Fig. 4. AVSM graph comparison for 'Sorbet No. 7'

Fig. 5. AVSM graph comparison for 'Michi'

Table 4. Experimental data for 'Sorbet No. 7'

Investigation 1	Total Average	Standard deviation	Investigation 2	Total Average	Standard deviation
Factor 1 'Uplift'	16.13	5.36	Factor 1 'Uplift'	17.84	4.61
Factor 2 'Strength'	22.10	3.88	Factor 2 'Strength'	20.58	4.29
Factor 3 'Solemnity'	6.45	2.58	Factor 3 'Solemnity'	7.45	4.06
Factor 4 'Affinity'	5.32	2.15	Factor 4 'Affinity'	5.26	2.27
Factor 5 'Lightness'	9.74	2.97	Factor 5 'Lightness'	9.19	2.93

musical rhythm' for each factor, was performed. There was no significant difference for all of 'uplift' ($F_{(1,60)}= 1.76, ns$), 'Strength' ($F_{(1,60)}= 2.06, ns$), 'Solemnity' ($F_{(1,60)}=1.30, ns$), 'Affinity' ($F_{(1,60)}=0.01, ns$) and 'Lightness' ($F_{(1,60)}=0.51, ns$).

Table 5. Experimental data for 'Michi'

Investigation 1	Total Average	Standard deviation	Investigation 2	Total Average	Standard deviation
Factor 1 'Uplift'	32.39	6.28	Factor 1 'Uplift'	33.97	5.27
Factor 2 'Strength'	12.52	3.58	Factor 2 'Strength'	13.42	4.30
Factor 3 'Solemnity'	10.71	3.85	Factor 3 'Solemnity'	11.42	4.90
Factor 4 'Affinity'	6.29	2.82	Factor 4 'Affinity'	5.90	2.80
Factor 5 'Lightness'	5.87	2.86	Factor 5 'Lightness'	5.84	2.77

Average score and standard deviation of each of 5 factors for 'musical rhythm' and 'visual element with musical rhythm' of Michi were found. For verifying if average value by each factor between the two has a significant difference statistically, 1 factor's ANOVA, whose factors were 'musical rhythm' and 'visual element with musical rhythm' for each factor, was performed. There was no significant gap for all of 'Uplift' ($F_{(1,60)}=1.11, ns$), 'Strength' ($F_{(1,60)}=0.78, ns$), 'Solemnity' ($F_{(1,60)}=0.38, ns$), 'Affinity' ($F_{(1,60)}=0.28, ns$) and 'Lightness' ($F_{(1,60)}=0.00, ns$).

4 Consideration

This study is a part of studies that 'Visual element with musical rhythm' can be replaced for 'Musical rhythm'. This study was progressed under the hypothesis that visual element produced by music rhythm could deliver an emotion similar to the emotion delivered by music. In this study, investigation 1 and 2 were measured by emotional scale consisted by 24 adjectives to review the effect of moving visual element on music. Each average score and standard deviation for 'Uplift', 'Strength', 'Solemnity', 'Affinity' and 'Lightness' were found and statistical significant difference among the average values of each score was evaluated. As the result, only suggestion 1 'Solemnity'($F_{(1,60)}$=3.83, $p<.10$) applying 'Concerto for solo percussion & chamber orchestra 1st movement' and suggestion 2 'Lightness'($F_{(1,60)}$=3.06, $p<.10$) applying 'Sorbet No. 5' showed marginally significant difference and others didn't show a significant difference among the average value statistically. In other words, 'Visual element' produced by music rhythm did not influence to 'Musical rhythm' as a noise. And it communicated the emotion of music as it was.

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