Enjoying of Traditional Chinese Shadow Play – A Cross-Culture Study

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Abstract. Piying, the world's intangible culture heritage, is an old Chinese art form and one of the origins of modern movie, which encountering the risk of extinction. The spirit of traditional Piying is to express rich emotion and stories through action change by artists. A cross-culture study was conducted to investigate the effect of Piying-induced emotion on heart rate and heart rate variability during Piying perception and performance. The result confirmed that Piying performance was far more effective in emotion induction than Piying perception. The results suggested Chinese are more fond of traditional Piying elements and American prefer experiencing interaction of Piying while the result of Japanese is between those of Chinese and American, they hope that there is a rule to follow in Piying show. Our approach is the first explorative emotion study on Piying art, which could be used as design mechanism to re-create and inherit Piying culture.

Keywords: Emotion, Culture heritage, Performance, Perception, Heart rate variability.

1 Introduction

Piying, a traditional Chinese Shadow Play, is a characteristic Chinese folk art form, which is regarded as one of the origins of modern movie. [1],[2] In Piying, the shadow of fur made 2D characters with delicate carving could be seen by audience in front of the curtain. The artists behind the curtain control the actions of shadow using sticks fastened to the characters. [5] But now, Piying gradually fades away in people's life, encountering the risk of extinction. [3],[4] It is time that it be supposed to consider the way to reform and recreate Piying art form and to reserve a foothold of Piying among the fierce art performance market.[1]

The spirit of traditional Piying performance is to express rich stories and emotion through action change controlled by the artists. [5] The successful approach to protect Piying culture is determined by the extent to which its attractiveness enables people to have a positive experience and increase the immersion of Piying culture content, which means the various emotion induced by Piying culture.

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The culture legacy of Piying art including Piying perception and performance. Piying art is also universally enjoyed by both performers (instrumentalists and/or player) behind the scene and those who watch Piying performances (active or passive audience) in the front stage. Piying performance is distinctly different from Piying perception because the performer can integrate voluntary sensorimotor actions that convey his or her unique artistic expression and emotions during the performance of a Piying story.

Piying art is Intangible cultural heritage (ICH) which is tangible and can be interacted with. ICH emphasizes people-oriented skill, experience, spirit, with features of active state, flowing and change. If already the world may mean so many different culture styles, how can we expect one country's culture treasures be enjoyed and interacted with abroad, how can traditional Piying art can be enjoyed by modern people? People's cultural background is also often mentioned to influence people's feeling of a kind of culture impression. Moreover, after culture shock, foreigners may be enlightened by Piying art, and may be able to take his or her experience home. Great ideas to Piying art may also be enriched by foreign influence. Few Piying studies investigated the relationship between people's cultural background and Piying art induced emotion. Thus, with this study, we aim to investigate the perception effect and performance effects of Piying-induced emotion in a cross-culture study then explore the basic elements for Piying art related essence which is worth inheriting and re-creating.

2 Related Work

2.1 Culture Chinese Shadow Play--Piying

With a history of two thousand years, Chinese Shadow Play-Piying is a splendid art, combined with delicate hand craftsmanship and folk drama, which means Piying is the sole graphic art performed at the stage in Chinese folk arts. [1] As the world's intangible culture heritage, Piying is commonly viewed as a traditional edutainment approach to express a Chinese historical socio-cultural message of faith and customs, such as a specific lifestyle, a traditional festival, through the show's interactive performance. [4],[6] It was spread to Turkey, Germany, France, Italy, Russia, Thailand and other countries around world in 13th century. [4],[1],[8]

2.2 The Situation of Piying

However, with the development of film, television, PC games, Piying gradually fades way in people's life, encountering the risk of extinction. [7] People have sense of strangeness and distance for the traditional and ancient art, Piying. [3],[4] Chinese government has established cultural protect associations to protect Piying, such as Piying museum and Piying based research groups. [5],[3] Such way has protected and inherited Piying but cut off connection between Piying and primitive background. Some researches present a set of techniques developed for turning Piying show into electronic form or made Piying animation system and a set of techniques developed for turning Chinese Shadow Play into electronic form. [10],[11],[12] Hsu use motion planning method to design an animation system that can generate the motions of a

character in a shadow play automatically [13],[14] And new computer software has been designed to create Piying animation characters. [9],[15],[16] A few programs focus on interactive performance under mixed real environment, generate new digital media and animation creation plan for Piying animation. [17],[5],[18] In foreign countries, there are associations and curriculums focusing on Piying on campuses [19] and a special gallery about Piying in the museum in Bursa of Turkey showing many kinds of Piying props and production supplies in different periods. People there have applied Piying to TV drama and published many books about Piying. [1]

However, the method of preserving is limited to several common computing technologies, like the screen animation. Although via these methods, people could receive partial feeling and information about Piying, the vivid performance experience of Piying show and the improvised emotional expression presented during the performance cannot be delivered to people.

2.3 The Relationship between Emotion and Culture

Culture is shared, is adaptive or has been adaptive at some points in the past, and is transmitted across time and generations. [20] Culture plays a central role in shaping emotional and cognitive experiences. Cultural norms have profound implications for the ways in which emotions are constituted, experienced, expressed, and managed. [21][22][23] Thus, emotions vary across cultures.

From the aspect of social-culture, in the Chinese way of life emphasis is put on the individual's appropriate place and behavior among his fellowmen. [24] Chinese and Westerns are two opposite cultures: interdependent cultures versus independent. From the art-culture aspect, Chinese are implicit and extroverted in aesthetics so that Chinese design enjoys the unique art style of formal beauty. However, western culture determines the thought of western design. The design idea of the west is extroverted aiming at expressing form and shape. Impacted by different cultures, people are different in thinking and dealing with things. Thus there is difference in selecting and perceiving emotion.

Culture is closely related to human life. It cannot be called culture without emotion. Even though China and the west have different cultures, connotative culture can surpass such difference to reach uniformity of emotion and culture.

2.4 Heart Rate Variability (HRV)

Changes in emotions generated by exposure to Piying art undoubtedly involve interactions with central neural network responsible for autonomic nerve functions, which can in turn affect peripheral cardiovascular functions. Heart rate variability (HRV), as an index of cardiac vagal tone, is associated with autonomic flexibility and emotional responding. [25],[26],[27] In that way, HRV has been presented as a good and accessible research tool to study the understanding of emotional effects of Piying art. There are no literature-revealed investigations of the emotion-associated autonomic cardiovascular responses of Piyng culture yet.

2.5 Present Study

In the present study, we first want to get Heart rate (HR) and Heart rate variability (HRV) information about the emotion-related autonomic and physiological responses to Piying perception and performance. Take Chinese and USA participants in our study as optimized cultural diversion and choose Japanese as a country with similar cultural background. Hofstede [28] provides an empirical framework of culture by defining several dimensions of culture. China and the USA differ substantially on all dimensions and Japan almost ranks between this two countries at all dimensions. (see Table 1)

All subjects have not got in touch with Piying show before. We conducted a 3x2 one-between-one-within-subjects mixed experiment to investigate the effects of emotional input on HR and HRV when participants from three countries watching one Piying show in perception and performance conditions.

Table 1. HOUFSTEDE's culture dimension scores for Chinese,USA and Japanese

	Chinese	USA	Japanese
Power distance	80H	40L	54M
Individualism	20L	91H	46M
Masculinity	50M	62H	95H
Uncertainty avoidance	60M	46L	92H
Long-term orientation	118H	29L	80H

H, top third; M, medium third; L, bottom third (among 53 countries and regions for the first four dimensions; among 23 countries for the fifth).

Make questionnaire for each subject after HRV experiment. The questionnaire design pays attention to the feeling of subjects for Piying perception and performance, and designs questions as per essences of traditional Piying perception and performance.

In this framework of emotion-induced exploration, we defined the following two research questions: (a) The levels of emotion attainable with performance may be necessarily higher than those experienced during Piying perception; (b) What influence has the subject's cultural background on the subject's experience on Piying culture.

The apparent dearth of information about the emotion-related responses to Piying show is surprising. It is the first time to research the inheritance and innovation of Piying culture from emotion acpect; and focus on the value of Piying performance and its influence on Piying culture development. In our view, the result can be a powerful design driver that helps connecting culture, emotion and art aspects. Such information may be potentially more valuable than information only concerning Piying perception. The study of cultural background differences in emotional response to Piying art can provide considerable insight into the culture connotation and intercultural acceptance. Such information is also of potential value for cultural educator who tries to combine key elements of Piying art then turn it to edutainment, also benefit people who have economic interests in these matters. Such thinking mode of cultural protection and inheritance can be applied in protection process of other intangible cultural heritage.

3 Methods

3.1 Subject

There are twenty native Chinese and forty participants coming from America and Japan respectively, half men and half women. All subjects' age ranged from 20 to 31 years (mean±SD＝ 23.8±4.9 years). All students studied at the Zhejiang University, and have been paid to participate in this study. None of them have watched Piying show before. Specifically, take Chinese young adults who are familiar with Chinese culture and corresponding American and Japanese who are unfamiliar with Chinese culture as subjects. All subjects have gone through standard medical health checkups which include the measurement of resting ECG, BP, chest X-ray, haemogram, and liver function, and all were classified as being "healthy".

All of the Chinese subjects have at least 8 years of Chinese Arts training. Sixteen of the subjects focus on Chinese painting and calligraphy, and the remaining 4 have an experience of Chinese musical instrument, such as Zither and pipa. All subjects from America and Japan come to China with the hope of feeling Chinese culture. It is the first time for them to be in China, with an average length of stay of 18 days.

It was recognized that the validity of the present investigation was dependent upon each subject's ability to monitor his or her own emotions during performance. This was facilitated in part by the selection of a Piying show that was not a challenge of understanding for Chinese and westerner participants (see below). Subsequently, the procedure for subject selection was rigorous. A letter describing the general nature of our proposed culture psychological study was sent to four colleges of Zhejiang University, especially college of International Exchange Education and college of Art in order to solicit interest in participating in the investigation. The Ethics Committee of Zhejiang University Faculty of Information Technology approved all procedures.

3.2 Experimental Piying Show

The Piying show selected for the present study was the classic Piying show named 'Story of turtle and crane '. The story is a fable which is about turtle and crane that tried various ways of using their advantages to eat each other. This Piying show has won awards in international Puppet festival in 1965 and 2000.

This Piying show was chosen for several reasons. First, since a media content that is acceptable in one culture can be perceived inappropriate, rude or offensive in another, [29] so the content was chosen to be as culturally neutral as possible. Second, it needs representative story of traditional Piying. Third, reduce the understanding barrier in Piying and the emotional disturbance for figure. Fourth, only background music to break through language constraint. Fifth, suitable for eliciting stronger emotion-related cardiovascular response in the participants.

Five Piying shows eventually selected by us. In our earlier survey of understand resulting from watching these five videos of different shows, Chinese art-major students (N=25) as well Chinese non-art-major students (N=20), European students(N=49) nearly equally rated the video named the 'Story of turtle and crane ' as highest degree of understanding(average±SD=7.8±1.6 points) among these five videos on a 9-point scale.

3.3 Experimental Tasks

We have built simple Piying stage in experiment room, and invite two Piying artists to perform for the experiment. Three experimental tasks were examined in the present study. These were, (1) resting in a stationary sitting position (the baseline situation). (2) the perception task : the Piying show watching at the front stage. (3) the performance task : watching behind scene performance process of this Piying show. The order of task 2 and task 3 were randomly assigned for each of the subjects. It has been recommended that segments of HR should at least last for 5min for purpose of HRV analysis. [30] Therefore, the three tasks are lasted for 5min.

During the experiment, subjects were requested to avoid non-essential movement. Comparable restrictions on movement of the trunk, head, and upper limbs during the experiment were requested because movements of the large segments of the body (mainly the trunk and head) can significantly modulate the HR response. Thus, the subjects were requested to minimize motions of any portion of the body and make sure to keep their eyes.

3.4 Apparatus

The apparatus used for data collection was assembled in a laboratory that provided a comparable environment for an acoustically controlled and temperature-controlled recording studio. The experimental set-up consisted of a headset electrocardiogram (ECG, Nanjing heart - wing VISHEE, ltd, China) a Piying stage and Chinese folk musical instruments. There is light projected on the top of Piying stage. Instrument such as Erhu, bamboo flute and hand gong are carried by performers.

3.5 Procedures

All the subjects have not appreciated Piying on site or in movie before. Therefore, we interpret Piying culture for them before formal experiment. One day before scheduled data collection, each subject came to the experiment room in the laboratory. We interpret the history of Piying and its status in Chinese historical culture and they have 15 minutes to contact the Piying stage we built, Piying character and feel the operation method of Piying. They are required not to understand and appreciate Piying through other channels before formal experiment. The subjects were also given additional instructions, including avoidance of strenuous exercise and maintaining customary diet for 24h preceding the day of data collection, and to refrain from ingesting food, alcohol and caffeine for at least 2h preceding the data collection session.

After arriving at the experiment room on the day of data collection, the head ring testing HRV is on their heads, and electrode clip testing HR is carried on their eardrop. The subject was then requested to maintain a seated position in front of the screen for approximately 10 min to achieve a stable and calm cardiovascular status then a baseline reading was taken for 5 min. The subject then performed the rest main experiment tasks. Adaptation periods of approximately 5-10 min between the tasks allowed HR to return to the baseline.

3.6 Subjective Evaluation Measures

At the conclusion of data collection for each of the tasks the subject was asked to provide a subjective rating for his or her responses to the experimental Piying show using 10-point rating scales. The scales were used to designate the levels of valence (1=very unpleasant, and 10=very pleasant) and arousal (1=lowest arousal, and 10=highest arousal). They were also requested to identify the portion or measures where the highest pleasant emotions were perceived. In addition, subjects were asked to report if they were able to elicit emotions in response to Piying perception task and Piying performance tasks.

In addition, after all tasks subjects were asked to finish a semi-open structured questionnaire, in order to gain further insights into their experience. The questions were classified into five groups based on the features of traditional Piying art: (a) a general impression of Piying art; (c) image impression; (b) interactive form of Piying characters; (d) music impression; (e) the real control of backstage Piying art.

3.7 Heart Rate Data Treatment

From the onset of each experiment task, ECG were continuously monitored and recorded using a personal computer via an A/D converter at a sampling rate of 1000HZ. ECG data were translated into bpm data for each R-R interval. They were then re-sampled using cubic-spline interpolation to obtain an equally sampled time series.

3.8 HRV Analysis

HRV measures are derived by estimating the variation among a set of temporally ordered interbeat intervals. [25] From the onset of each experimental task, consecutive R–R intervals were extracted for 5 min HR data. The frequency-based technique of power spectral analysis is a sophisticated approach we choose to quantifying HRV. The frequency bands for LF, HF were 0.04–0.15 Hz, 0.15–0.40 Hz respectively. The LF component is affected by sympathetic influence, while HF component primarily reflects cardiac parasympathetic influence, many researchers have reported the ratio of LF to HF power as an index of “sympathovagal balance”. [30],[31]

3.9 Statistical Analysis

Depending on the purpose of the comparison, we used a one-way ANOVA with repeated measures. Independent variables were nationality (Chinese versus American versus Japanese), and task (perception versus performance). If the sphericity assumption was violated, then Greenhouse–Geisser degrees of freedom corrections were applied. Post-hoc analyses were conducted using Least-Significant Difference procedure. $P<0.05$ level was taken as the evidence of a significant difference.

4 Result

4.1 Heart Rate

HR and HRV data were evaluated using 5-min data from entire experimental period. Figure.1 shows changes in the 10-s mean values of HR for three different nationality subjects during 5 min for three experimental tasks. According these three culture different subjects, the performance task produced constantly higher HR values than perception tasks during the entire testing period. The phase fluctuation was also greater during the performance task than that during perception tasks, and thus it had the largest range of HR. The HR of the three groups in ending performance is basically the same with that in setup of show. The findings suggested that perception is less attractive for long term. Americans' has slightly declined in Performance while the other two countries' retain stable. At the beginning, Americans have the maximum HR. The three countries all have highest emotional point e. The two points are the moment of Piying characters' close interaction in Piying show. (Figure. 1)

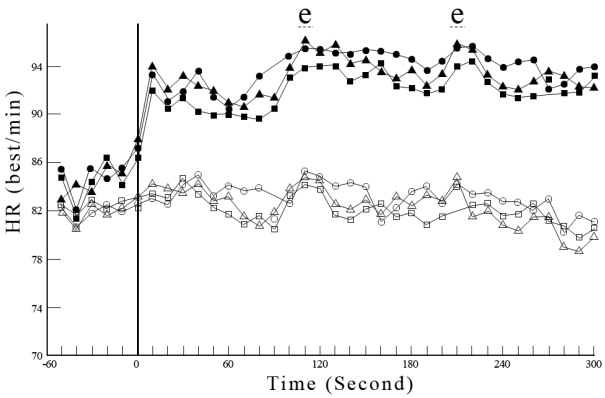

Fig. 1. Time course of the 10-s mean value of HR during the pre-and experimental period for all experimental conditions. ●, Performance task of Chinese; ▲, Performance task of American; ■, Performance task of Japanese; ○, Perception task of Chinese; △, Perception task of American; □, Perception task of Japanese.

4.2 Heart Rate Variability Difference Caused by Different Culture Background

In quiet state, the associated probability of LF, HF, LF/HF of Chinese, Americans and Japanese are all larger than significance level ($p>0.05$). That means there is no significant difference in average value of three indexes for these three groups. There was a significant effect for HF in perception task. The difference between Chinese and Americans ($p<0.001$) is more significant that of Americans and Japanese ($p=0.04$) while there is no significant difference between Chinese and Japanese. (Figure. 2) There is no significant difference in the three indexes during performance. The table below gives the results of the HRV analyses.

Table 2. Five-minute data for HRV among three different culture subjects

	Perception	Performance
LF	7.8	7.3
HF	14.9***	13.7
LF/HF	25.4	9.2

The values are the F values for all subjects

* p<0.05 * * p<0.01 * * * p<0.001.

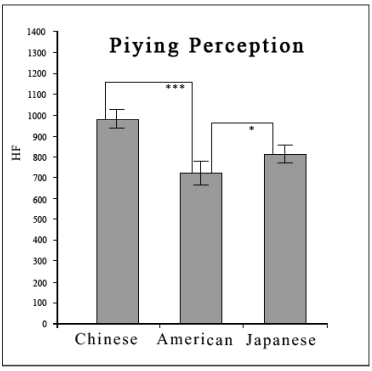

Fig. 2. Mean LF of Chinese, American and Japanese for Perception task

4.3 Heart Rate Variability Difference Caused by Perception and Performance

Make statistical analysis for LF, HF and LF/HF under baseline, perception and performance of three nationality subjects. Except for HF of Chinese, LF of Americans and HF of Japanese, the associated probability of other indexes of the subjects in the three countries are all smaller than significant level($p<0.01$). Therefore, the three states have significant difference in at least one group or the other two, or in all the 3 states. (Table 3) The result of LSD multiple comparisons: in group with significant difference, the significant effect of baseline and performance are higher than the indexes of baseline and perception. This indicates a higher emotion-induced arousal level during watching performance than that during watching Piying perception. (Figure. 3)

Table 3. Five-minute data for HRV between perception and performance

	Chinese	American	Japanese
LF	16.6***	5.8	11.2***
HF	3.3	7.9***	3.1
LF/HF	13.8***	4.9*	4.9***

The values are the F values for all subjects

* p<0.05 * * p<0.01 * * * p<0.001.

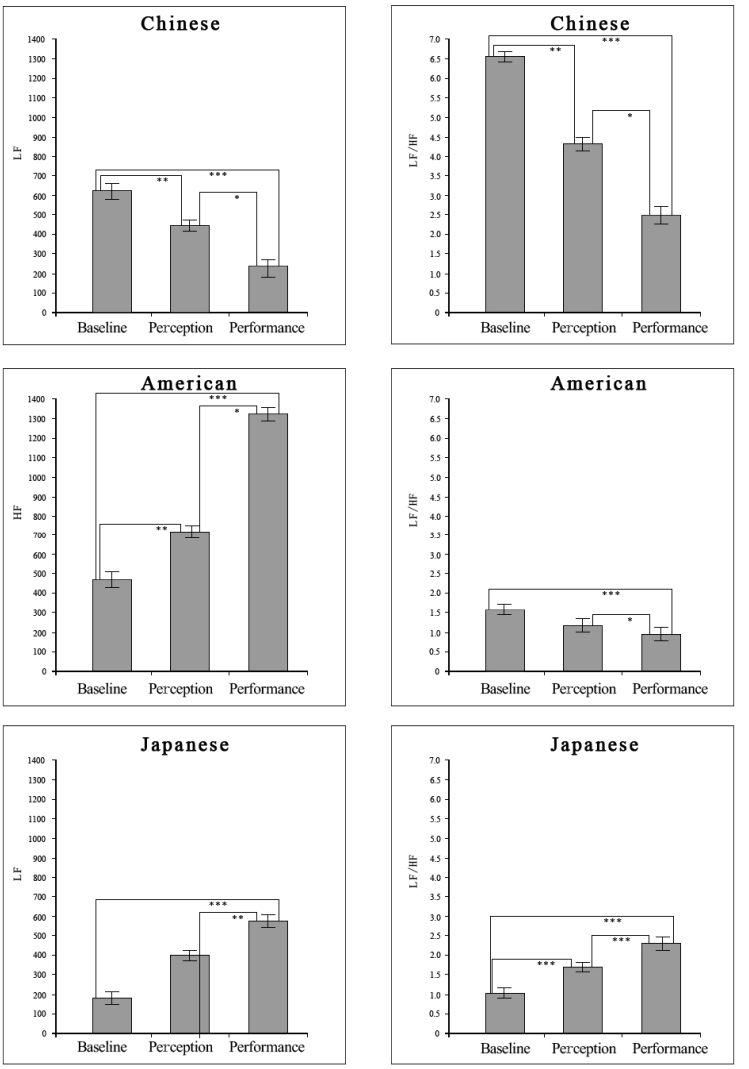

Fig. 3. Mean LF, HF or LF/HF of baseline, perception task and performance task for Chinese, American or Japanese

4.4 Subjective Measures

The mean values of the valence and arousal levels of all conditions for all subjects are reported in Table 4. ANOVA revealed a significant task effect for the mean value of valence and arousal level, indicating a higher emotion-induced arousal level during performance than that during perception. Significant main effects of culture difference were also found for arousal levels. The highest level of pleasant feeling of Chinese, Japanese and Americans was commonly reported to have been experienced during the

120-121th and 194-195th measures around the close interaction between Piying characters for twice. (Figure.1). Some reported the highest level of pleasant feeling at the 116th and 122nd bars, and some at the 183rd bar.

Table 4. Subjective evaluation measures of emotion-induced by Piying art

Culture	Chinese		American		Japanese		ANOVA F-values	
Task	Perception	Performance	Perception	Performance	Perception	Performance	Culture	Task
Valence	5.9±0.8	7.7±1.2	5.2±0.8	8.0±1.1	4.5±1.3	7.2±1.4	6.5	12.9*
Arousal	5.1±0.9	7.3±1.0	4.4±1.3	8.9±0.8	4.9±1.2	6.7±1.4	9.9*	7.8***

The values are the F values for all subjects

* p<0.05 ** p<0.01 *** p<0.001.

In order to develop more robust indicators from the experiment, we asked subjects to give a rate to each feature of Piying art (1=do not like, 10=like very much). To better understand the influence, subjects were asked to give a ranking to these eight elements that clustered to five main features.(Table 5) The mean values of impress of interaction between artiest and Piying characters are very high among three different culture subjects. It was believed that the performance is popular among people and can well arouse their emotion. It has been proved in ranking given by subjects. There is great difference in 'shadow'. The ranking of selection by the east is among the top few while Americans ranks the end. Image impress of 2D Piying characters is on the top while is ranked end in terms of image Piying color of three cultural backgrounds.

Table 5. Subjective evaluation measures of features of traditional Piying art

		Chinese		American		Japanese	
		Mean	rank	mean	rank	mean	rank
a	General impress of "shadow"	8.3	1	2.3	8	6.8	2
	General impress of Piying created atmosphere	6.8	3	4.5	6	4.2	5
b	Image impress of 2D Piying characters	7.2	4	6.7	2	7.3	1
	Image impress of color of Piying characters	2.1	8	3.2	7	2.4	8
c	Interactive form of Piying characters	4.6	6	5.2	4	5.9	4
d	Music impression	6.8	5	5.1	5	3.7	7
	Music impress of instruments	6.4	7	6.8	3	5.8	6
e	Impress of the real control of backstage Piying art	7.9	2	8.8	1	7.1	3

5 Discussion

The results of the present investigation yielded two novel findings: (1) the result confirmed that Piying performance was far more effective in modulating emotion-related activity than Piying perception. (2) Chinese are more fond of traditional Piying elements and American prefer experiencing interaction of Piying while the result of Japanese is between those of Chinese and American, they hope that there is a rule to follow in Piying show.

5.1 The Effects of Emotion Induction by Different Culture Background Subjects

In perception task there is significant difference between Chinese and Americans, American and Japanese in HF of HRV and the HF average value of Chinese is higher than that of Americans and Japanese. (Figure.2) The difference in HF shows the activation degree of vague. Based on HR figure, it can be seen that the initial position of HR values for Americans and Japanese are all high. Americans is higher than Chinese but it decreases in later period, which indicates that Piying is fresh to foreign subjects but lacks persistent appeal.

The questionnaire after HRV experiment also supports HRV data analysis. All American subjects reported that at the beginning Piying perception gave them a higher level of arousal as well as surprising feeling, indicating that the subjects must have received a higher level of positive emotions.

American and Japanese give the rank of "Image impress of 2D Piying characters" second grade and first grade, respectively. The image of Piying character is fresh to Westerner. The Piying character make Chinese subjects associate with the expression method of traditional Chinese painting.

As for interactive form of Piying character, subjects all feed back that the interaction form is monotonous. Foreign subjects say that since Piying is a performance without expression and they cannot well read the story just by means of interaction among Piying characters and the performance is monotonous sometimes. Combining with the value figure of HR, it can be inferred that the highest emotional point e appears in interaction among characters.

As for background music, most subjects know it is folk music of China with features. But 8 Americans subjects and 12 Japanese subjects mention that the background music is too noisy and wish it be powerful but not noisy. Hence, the ranking of music impression is at the end few. In music instruction, domestic and foreign subjects are all astonished with traditional Chinese instrument and the ranks the top compared with the former. 6 Americans subjects mention that instrument familiar by the world may be added such as drum. Also they wish Piying show mainly adopts traditional Chinese instrument.

In performance task, the significance of HF, LF and LF/HF is not obvious. Based on HR value, the HR of subjects of the three countries are all high during performance. It may attribute to two reasons: (1) One explanation for this may be the presentation of performance behind the curtain is fresh to both Chinese and western people, with fluctuated mood. Therefore, the difference is insignificant. (2) The presentation of performance behind the curtain reflects the interaction process between Piying artists and characters and among artists so that subjects are not strange. Thus, the difference is insignificant.

The analysis above complies with the result of questionnaire after experiment. All subjects reported that performance show gave them a higher level of arousal as well as valence (pleasant feeling), indicating that the subjects must have received a higher level of rewarding and positive emotions under this condition. 14 subjects wish to try Piying performance. Especially that 6 people have mentioned the word of "game". In

their mind, it is a game and can interact with Piying characters or their partner to immerse them into the interaction. Though Chinese subjects are not as excited as western ones when describing the mood when they watch the performance, they express that it is the first time to know the actual performance process behind the curtain, which is fresh and interesting.

Piying character is presented as shadow in front of the curtain and entity behind the curtain. "Shadow" is the showing way of Piying character with deficiency and excess state. Factors frequently exist in Chinese art, e.g. uninterrupted mountains in Chinese painting represented by pieces of ink marks, the artist conception with interrupted writing but uninterrupted conception in Chinese calligraphy. There is great difference in evaluation for the typical Piying element among the three countries. China and Japan rank it as the first and second while the last in American ranking. The national culture difference can thus been seen. More than half of American subjects become aware of the concept of "shadow" only in questionnaire. Moreover, according to Hofstede's culture dimensions [28], in our case, we might speculate that the long-term orientation in Chinese culture would result in persist core spirit of traditional culture, while Americans find values rather than fulfilled enjoy of the moment. (Table 1)

As for Piying color, the evaluations from the three countries are all at last. So is the feedback: In perception task, it is hard to distinguish and note the color of Piying character which only presents dark hue. In performance task, it can be seen that Piying character is pained by diverse colors but is not impressive and without rich colors. It is hoped to employ modern and bright multi-colors to vitalize the color image of Piying character.

5.2 The Effects of Piying Perception and Piying Performance in Inducing Autonomic Nerve Response to Emotion

There is significance in LF, HF and LF/HF values under baseline, perception task and performance task for people from the three cultural backgrounds, indicating that Piying performance can attract and arouse emotion, which has supported the foregoing deduction: in performance task, such form is fresh and attractive to the three types of subjects, with distinct mood fluctuation. Therefore, there is no significance among races.

The reason may be that the performance behind the curtain of Piying can arouse the resonance of subjects. There is significance between baseline and perception task. The subjects are significant in arousing and interest in Piying but the interaction performance presented in performance task give stronger sense of participation to subjects and arouse their interest. We may reasonably assume that Piying perception present fresh and curious feelings to subjects while interaction of Piying performance propel them to have a try. In this way, the subjects and Piying culture positively interact with each other not just one-way culture display and influence of publicity. Instead, it is two-way communication and interaction with Piying culture from emotion. Thus, Piying performance facilitates emotional enthusiasm of the subjects. It is like taking intangible culture heritage into tangible interaction which means taking advantage of natural physical affordance to achieve a heightened legibility and

seamlessness of interaction between people and information [32] in order to build an immersive impression.

The result concluded from questionnaire after experiment supports the analysis. Four American subjects say they admire that ancient Chinese can design such nice hand-made characters. Five American subjects mention that Piying makes them associate with puppet show which is also to display story by hand-made control. Four foreigner subjects said 'the overall feeling of Piying show (perception) is not as fun as they thought it was'. Thus, the 2D performance mode of Piying is the presentation way of traditional Piying but is limited in the effect of arousing audience's emotion. In performance task, the performance way of Piying artist makes western subjects have the idea to try.

Chinese subjects also show interest in Piying. Some said that "they feel it vivid, interesting and of rhythm", "a marvelous visual art", "the character features are unique and interesting", "the plot is traditional", "the joints can move, which is quite interesting". In terms of Piying performance, some subjects say that: such performance is of strong rhythm just like kung fu to attract audience. In effect, nearly 90% domestic and foreign subjects mention that it is the most exciting moment when they see Piying artist talks and sings Piying character singly. It indicates that the interactive performance process is approved by subjects and can highly arouse their emotion.

The observation that Piying performance was far more effective in modulating emotion-related response than Piying perception should have implications for education and entertainment. From time to time, museums will perform and promote traditional Piying show for people in order to deepen people's impression on traditional culture. Our data indicated that greater effects of emotion modulation would be expected as a result of interact with Piying character or playing an interactive Piying show, rather than watching Piying art. Immersion experience of Piying art can also practice self-expression ability and cooperative ability of children.

In the ranking of 'Impress of real control of Piying art in background', American subjects rank the first, followed by Chinese and Japanese. On the one side, it indicates that Piying performance has high arousing degree and subjects wish to immerse and participate in Piying performance. Moreover, the fourth dimension of Hofstede's culture dimensions appears relevant to this element's rate. [28] The fourth dimension is labeled as Uncertainty Avoidance, and it can be defined as the degree to which people in a country prefer structured over unstructured situations. Japanese show high score on uncertainty avoidance, people show more nervous energy, while Americans with low score mean easy going. Seven Japanese subject mentioned they hope that there is a rule to follow in Piying show. We suggest interaction of Piying may mean curious to Americans but mean a certain degree of out of rules to Japanese.

According to the atmosphere built by Piying show, Chinese gave a top rank, but the other two countries did not. Chinese people prefer to act as members of groups rather than individuals, which means collectivism. While American learns very early to think of itself as "I" instead of as part of "we". [28] Therefore, Chinese like the get-together atmosphere created by Piying show.

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