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# A Study of Children's Musical Preference: A Data Mining Approach

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*Abstract: Musical preference has long been a research interest in the field of music education, and studies consistently confirm the importance of musical preference in one's musical learning experiences. However, only a limited number of studies have been focussed on the field of early childhood education (e.g., Hargreaves, North, & Tarrant, 2006; Roulston, 2006). Further, among these limited early childhood studies, few of them discuss children's musical preference in both the East and the West. There is very limited literature (e.g., Faulkner et al., 2010; Szymanska, 2012) which explores the data by using a data mining approach. This study aims to bridge the research gaps by examining children's musical preference in Hong Kong and in South Australia by applying a data mining technique – Self Organising Maps (SOM), which is a clustering method that groups similar data objects together. The application of SOM is new in the field of early childhood education and also in the study of children's musical preference. This paper specifically aims to expand a previous study (Yim & Ebbeck, 2009) by conducting deeper investigations into the existing datasets, for the purpose of uncovering insights that have not been identified through data mining approach.*

## Introduction

Music is universal – it crosses the boundaries of cultures and generations. Throughout human history, music exists in every extinct and extant culture. In each cultural context, activities relating to music can be found, such as singing, listening, playing musical instruments or dancing. Whilst these musical activities may serve different roles and functions in different societies (i.e. the East and the West) and circumstances (e.g. celebration, religion and education) nevertheless, and regardless of the boundaries of culture and generation, the majority of us have been engaged in these musical activities since we were born. From an early childhood education viewpoint, music has also widely been regarded as an important 'food' that benefits children's holistic development.

The term 'music' in the early childhood education context basically includes the activities such as singing, listening, playing musical instruments and dancing/moving (Kontos, Burchinal, Howes, Wisseh, & Galinsky, 2002; Temmerman, 2000). In most modernized eastern and western countries, music has also widely been included in their early childhood curriculum guidelines as one of the key learning areas in the Arts – such as the Hong Kong Special Administrative Region (HKSAR) of the People's Republic of China (PRC) (Education and Manpower Bureau HKSAR, 2006), Australia (Department of Education Training and Employment DETE, 2001), the United Kingdom (Qualifications and Curriculum Authority QCA, 2000), Singapore (Ministry of Education, 2005), and New Zealand (Ministry of Education, 1996).

Musical preference has long been a research interest in the field of music education (Cassity, Henley, & Markley, 2007; Hedden, 1981; LeBlanc, 1981; LeBlanc, Colman, McCrary, Sherill, & Malin, 1988; LeBlanc & McCrary, 1983; Teo, Hargreaves, & Lee, 2008). Understanding children's musical preferences enables early childhood teachers to use this information when planning music activities. Children derive enjoyment from engaging in music they like and thus they respond to it positively making it a time that all look forward too. This is supported by Temmerman (2000) who states that there is a need to identify and monitor children's preference for musical activities in order to encourage their active engagement in music learning. Information about children's musical preferences can also be used to analyse the types of musical activities preferred as a basis for deciding what new music activities can be introduced and how these might be balanced in the overall curriculum.

Musical preference is among the most frequently researched topics published in major music education journals, such as the Journal of Research in Music Education (Schmidt & Zdzinsky, 1993). Similarly, Yarbrough (1996) reported that music preference occupied 17.05% of the total research reported in the Journal of Research in Music Education during the period of 1984-1995. She further highlighted that in the 21st century there is a need "for building a focused, cogent body of literature" in the area of musical preference (Yarbrough, 1996, p. 200).

The abovementioned research confirms the importance of musical preference in one's musical learning experiences, however, only a limited number of studies were found to be focused on the field of early childhood education (e.g. Cassidy & Geringer, 1999; Hargreaves, North, & Tarrant, 2006; Peery & Peery, 1986; Rogers, 1957; Roulston, 2006). Among these limited early childhood studies, most were mainly concerned about young children's preference for musical styles or genres. Very few of them explored young children's preferences for identified practical classroom musical activities (e.g. Bowles, 1998; Harrison & O'Neill, 2000; Murphy & Brown, 1986; Nolin, 1973; Temmerman, 1995). Within early childhood education, practical musical activities generally denote *singing*, *listening*, *playing musical instruments* and *dancing/moving* (Kontos et al., 2002). Further, among these limited early childhood studies, very few of them discuss children's musical preference in both the East and the West. In addition, very few studies explore the data by using data mining approach.

This study, therefore, aims to bridge the research gap by examining children's musical preference in Hong Kong SAR and in South Australia via a data mining technique – Self Organizing Maps (SOM), which is a clustering method that groups similar data objects together. It is proposed that the application of SOM is new in the field of early childhood education as well as in the study of children's musical preference. Therefore, this paper aims to use the data analysed with statistical packages (e.g., SPSS) in a previous published study by Yim and Ebbeck (2009), in order to further drill down the datasets with a data mining approach for uncovering insights that may have not been previously identified. As stated by Hand (1998, p. 112), data mining is concerned with the secondary analysis of a database in order to find previously un-suspected relationships which are of interest or value to the database owner. In essence, this current study was to assess the reliability and validity of some of the quantitative data gather in the earlier study by using a statistical approach.

## Data Mining in Early Childhood Education

The data in early childhood education is burgeoning, especially as the adoption of technology (e.g. video recording and multimedia learning) is proliferating in the field. Such data has been astronomically accumulated over time and has yet to be fully harnessed for the field of early childhood education. In fact, how can researchers effectively extract valuable information from such voluminous data for better understanding of the behaviours and needs of children, parents and practitioners such as teachers and directors of childcare centres? Such information needs to be subsequently applied for helping parents, practitioners or even policy makers to make more informed decisions. There is a need to look beyond existing approaches and paradigms to obtain in-depth understanding, interpreting the data thus extracting deeper insights in the field of early childhood education. This paper therefore aims to expand a published study by using a complimentary tool to analyse multi-dimensional quantitative data and provide visualisation to present information in an explicit graphic way.

Data mining may be described as an analytical approach to uncovering new and potentially useful insights (sometimes called knowledge) residing in huge amounts of data (Fayyad, Piatetsky-Shapiro & Smyth, 1996). This approach is a newcomer to the world of analytics in comparison to historically well-known approach such as statistics, especially when the advancement and ubiquity of computing technologies occurs (Zhao & Luan, 2006). Nevertheless, both data mining and statistics intersect with each other as they essentially share the common goal in analysing the relationship among the data points, which also provides valuable insights or new knowledge (Zhao & Luan, 2006). Despite the blending with statistics, data mining also incorporates techniques from other disciplines such as database management, machine learning and artificial intelligence (Fayyad et al., 1996). In addition, the applications of data mining in the world of business are evident (Apte, Liu, Pednault, & Smyth, 2002). For example, it is common for retail companies to mine their customers' transactional data in order to understand the customers' purchasing behaviours and subsequently personalised different promotions or services accordingly. Similarly, the impacts of data mining are extensively reported in the domain of health (Koh & Tan, 2005), higher educations (Romero & Ventura, 2010), meteorology (Kitamoto, 2002), and criminology and counter-terrorism (McCue, 2005).

The application of data mining in early childhood research is still at an infancy stage and is yet to be widely embraced. To the best of our knowledge, there are very limited studies on the adoption of data mining techniques in analysing early childhood datasets. For instance, Faulkner, Davidson and McPherson (2010) have reported the use of data mining technique for studying musical journeys, experiences and abilities of children originally from primary schools through a longitudinal study over a period of 12 years. Szymanska (2012) has used data mining technique to describe differences in preschool children's families from the perspective of parental influence. In addition, the study on early intervention for developmentally delayed children was conducted by applying data mining technique on medical history data of the children (Chang, 2007).

As a data analytical approach, a variety of data mining modelling functions could be generally categorised into seven classes, namely classification, regression, clustering, summarisation, dependency modelling, link analysis, sequential analysis and association rules (Fayyad et al., 1996). The three examples discussed previously (e.g. Faulkner et al., 2010; Szymanska, 2012; Chang, 2007) share the similarity of using the classification method for mining their datasets in which the groupings of data are already pre-determined or specified beforehand.

The focus of this paper is on a clustering method in order to enable exploratory data analysis and to form natural groupings of data. In other words, there are no preconceptions or hypotheses about the dataset, but rather allowing the data to be explored and findings to be deduced via clustering method. Hence, clustering is a suitable method for exploratory study as it is a data-driven process of grouping the data objects into separate groups or clusters, particularly when the pre-determined labels or classes of the data are unknown from the beginning. Therefore, in the context of early childhood education, the clusters could comprise of children's developmental domains/musical preferences, which further allow the investigation of similarities and differences among the children.

## Data Mining with Self-Organising Maps (SOM)

One of the popular and commonly used clustering techniques is the Self Organising Maps (SOM). It is a non-linear and adaptive data processing technique developed based on the neurological findings of human brains, which involve in self-organising and self-learning manner during the pattern identification process.

SOM is effective in handling large volumes of multi-dimensional data and therefore its scalability allows high dimensional data to be mapped into lower dimensional data abstractions through dimensionality reduction (Kohonen, 2001). In addition, the topological relationship of the data elements is also preserved during the process of dimensionality reduction and subsequently provides the robust results. The capability to visually represent data allows the study of the dependency and relationship among the voluminous data. The visual representation of data provides the superiority of SOM over other traditional clustering methods.

A typical SOM architecture is shown in Figure 1 and the algorithm is detailed by Li, Boo, Ee and Chen (2013). The input layer consists of input vectors, and the output layer, which is also the feature map, consists of output nodes. They are completely connected as every node in the input layer

is connected to every node in the output layer but not to other nodes in the same layer (Larose, 2005). In SOMs, input vectors are connected to an array of neurons, in which weights connecting input vectors to certain regions of the array of neurons will be adjusted and strengthened during a competitive learning process (Smith, 1999).

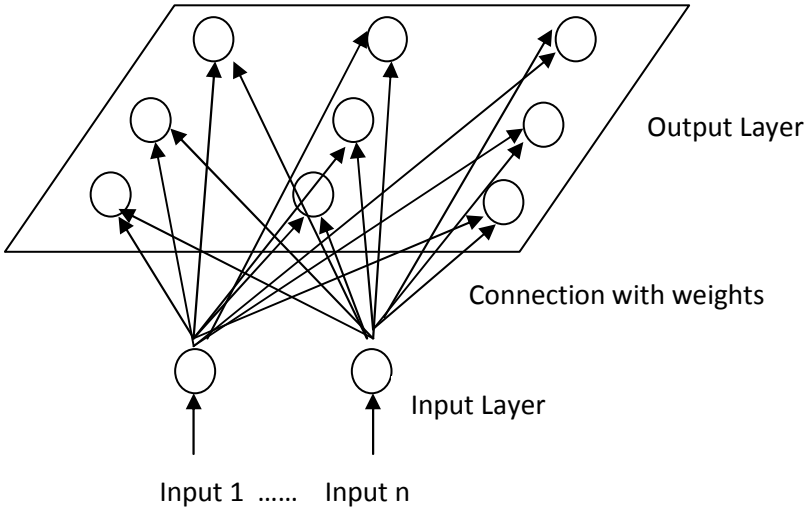


**Figure 1: A Typical Self-Organising Maps (SOM) Architecture**

Such a learning process is the principal mechanism in SOMs, where the output nodes compete among themselves to be the winning node. In this case, the winner of the competition is the output node that has the smallest distance to the input node and, therefore, becomes the centre of its neighbourhood. Subsequently, the winning node earns most "rewards" and cooperatively shares its "rewards" with its neighbouring nodes. Specifically, the reward refers to the learning received, thus, the winning node is that which receives the most learning with its neighbours but receives less the further away it is. That means, these nodes participate in learning and therefore demonstrates adaptation as weights are adjusted to increase the chance of winning the competition again. In brief, the SOM exhibits three characteristic processes, namely, competition, cooperation and adaptation (Larose, 2005).

In short, the nodes that are grouped together in a neighbourhood will form a cluster with its own characteristics or features. In this paper, we aim to obtain a few clusters and to describe different characteristics of musical preferences for each cluster. In addition, the SOM software – Viscovery SOMine (Ward cluster algorithm of Viscovery SOMine, n.d.) was adopted in this study because the optimal number of clusters is endogenously determined.

## Data Collection

Participants in the research were 228 young children aged 4-5 years and their parents/caregivers in the Hong Kong Special Administrative Region (HKSAR) of the People's Republic of China and in the Adelaide city of South Australia (SA). Of the total number of participants ($N$ = 228), 115 (66 males and 49 females, mean aged 4.4 years) young children were in four child care centres in HKSAR, and 113 (62 males and 51 females, mean aged 4.2 years) young children were in three child care centres in South Australia. The children participating in the research were aged 4-5 years during the research period, and they participated with the approval of their parents/caregivers who responded to a carefully designed questionnaire tool. The purpose of the research and brief data collection process were also explained to the children in each child care centre in the first data collection phrase according to the ethics protocol approved by the researchers' university, and also to new children during the research period. Both children and parents were invited to participate voluntarily in data collection, and they were also informed that they could refuse their participation in data collection without any explanation, penalty, or cost to them.

Child-participants were invited to respond verbally to an integrated interview-questionnaire that contained both closed- and open-ended response questions. The closed-ended questions were developed to elicit the quantitative information about children's 'likes' as well as 'dislikes' of musical activities. The open-ended questions were developed to collect the qualitative information about children's indications of preference. Questions were developed according to the 'Child Questionnaire' in Temmerman's research (2000) of young children's musical attitudes who found that dancing/moving is Australian pre-school children's favourite musical activity.

Within the current research, a total of four dichotomous questions each of which was followed by an open-ended question developed by the researchers. Given the focus of this paper, the dichotomous data (e.g., likes or dislikes) were used only. The qualitative data had been reported in the previous published study by Yim and Ebbeck (2009). The four dichotomous questions were about children's likes or dislikes of each of the four selected musical activities – 1) singing; 2) listening; 3) playing musical instruments; and 4) dancing/moving. The question stated '*Do you like (each of the four musical activities) in child care centre?*' The open-ended questions stated '*Why do/don't you like (each of the four musical activities) in child care centre?*' which asked children to elaborate on their choice in their own words. A picture of the four musical activities was also presented to each child -in order to provide visual support to the verbal interview-questionnaire. Children who were unwilling to respond verbally to the dichotomous questions could choose to point to picture with symbols of 'tick' and 'cross'. The integrated interview-questionnaire was pilot-tested on 10 children using convenience sampling in each cultural context resulting in no amendments to the interview-questionnaire.

A total of three interviews were conducted with each child participant using the same interview-questionnaire during the research period. At least one month interval between the interviews was made in order to enhance the reliability of data collected, as children's musical preferences were relatively inconstant before aged of 5 (Zenatti, 1993) and one's preferences could be unstable due to factors such as learning ('learning effects') and boredom ('fatigue effects') (see McFadden, 1986).

## Results

The SOM cluster results are depicted in Figure 2 as well as the pattern of three clusters. In addition to Figure 2, one could also examine the feature maps for all input attributes, as depicted in Figure 3. The feature maps allow one to inspect the distribution of values of the respective input attributes, in which the name of input attributes are displayed on the top of each map and the spectrum of colour pixels that range from blue to red are exhibited at the bottom. In the context of this paper, blue and aqua pixels respectively represent children who have least and inconsistent preference for the musical activities. On the other hand, the lime and yellow refers to children who have slight preference for musical activities. Children who have the most preference for musical activities are indicated in orange and red. Therefore, this allows visual examinations of the relationship between the attributes in terms of comparisons, contrasts and associations and subsequently extracts hidden knowledge that are interesting and meaningful. The cluster results are given in Table 1 and the overview of the cluster descriptions is available at Table 2. At first glance, playing instrument (0.858) and dancing (0.846) appear as the most preferred musical activities in Cluster 3 and Cluster 2 regardless of the locations. However, the results are further drilled down and detail elaborations of the results are discussed as follow.

**Locations and Overall Musical Preference (OMP)**

As shown in Table 1, it is apparent that Cluster 3 has the highest frequency (38.16%) and thus become the largest cluster. As depicted in Figure 2 and Table 1, the size of Cluster 1 (33.33%) is close to Cluster 3 as both have similar frequencies whereas Cluster 2 (28.51%) is the smallest cluster. The largest cluster (i.e. Cluster 3) consists of children from HKSAR (Hong Kong) only and their overall music preference (OMP) is high (0.70), which shows musical activities are most preferred among the children. Although Cluster 2 is the smallest cluster, it has the highest OMP (0.73) and that means 83% of SA children and 17% (or 0.171) of HKSAR children in this particular cluster mostly prefer musical activities. This could be visually observed in the OMP feature map in Figure 3 where large numbers of pixels are in red and orange in Cluster 2. The OMP values in Table 1 has shown that musical activities are slightly preferred in Cluster 1 with 0.48 as the lowest value among the three clusters. In addition, Figure 3 shows that OMP for Cluster 1 mainly consists of pixels of lime and yellow (i.e. slight preference) and some aqua and blue (i.e. no and inconsistence preference). In other words, we notice that 77% of SA children and 23% (or 0.231) of HKSAR children in Cluster 1 mostly have slight preference for musical activities. In fact, it is obvious that the no preference and inconsistence preference for musical activities only appear to be in SA.

**Playing Instruments**

To further drill down the analysis, the association of OMP with each musical activity is examined. In Cluster 1 (i.e. lowest OMP, 0.48), there are up to 96% of children who have inconsistent preferences and no preference in playing instruments. In fact, the children in Cluster 1 have least preference in playing instruments in comparison to another 3 types of activities. Specifically, there are up to 79% of children from SA who have inconsistent preference and no preference in playing instruments in comparison to only 17% of children from HKSAR. However, there is also a small group of children (4%) shown in Cluster 1 who indicated playing instruments as their most preferred activity and they are all from SA. In fact, this could be observed in the feature map of playing instrument whereby the red pixels at the top right corner and bottom corner. In Cluster 2 (i.e. highest OMP, 0.73) shows that there are up to 80% of children who have slight preference, inconsistent preference and no preference in playing instruments. Among them, children from HKSAR are accounted for 23% and 57% of children are from SA. The red pixels at the bottom left corner in the feature map of playing instrument shows that children in Cluster 2 who indicated playing instruments as their most preferred activity are from SA and are accounted for 20%. Children in Cluster 3 (i.e. high OMP, 0.70) are all from HKSAR and it was found that playing instruments are most preferred among this group (59%) in comparison to 41% of children who have inconsistent and slight preference to this activity. Interestingly, the visualisation of playing instrument feature map do not have blue pixels in Cluster 3 and that means none of the children in this cluster indicated no preference for this musical activity.

**Singing**

There are up to 89% of children in Cluster 1 who indicated a slight preference, inconsistent preference and no preference in singing. Specifically, there are 72% of them are from SA and 17% from HKSAR. The remaining 11% are children from SA only and who have indicated singing as their most preferred activity. In Cluster 2, there are no blue pixels in the feature map of singing, which means none of children indicated that they do not prefer singing. However, there is 65% of SA children and 23% of HKSAR children in this cluster who have indicated slight preference and inconsistence preference in singing. The ones who have indicated singing as the most preferred activity (i.e. red pixels in Cluster 2) are only from SA and they are accounted for the remaining 12%. In Cluster 3, there is up to 77% of children from HKSAR who indicated slight preference, inconsistence preference and no preference to singing. The red pixels in Cluster 3 indicate that there are 23% of HKSAR children expressed that their most preferred activity was singing.

**Listening**

Some 86% of children in Cluster 1 indicated slight preference, inconsistent preference and no preference for listening and most of them are from SA (74%) in comparison to HKSAR (12%). The red pixels in the feature map of listening are distributed in two locations with 9% from SA and 5% from HKSAR. In Cluster 2, there is 66% of SA children and 23% of HKSAR children who indicated slight preference and inconsistence preference for listening. The red pixels in the feature map of listening refer to 11% of SA children who indicated listening as their most preferred activities. Interestingly, none of the children in Cluster 2 indicated that they do not prefer listening, as there are no blue pixels at all. Largely, the children from HKSAR in Cluster 3 have slight preference, inconsistence preference and no preference for listening as they are accounted up to 97%.

**Dancing / Moving**

There are a large proportion of children (91%) in Cluster 1 who indicate slight preference, inconsistent preference and no preference in dancing and mainly 74% are from SA and 17% from HKSAR. Only 9% of children indicate dancing as their most preferred activity and all of them are from SA. Dancing is popular in Cluster 2 as there are up to 54% of children from both locations who indicate dancing as their most preferred activity. Specifically, there are 23% of them from HKSAR and 31% from SA. There are 46% of children in this group who indicated slight preference for dancing and they are all from SA. All HKSAR children in Cluster 3 indicated slight preference (90%) and inconsistent preference (10%) for dancing and interestingly none of them indicated it as either most preference or no preference.

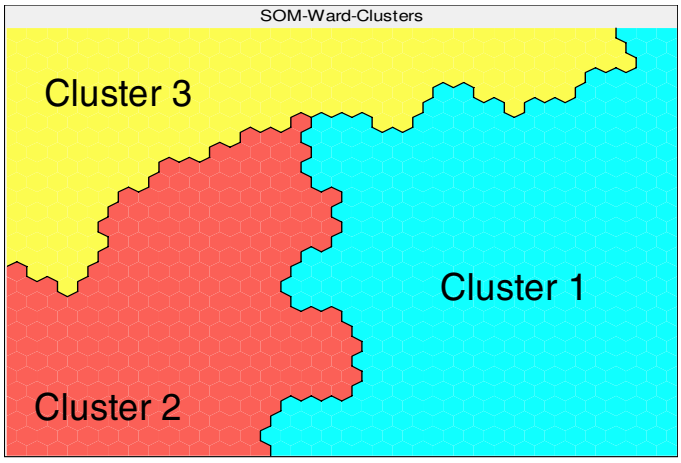


**Figure 2. SOM clusters.**

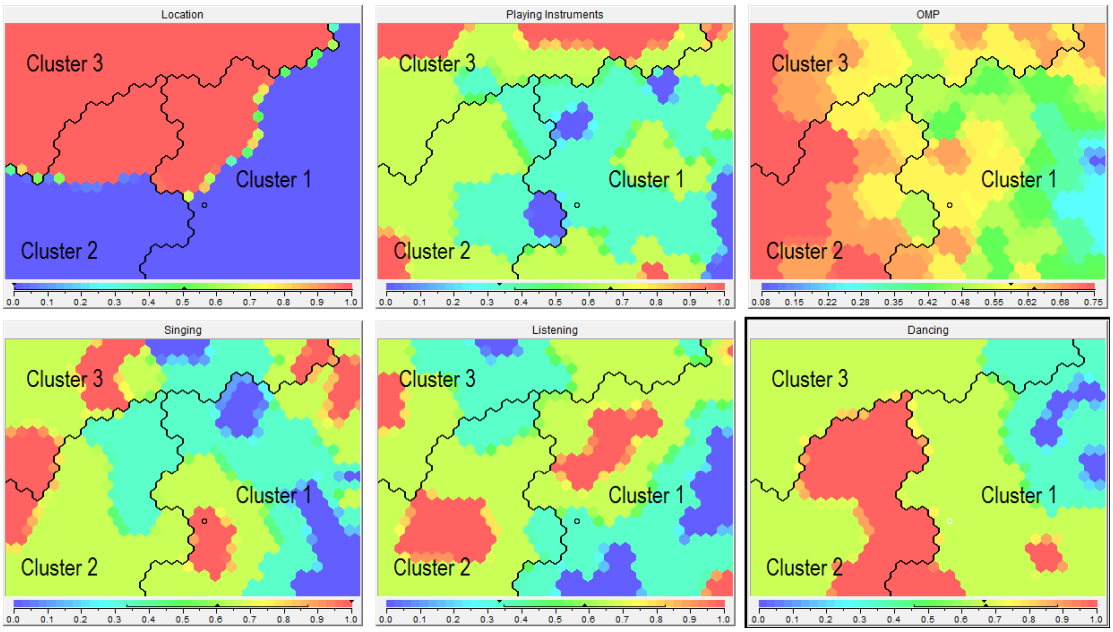


**Figure 3: Feature maps of input attributes, namely Locations, Overall Music Preference (OMP), Playing Instruments, Singing, Listening and Dancing.**

| Cluster | Frequency | Location^ | OMP* | Playing Instruments | Singing | Listening | Dancing |
|---|---|---|---|---|---|---|---|
| Cluster 1 | 33.33% | 0.171 | 0.4781 | 0.412 | 0.452 | 0.482 | 0.566 |
| Cluster 2 | 28.51% | 0.231 | 0.7256 | 0.692 | 0.677 | 0.687 | 0.846 |
| Cluster 3 | 38.16% | 1 | 0.6925 | 0.858 | 0.678 | 0.602 | 0.632 |

^Location denotes HKSAR and SA.
*OMP (Overall Music Preference) denotes quantitative summation of the fours musical activities.

**Table 1: SOM cluster results.**

| Cluster | Characteristics |
|---|---|
| Cluster 1 | These were mainly SA children with a small percentage of HKSAR children. Overall music preference (OMP) is low across four musical activities. Children from SA have lower levels of music preference. Children in HKSAR tend to have a higher-level preference in listening and dancing. A small number of children from HKSAR dislike singing and playing instruments. |
| Cluster 2 | These were mainly SA children with a small percentage of HKSAR children. Overall music preference is mainly "most preferred". Obviously there are some high preferences in all musical activities. However, dancing is the most preferred activity. |
| Cluster 3 | All children from HKSAR, show some high preferences in singing, listening and playing instruments. However, slight and inconsistent preferences in dancing are noted. Overall music preference mainly indicated "most preferred". |

**Table 2. Summary of the clusters' characteristics.**

## Discussion

### Dancing/Moving is the Most Preferred Musical Activity Among Children in Both SA and HKSAR

Such a finding using the data mining approach confirms the results of the earlier cross-cultural study by Yim and Ebbeck (2009), and in other studies in the western contexts (e.g., Denac, 2008; Temmerman, 2000). Dancing/moving is an important media for children to learn and express. Wright (1991) highlighted that children love to use movement to explore the way their bodies move through space, and to communicate their innermost feelings. Indeed, early childhood music educators and researchers consistently remind practitioners about the benefits of music and movement experiences for young children, as moving to music could be an important milestone in children's holistic development (e.g., Kazimierczak 2004; Pound & Harrison, 2003; Scott-Kassner, 1992). Due to children's strong preferences for dancing/moving as revealed in this study, early childhood educators/caregivers in both cultural contexts are encouraged to provide movement experiences to children— both the spontaneous and the planned experiences. Adults should always feel comfortable moving and dancing, as they are not only children's play mate, but could also be the source of ideas for children.

### Dancing/Moving is a More Preferred Activity by Children in HKSAR than in SA

Such a finding, again, confirms the research results as discussed by Yim and Ebbeck (2009). Children love to dance/move. Nevertheless, such an intrinsic value or passion may become a luxury, if the land population density is extremely high. In HKSAR, for example, the land population density as at mid-2010 stood at 6540 persons/km$^2$ (Census and Statistics Department HKSAR, 2012). Local children are forced in live in a very confined area, and they generally lack of space to play indoor or outdoor. Their strong preference to dance/move as revealed in this study may therefore be a reflection of their underlying desire and possible inner conflicts.

Dancing is also a very popular after-school-hour activity for children in Asia. In Malaysia, for example, the Federal Academy of Ballet has approximately 2,000 students studying dance (Gonzales, 2008, p. 297). Gonzales further indicated that there is indeed a huge market for the arts in the Asia-Pacific area. However, the number of Asian students choosing to pursue dance education at tertiary level or to dedicate their careers in dance is ridiculously small. Based on the results of the present study, a longitudinal research approach may be applied to capture the impacts of children' preferences in dancing on their ongoing academic and professional developments in this arts form.

**More HKSAR Children Indicated Their Clear and Strong Preference in Playing Instruments**

This new finding is identified by using the SOM. In the study by Yim and Ebbeck (2009), musical instruments were usually displayed on open shelves in music rooms in early childhood educational settings in HKSAR, and music was usually one of the timetabled activities. Some commonly used musical instruments in the local settings are percussive (e.g. drum, tambourine), string (e.g. guitar) and self-made ones (e.g. beans in recycled bottle). Further, some local early childhood educational settings even have designated teaching areas (e.g., music corner or music room). Research also consistently confirms the 'craze' for HKSAR parents to send their young children to learn an instrument (e.g., Poon, 2006, Cheung, 2004). Children in HKSAR may therefore have more opportunity to access musical instruments on a relatively more regular basis.

In South Australia, however, musical instruments are usually placed in storerooms and are brought into the classrooms only when the teachers intentionally or spontaneously decided to use them. Similar to HKSAR, percussive, string and self-made/recycled instruments are commonly available in the centres in SA. Also, designed music teaching areas, timetabled music activities and out-of-school instrumental learning are relatively not common in Australia, as compared to other learning areas such as sport. Recent research confirms that the accessibility of materials and/or information is important elements of children's learning (Killian & Basinger, 2004; Lim & Chung, 2008; Wavle, 2006). Custodero (2005) also highlighted that accessibility to musical instruments applies to and is important to music education for young children. The findings in this research further suggest that accessibility to musical instruments may impact on children's preference.

**South Australian Children are More Likely to Indicate Their Least Preferred Musical Activity than HKSAR Children**

This study found that South Australian children are more likely to express their least preferred activity than HKSAR children. Such a finding is revealed due to the use of SOM, and it implies the possible intercultural aspects of argumentation in the early childhood educational contexts. This argumentation denotes that the way of expressing opinions may vary between the East and the West, and such a variation may exist at early age. In a recent study, Horne (2010) claimed that some Asian students might not be expected to express complex opinions in their classrooms. Also, some Asian students may be more inclined to fit in with others and be attuned to their feelings, rather than impose their ideas on the environment (Nisbett, 2003). Such research findings may also explain this present study's finding that HKSAR children have higher levels of overall music preference than SA children. Nisbett (2003) further commented that when faced with apparent contradiction, some Asians might incline to seek the middle way whereas Westerners will insist on one particular point of view. Such a comment seems to be consistent with the results of this study (refer to feature maps - Figure 3). Researchers of intercultural studies are therefore advised to use culturally sensitive and age-appropriated mixed-methods approach to capture participants' quantitative and qualitative data (e.g., Yim and Ebbeck, 2009), should high quality research are expected to be conducted.

## Conclusion

The use of a data mining approach presented in this paper has allowed for a deeper interrogation of the data from an earlier study by providing a deeper drilling down into the datasets. This data mining approach offers exciting possibilities for researchers to explore in more depth, that is to look beyond which might be termed a superficial analysis. It is useful to consider that early childhood research using this approach may provide greater insights, not only into musical preferences of children but unlimited opportunities of finding more about young children's development and learning. Recognising that young children are capable of expressing valid views about their musical preferences, values and respects their opinions and it is hoped leads to deeper engagement and appreciation of music. It also offers possibilities for children to develop a love of music which may endure even into adulthood. Music has long been recognized as a universal artefact that crosses borders, times and cultures. Nowadays, music is further widely accepted in the global educational community as being a

key element and/or learning area in quality education because it has ramifications for and influences other developmental domains. There is a need, therefore, for educators to realize the importance of this universal artifact by supporting young children's engagement in music in order to enhance their holistic development.

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