ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Neuropsychological Perspective of Emotional Responses to the Javanese Gamelan's Music and Culture

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ABSTRACT

Many researchers stated that after a period of neglect, because of the methodological problems, the topic of music and emotion is again at the forefront of music psychology. Therefore it is important to integrate existing knowledge from a variety of disciplines to be able to further theoretical development, and the findings of this experimental study would contribute with some conclusions. The study found that effects of unmodified and modified tempo and timbre element towards the emotional musical responses of the musicians differs from those of non-musicians, since musicians are significantly more sensitive towards the tempo and timbre differences. There are definitely differences provided by effects of modified and unmodified tempo and timbre element stimulation towards the emotional musical responses of the listeners, as well as showing that tempo is the most important element and potentially stimulate emotional responses. This study also shows that musical emotional responses which are stimulated by the timbre element of the Javanese gamelan instrument is more effected by the listener's perception, experience and sociocultural aspects, than only by physics factors. It was shown by the evidence that musical emotional responses of the Javanese Gamelan listeners are significantly more affected by the tempo element compared to the timbre element. Cultural factors were also determined as dominant factors that should always be considered, as it is always related to the perception and musical emotional responses that come forward.

Key words: Psychology; Music; Javanese Gamelan; Culture; Emotion

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ISSN: 0975-8585

INTRODUCTION

Music is one of the prominent cultural activities that are most associated closely to the human existence. For every nation, music contributes to significant life events in various ways through many ceremonies that marked the significant events in people's life: weddings, funerals, parties, state ceremonies of commemoration, coronations, and political rallies, all with their fanfares and anthems. Since music goes together with human activities, it promotes also more attention and interest in musical based research, either to contribute to the advancement of musicology, as well as the growth of interrelated disciplines. Music is heard and went through it's the listeners. Therefore, music is related to psychological factors that play a significant role to those listening process [1,5]. Consequently, one of the most related fields that correlate to music is psychology. It could be understood, since psychology deals with human behavior. Many psychological aspects are expected to explain various activities people are dealing with everyday, including the everyday music listening. The enhancement of psychology as science has shown that psychology is not developing just one single paradigm. It deals not only with cognitive and behavioral aspects, but also biological and social matters. However, there is always a divergence in efforts of the conception of theories. Some streams are still based on the "*hard science*" which concentrated to the "*body*" issues including neural systems, physiological and biological aspects, emerges for example in psychoneurology or psychoimmunology, whereas on the other hand, psychology is particularly interested in answering the "*mind*" problems that have a very different approach [1,5,8]. Generally, it could be said that the psychological approach to music tend to look for an explanation about how and why some people are experiencing emotional reactions from music and how the music experiencing process will end up with the expression of emotion. The streams in psychology will then influence how music listening would be pictured. The hard science approach for example will correlates music to the neural and physiological aspects, while other streams are interested to find other explanations [1,2].

From those explanations, it would be understood that psychology and music are possibly associated by a comprehensive explanation on emotions, since music listening will be tied in with emotional reactions. Psychology and musicology could be understood all together since they also share the same structure of "body" and "mind" approach: the music instruments are the "body" in psychology, whereas the "mind" is the music itself. For years, researches on emotional responses related to music is a problematic matter since first, emotional reaction is generally understood in terms of adaptive function related to the continuity of biological cycle. Secondly, researchers interested in emotional reaction issues are facing a wide range of individual variability [1,5]. Thirdly, the experimental inquiries that are attempted to measure the affection responses on music listeners tend to be complicated since music listening will come up with diverse spontaneously reaction [2]. Drawings on ecological psychology mentioned that perceptual information in clearing up the "object and events" or "perception and action" in the world are links that could not be broken. One of the interrelations among individuals, groups, and environment produced numbers of media communications. Lund [3] mentioned that one of the outcome of the interaction between human and the environment is sound instruments. Sounds from the nature that are produced by humans through instruments they need are called musical instruments [4]. With regards to Juslin [5], emotion is inferred on the basis of three kinds of

evidence: (a) self-report, (b) behavior, and (c) physiological reaction. The most common, and deceptively simple, way to measure emotional responses to music is by self-report – either verbal (for example adjective checklist, quantitative ratings, questionnaire, free description) or non-verbal (moving a slider, pressing a bar, drawing a picture). Verbal reports are associated with problems such as demand characteristics and choosing which words to include in checklists or scales. Non-verbal reports involve the problem of interpreting the responses in a meaningful way. Yet, self-report is the most direct evidence of emotion and cannot be excluded despite its problems. Juslin also mentioned, since the use of self-reports is not always possible (or reliable), another approach has been to measure different forms of behavior or products of behavior. This may include facial expressions, vocalizations, and body language. This form of evidence can be valuable because it is less subject to demand characteristics than are self-reports, although it is problematic in that felt emotion does not always result in specific behavior. The third kind of evidence used to infer emotions involves different physiological measures of emotion. Those three evidences were considered in this research, either through self reports, facial and emotional expression observation, or focus group discussion session.

From the anthropology point of view, Indonesia is an enormous nation with various cultures and traditional music. According to Haryono [6], looking into records from the pre historic period will come up with a presumption that membranofon is believed to be an earlier gamelan instrument, prior to the cultural contact with India, which also used in ritual ceremonies. A number of research findings regarding music and emotion verified that tempo and timbre are the most important elements in music. However, most of the study were based on Western music, while less has been done on the Indonesian music framework, especially on musical emotional responses, either pleasant or unpleasant, as well as the using of traditional Indonesian musical instrument. Most of studies in music and emotion are concerned with the Western culture and there is no research on the same topic that involved Indonesian music yet. Therefore, the present study will explore the Javanese gamelan music which has a unique characteristic and difference rule of performing compared to Western music. Therefore, the use of tempo and timbre as a primary element in music related to Javanese gamelan music will get a different explanation. The role of *pengrawit* and *pandhemen* as subjects in this exxperiment became important, since through these two groups it could be described how the sensitivity differences of the “musicians” as musically trained listeners and the “naive” or musically untrained listeners (non musicians) listener come forward. According to Martopangrawit [7], theoretically, the Javanese gamelan’s music consists of (1) rhythm with aughmented and diminished syntactical unit which is related to the slow and fast tempo, and (2) songs or repertoires which consists series of organized tones that sounds good while played on. This experiment is based on the above theory, and was expected to contribute to the enhancement of musicology and applied psychology. Therefore, the basic problem of this experiment is how the tempo and timbre element of Javanese gamelan’s music influences the musical emotional responses of the listeners.

ISSN: 0975-8585

MATERIALS AND METHODS

Participants

The participants of this study consisted of 16 Javanese music musicians called *pengrawit* and 16 non-musicians called *pandhemen* who were participating in this experiment. The musicians are musically trained persons who worked as professionals at the Indonesian Radio Broadcasting of Yogyakarta, and those 16 non-musicians were musically untrained persons who regularly listen to the Javanese gamelan repertoires aired through several radio local programs. They were about 35 – 55 of age, and devided into 8 groups, so that one experiment group consisted of 4 persons. Most of the musicians were the Karawitan High School or Bacheloring in Karawitan (Javanese gamelan music).

Equipments

Equipments in this experimental research were supported mainly by the Javanese gamelan music which was played using the bronze and iron gamelan, twice for each, once performing the unmodified tempo and once the modified tempo. Participants were listening to the music through 4 units computers using Sound Forge 6.0 software and wearing earphones. The Sound Forge 6 program was used to observe when participants were experiencing their unpleasant feeling. They were asked to press the computer keyboard directly when their judgement for the played repertoire was unpleasant. The computer specification which was used to operate those experimental sessions included: Intel Pentium 4 2, 4A Cache L2 1MB, MB Biostar Chipset Intel 865PE, RAM 256 MB PC 3200 Kingston DDR dual CH, Hardisk 40 GB 7200 RPM, AGP 8x Power Color GF 4Mx440 64MB, with a *sound card on board* Codex 6 Ch. The earphones were SONCM SM-622M.V. type. The quality of the music played was of the same quality and condition for all sessions. There was also a hidden video camera prepared for the purpose of observational sessions to detect the facial and emotional expressions during the experimental sessions.

Stimuli and Manipulated Variables

The stimuli of this experiment is *Gendhing Ladrang Agun-Agun*. This repertoire consists of two kind of rythms which were (1) *merong* - in slow tempo, and (2) *inggah* – in fast tempo. The manipulation of the stimuli was done through the substitution of both parts. The slower tempo was swicth over the faster, and so did the faster towards the slower. Consequently, the faster part of the repertoire became slower, and the slower part became faster. Using the modified tempo, this repertoire was played twice: the first time it was played on the bronze gamelan resulting in a unmodified tempo, the second was played on the iron gamelan resulting in a unmodified tempo. Despite of this modified tempo, the repertoire was also played twice using the modified tempo, once using the bronze gamelan resulting in modified tempo, and the later using the iron gamelan, resulting in an modified tempo. The entire experiment would then consisting of four sessions: the unmodified bronze tempo, modified bronze tempo, the unmodified iron tempo and modified iron tempo. There were no modification made concerning the melody and the dynamic elements.

Procedures

An experimental laboratory was prepared to carry out the experiment, using a room that can engage 4 persons every session. A hidden camera was placed inside a small window using a one way mirror. The participants took their own seat and were asked to be relaxed, while the administrator read the experiment procedures for them. The participants were asked to listen to the modified and unmodified *Ladrang Agun-agun*, which were played 4 times continuously. The unmodified bronze tempo, modified bronze tempo, the unmodified iron tempo, and modified iron tempo were all played based on a counter balance procedure. Once the participants were finished with one session, they were asked to report their emotional responses. Each session completed either in 3.30 minutes for the unmodified tempo or 5.30 minutes for the modified tempo, ending up with a sum of 38 minutes including the self-report process of 5 minutes each. The modified tempo took a longer duration since some parts of the repertoire were played slower in order to gain the difference. During the entire experimental process, the hidden camera operated behind the window recorded the facial and emotional responses of the group randomly. The mood, musical emotional responses and facial emotional expressions were among those psychological aspects that were measured upon each treatment. One week later five participants were chosen to gather for the purpose of a focus group discussion. All five participants were representing the musically trained and untrained listeners. The focus group discussion analysis contributed to the whole experiment analysis thoroughly.

RESULTS AND DISCUSSION

It could be seen that the musicians as musical trained listeners are more responsive towards the modified sessions. Musicians are more sensitive about modified tempo, especially when the repertoire was played on a modified timbre (7 participants at Modified Iron Tempo, TMB, compared to 2 participants). None of the musicians were displeased when the unmodified bronze tempo as the real and standard repertoire was played, whereas 8 non-musicians were reporting unpleasant response although nothing has been changed concerning the music heard. The major hypothesis stated for this experiment was to examine whether the tempo and timbre element stimulation on Javanese gamelan music will influence the musical emotional responses of its listeners. There was a sum square of 52,531 on a degree of freedom of 1. The F value that is equal to 4.968 was significant (p<0.05). It means that the statistical analysis supported the major hypothesis proposed significantly. In addition, there are influences of unmodified bronze tempo and unmodified iron tempo stimulation towards the musical emotional responses of those listeners, and also that there are influences of modified bronze tempo and modified iron tempo stimulation towards the musical emotional responses of those listeners. Therefore, it is significantly tested that there are differences between the unmodified and modified bronze tempo and the unmodified and modified iron tempo stimulation towards the musical emotional responses of those listeners.

The research findings prominently contribute to the research purpose, that the influences of the tempo element in Javanese gamelan music towards the musical emotional responses of musically trained listeners (musicians) and musically untrained listeners (non-musicians) are unquestionable. In this experiment, the musical element that had been given

more attention were the tempo and timbre elements. Reaction gained from the intentionally modified tempo supported Sloboda's thoughts that music induces and stimulates emotion [1]. Music became a intermediary factor to musical emotional responses. According to Cooke [8], emotional responses towards music will remain and elaborate even though the parts are not heard anymore. It will then contribute to the responses through a more comprehensive way. Moreover, our reactions towards music do not always contain memories and previous imagination, because music might force one feeling which even never felt before. In the present study, Cooke's definition mentioned above is significantly experienced by the musicians, since their sensitivity are highly achieved. Musician activities are filled with exercises, recording, and life performances. Juslin [9] explained that musical expression is often measured in terms of listener agreement: music is expressive of a certain quality to the extent that there is some level of agreement among listeners about the expression, presumably because there is something in the actual music that gives rise to similar listener impressions. The whole experiment process was also intended to examine the influences of the timbre element in Javanese gamelan music towards the musical emotional responses of musically trained listeners (musicians) and musically untrained listeners (non-musicians), as well as to determine the musical emotional response differences between those two groups. The difference between the bronze and iron timbre is actually not very distinctive, especially if it is used to play a similar repertoire. Only those musically trained listeners were able to make a distinction between the better timbre (usually using the bronze material), and the lesser (the iron timbre, which socioculturaly applied for a less sacred and less important event).

The following research purpose was to find out the meaning of tempo and timbre as musical elements in Javanese gamelan music that have an effect on musical emotional responses, and moreover determine the role of tempo element as an important aspect in music that potentially stimulate emotional responses. To explore this research purpose, the experiment was intentionally designed to involve the musically trained and untrained listeners, considering that perception of emotions in music is stronger in that listener judgments are only marginally affected by musical training, age, and gender of the listener. Listener agreement seems to be greater for some emotions (e.g., happiness, sadness) than for others (for example jealousy, disgust), suggesting that music can express some emotions, but not others. The emotions that music can convey reliably are mainly those basic emotions that do not require knowledge of the causal source [9, 10]. Knowledge gained from experimental studies of emotional expression is complemented by knowledge gained from more 'impressionistic' studies of expression, for example, in sociology [11, 12], philosophy [13] and psychoanalysis [14]. Freed from the constraints of operationalization, researchers are able to address more subtle and complex aspects of musical expression, although with more uncertainty regarding the underlying causal relationships.

CONCLUSION

This study found that effects of unmodified and modified tempo and timbre element towards the emotional musical responses of the musicians differs from those of non-musicians, since musicians are significantly more sensitive towards the tempo and timbre differences. The musical emotional responses which are stimulated by the timbre

ISSN: 0975-8585

element of the Javanese gamelan instrument is more effected by the listener's perception, experience and sociocultural aspects, than only by physics factors.

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