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Abstract

Previous research on contextual correlates of musical taste has considered micro-level influences extensively, but has yet to consider macro-level factors, such as time of year. The literature concerning seasonal correlates of mood and behavior suggests that colder weather is associated with low activity and a reflective cognitive style while warmer weather is associated with higher activity levels. Analyses of the season-based playlist music preferences of 402 participants as measured by their ratings of 24 adjectival descriptors of music indicated three dimensions: arousing, serene, and melancholy. Findings demonstrate listener preferences for arousing music for the warmer months, serene music for spring, and melancholy music for the cooler months. Consequently, these findings demonstrate that the nature of seasonal correlates of musical taste reflect the broader literature on the former, and more generally that macro-level factors are associated with musical taste and listening behaviors.

Keywords: music preference, season, playlists

Running head: season and musical taste

'Tis the season: Music playlist preferences for the seasons

1. Introduction

Doise (1986) proposed that there are four levels of analysis in social psychology, namely intra-individual, inter-individual, socio-positional, and ideological. At the lowest level, the intra-individual level, research considers how people organize their environment in terms of cognitive, perceptual, and biological processes. The inter-individual level is concerned with the processes between people in a given situation. Also concerned with the relationships between people, the socio-positional level considers effects arising from differences between people's social position arising from group membership or social institutions such including schools or communities. The broadest, ideological, level considers broad cultural beliefs, representations, and norms, as well as other macro-level factors.

Previous research on contextualized music listening has considered micro-level influences at the intra-individual level (such as Rentfrow & Gosling's (2003) work on personality correlates of musical taste), the inter-individual level (such as Radocy's (1975) frequently-cited work on conformity in musical preference), and small scale social-positional levels (such as North & Hargreaves's (1996) work on situational determinants of musical preference); and Hargreaves and North's (1997) review of the field is explicitly organized around this structure. However, there is very little work at the broadest of Doise's levels concerning macro-level correlates of responses to music.

Perhaps the best-known example of this is provided by Zullow (1991). He considered the best-selling pop songs from 1955 to 1989 in the U.S., finding that the levels of pessimistic rumination in the lyrics could predict changes in consumer optimism, which in turn could predict Gross National Product growth. Crain and

Tollison (1997) similarly considered the 912 songs that reached number one in Billboard Magazine's rankings from 1940 to 1988. By studying these songs in terms of their tempo, duration, and the number of weeks that each spent at number one, they found that economic factors were related to changes in the internal structure of successful songs. For instance, the length of songs was positively related to earnings and the dominance of a small number of artists in occupying the number 1 position, while negatively related to military deaths, prime interest rate, and advertising expenditure. Moreover, the tempo of these popular songs was positively related to the number of military deaths and the 'misery index' (i.e., unemployment rate plus inflation rate). Lastly, Pettijohn and Sacco (2009a, 2009b) also found musical evidence for the Environmental Security Hypothesis – that the style of Billboard number one songs were considered more meaningful and more comforting when environmental conditions were more threatening.

A considerable and completely distinct literature has considered emotional responses to music. Sloboda and Juslin (2001) outline three major psychological approaches to conceptualizing (music and) emotion. The first of these, the categorical approach, argues that more complex emotions are developed through the amalgamation of clearly distinguishable 'basic emotions' (such as fear), which themselves have an adaptive role. In contrast, within the prototype approach, the specific emotion in question is located within a hierarchy, such that the more general related emotion is located in a superordinate hierarchical position and more fine-grained related emotions are located at a subordinate hierarchical level. Finally, dimensional theories organize emotions according to their relative position along a small number of dimensions, such as pleasantness and activity. However, as this brief overview hints, the great majority of this research exists at Doise's intra-individual level

and/or has taken an approach informed heavily by musicology, and particularly concerns perceptual processes in relation to musical structures. Very little psychological research on music aesthetics has addressed the ideological level of Doise's hierarchy, and the present research addresses this by considering seasonal correlates of musical taste.

The literature on seasonal correlates of mood and behavior provides some more specific guidance concerning the nature of any seasonal variations in musical taste that may exist, and the kind of theoretical processes that may underlie these. Research in finance has suggested that weather may affect stock trading and returns (Goetzmann & Zhu, 2005; Hirshleifer & Shumway, 2003; Saunders, 1993). In particular, while the effects may be subtle, sunny days are positively correlated with daily stock returns, supporting the contention that sunlight influences the moods of stock traders, which in turn affects the prices they pay for stocks (Hirshleifer & Shumway, 2003). Moreover, limited marketing research has considered the influence of weather variables on consumer spending (Levy & Galili, 2008; Murray, Di Muro, Finn, & Popkowski Leszczyc, 2010; Parker & Tavassoli, 2000; Parsons, 2001). This work similarly argues that the effect of weather (and sunlight in particular) on behaviors is related to changes in mood. For example, Murray et al. (2010) found that as exposure to sunlight increased, negative affect decreased and consumer spending increased. One possible interpretation of these findings is that warmer, more clement weather is associated with a greater degree of activity and positivity in mood and behavior, whereas colder, less clement weather is associated with less active and instead reflective mood and behavior.

Violence and criminal behavior have also been linked to weather in a similar manner, such that warmer weather is associated with more violent/criminal activity

(Anderson, 2001; Cohn, 1990; Hipp, Bauer, Curran, & Bollen, 2004; Jacob, Lefgren, & Moretti, 2007; Schory, Piecznski, Nair, & El-Mallakh, 2003). For instance, increases in daily temperature were associated with increased aggravated crime, including assault, homicide, and rape (e.g., Gamble & Hess, 2012) and temperature increases have also been associated with increases in property crime (e.g., Horrocks & Menclova, 2011). One possible explanation, the heat hypothesis, states that hot temperatures can increase aggressive motives and behaviors (Anderson, 2001) and violent crime (Cohn, 1990) due to increased feelings of hostility and indirectly increasing aggressive thoughts, both indicators of increased activity. The simplest underlying idea suggests that this is due to "crankiness" (Anderson, 2001), or the notion that heat makes people uncomfortable. "Heat-induced discomfort makes people cranky. It increases hostile affect (e.g., feelings of anger), which in turns primes aggressive thoughts, attitudes, preparatory behaviors (e.g., fish clenching), and behavioral scripts (such as "retaliation" scripts)" (Anderson, 2001, p. 36). Consequently, evidence supporting the influence of weather on violent/criminal behaviors can also be interpreted in a manner such that warmer weather leads to people being more active (albeit in a different manner), while cooler weather is associated with less active, calm behavior.

However, perhaps the strongest suggestion that there may be a relationship between weather and musical taste is provided by work linking weather directly to mood (Harmatz et al., 2000; Howarth & Hoffman, 1984; Sanders & Brizzolara, 1982). Much of this work has been carried out in relation to mood disorders, and seasonal affective disorder in particular (e.g., Ohtani et al., 2006; Palchikov, Zolotarev, Danilenko, & Putilov, 1997; Suhail & Cochrane, 1998) in which sufferers most commonly experience symptoms of depression during autumn and winter, with remission to

normal mood (or sometimes mania) during spring and summer (Lam et al., 2006), as a consequence of light deprivation during winter (e.g., Palchikov et al., 1997).

Regarding music, researchers in the music information retrieval field have begun to suggest that recommender systems consider temporal factors. Two pieces of work have considered variations in music listening by time of day and day of the week (e.g., Herrera, Resa, & Sordo, 2010; Park & Kahng, 2010), but perhaps most interesting are those indications that music listening may be related to variations in season. For instance, there is evidence from online listening logs of different listening patterns based on the seasons (Baur, Büttgen, & Butz, 2012). Similarly, Pettijohn II, Williams, and Carter (2010) considered how the seasons relate to preferences between four types of music genre, finding that people preferred to listen to reflexive and complex genres more after thinking about autumn and winter, and preferred energetic and rhythmic genres when primed to think about spring and summer.

The present work argues that musical taste is linked to seasons via influences on mood which in turn influence behavior and this is because of evidence based on (i) behavioral analysis of financial markets; (ii) violence and criminal behavior; (iii) weather and mood; and (iv) a small number of studies that directly concern seasonal correlates of musical taste. In conjunction, this evidence suggests that during warmer months people may prefer more active music (whether this be positively-valenced (i.e., positive affect) or negatively-valenced (i.e., negative affect) as indicated by the literature on violence and crime), whereas in colder months they might prefer calmer, more reflective music (which may again be positively- (e.g., relaxing) or negatively- (e.g., depressing) valenced).

To test the nature of any seasonal correlates of music taste, a questionnaire was developed to consider self-reported strategies for constructing music playlists.

Playlists, in general, are created by listeners choosing the songs as well as the order in which the songs are presented. As of 2015, more than 1.5 billion playlists have been created for use on the online listening service Spotify (http://press.spotify.com/au/information/) alone: as such the concept of listening to music via playlists is understood in the general population and represents a common means of determining what music to listen to under certain prescribed circumstances. Based on the findings reviewed above, we hypothesized that participants would prefer music in spring and summer that could be characterized as energetic, and prefer music in autumn and winter that could be characterized as reflective.

2. Method

Participants

Four hundred and two residents of the US (N = 153) and Australia (N = 249) aged 17-71 years completed the online questionnaire. Table 1 details sample characteristics. Online recruitment included the author's website, the university's student research participation program, and dedicated online study websites. While participation was voluntary, some university students received course credit in compensation for their efforts.

-Table 1-

Design and Procedure

Using a repeated measures design, the online questionnaire consisted of two parts. First, participants reported their age, gender, and country of residence. Country of residence was recorded because it is possible that this may affect the participants' experiences of the seasons (e.g., the Australian summer typically involves more extreme

temperatures than summer as typically experienced in the US); and because geographical location has been linked to music preference and use in prior research (North & Davidson, 2013). Participants also reported their perception of the importance of both music and technology (using a 1-7 scale, 1 = *not at all* and 7 = *extremely*) and also estimated the average number of hours they listened to music and used technology daily. Respondents also indicated how frequently they made and listened to playlists (using a 1-7 scale, 1 = *never* and 7 = *a lot/always*).

Second, participants received directions informing them that the research concerned the creation of music playlists for the four seasons respectively. The online platform (Qualtrics) was programmed so that the presentation of the questions for the four seasons was random, thereby counter-balancing the questionnaire. A decision was taken at an early stage not to collect actual playlists from participants during different seasons as this would introduce biases over the course of the calendar year due to the evolving nature of the musical tastes of the individuals concerned, the evolution of musical fashions, and music industry marketing, in addition to the high attrition rate in the sample that would be expected over this period of time.

Directions to the respondents stated, "Imagine you are creating a playlist titled, 'Autumn'. Please circle how much each item below would match your playlist selections (1=not at all, 7=extremely)". These directions were repeated for each season. Thus, participants were asked to rate how well 24 characteristics would describe their selections for each named playlist. The 24 characteristics were taken from North and Hargreaves' (1996) list; and comprised familiar, sad, strong rhythm, attention-grabbing, can dance vigorously to it, happy, sensual, lilting, beautiful, natural/fresh, expresses profound emotions, sentimental, nostalgic, sophisticated/classy, exotic, quiet, loud, romantic, moody, inspiring/majestic, relaxing/peaceful, invigorating, exciting/festive,

strong ethnic roots. Importantly, as North and Hargreaves (1996) used these characteristics in research that explicitly addressed musical taste in the context of physical listening circumstances (and is one of very few studies to have done this), these dimensions are the most relevant to the present research. North and Hargreaves' (1996) principal components analysis of their participants' ratings showed that an 'Arousal' factor explained the greatest proportion of the variance (28%), such that these adjectives were particularly appropriate for testing the current hypothesis. Moreover, the use of 24 descriptors was chosen to provide more of an in-depth profile of music preference (as opposed to the four broad STOMP (Rentfrow & Gosling, 2003) categories, for example, as used by Pettijohn et al., 2010).

3. Results

Four separate principal component analyses with promax rotation were conducted on the participants' ratings of the 24 musical characteristics for the playlists for each of the seasons respectively. Each of the seasons gave rise to a three-factor solution, although the make-up of the three factors was not entirely consistent across the four seasons. Inspection of the four solutions identified the items that consistently defined each of the three factors for all four seasons. Through this process, a set of common items for each of the three core dimensions was identified. Across each of the seasons, Dimension 1 included attention-grabbing, invigorating, loud, exotic, can dance vigorously to it, exciting/festive, and strong rhythm, and was therefore labeled "arousing"; and Dimension 2 included beautiful, inspiring/majestic, natural/fresh, romantic, and relaxing/peaceful, and was therefore labeled "serene." Two items were common to dimension 3 across each of the seasons, namely sad and moody; therefore, it was labelled "melancholy." Three dimension scores per season were created for each

participant: each dimension score was the summed total of their responses on the items that loaded on each dimension in turn. Table 2 details the principal component analysis item loadings, as well as the means and Cronbach's alphas for each of the three dimensions.

-Table 2-

A repeated measures MANCOVA was then carried out, in order to investigate differences between the seasons on the three dimension scores (within-subjects variables). Country of residence was included as a between-subjects variable in the analysis, given differences between the countries in the typical experiences of each of the different seasons. As the Box's Test was significant, (F (78, 333865.17) = 1.40, p < .05), Wilks' Lambda statistics are reported. The multivariate within-subjects results indicated that the season by country of residence interaction was statistically significant, Wilks λ (9, 2915.77) = 4.22, p < .001, η_p^2 = .01, and that the main effect of season was significant, Wilks λ (9, 2915.77) = 169.07, p < .001, η_p^2 = .289).

Regarding the univariate tests, Mauchly's test of sphericity was significant for all three dimension scores (Dimension 1 - arousing: W = .75, χ^2 (5) = 113.96, p < .001; Dimension 2 – serene: W = .86, χ^2 (5) = 58.48, p < .001; and Dimension 3 - melancholy: W = .68, χ^2 (5) = 153.04, p < .001), and therefore the Huynh-Feldt statistics are reported. While the season by country of residence interaction was non-significant for arousing (F (2.52, 1009.12) = 2.31, p = .086, η_p^2 = .006), the interaction was significant for both serene (F (2.38, 1097.15) = 4.15, p < .01, η_p^2 = .010) and melancholy (F (2.38, 950.66) = 6.84, p < .01, η_p^2 = .017).

With regard to the arousing dimension, the main effect for season (see Figure 1) indicates that the preferred music for summer was rated significantly more arousing (*M* = 5.30) than the music for other seasons (autumn *M* = 3.59; winter *M* = 3.38; and spring *M* = 4.35). Moreover, the preferred music for spring was rated significantly more arousing than that for autumn and winter. This shows that arousing music is most preferred in summer, followed by spring, and then to a lesser degree in autumn and winter.

Regarding the serene dimension, the significant interaction (see Figure 2) indicated that there were variations between the US and Australian responses, with Australians expressing stronger preferences for serene music in spring (*M* = 4.65) and autumn (*M* = 4.75) compared to the Americans (*M* = 4.82 and 4.70, respectively); and Americans reported a stronger preference for serene music during winter (*M* = 4.73) as compared to the Australians (*M* = 4.65). Importantly, regardless of country of residence, the response pattern is such that Spring gave rise to the highest preference for serene music, while summer gave rise to the lowest serene music (USA *M* = 4.02; Australia *M* = 4.30).

The significant interaction concerning the melancholy dimension (see Figure 3) showed that there were variations between the US and Australian responses, such that in the case of Winter, Australian residents expressed a stronger preference for melancholy music than the Americans, whereas for summer, the American residents reported a stronger preference for melancholy music than the Australians. However, there was a clear demarcation between autumn/winter and spring/summer: the music preferred for autumn (US *M* = 3.98; Australia *M* = 3.86) and winter (US *M* = 4.73; Australia *M* = 4.51) was characterized as more melancholy when compared to spring (US *M* = 2.74; Australia M = 2.63) and summer (US *M* = 2.52; Australia *M* = 2.25).

-Figures 1-3-

4. Discussion

The results of the principal components analyses demonstrate that participants reported preferring different types of music between seasons. Analyses of the adjectival descriptors of season-based playlist music preferences indicated three dimensions: arousing, serene, and melancholy. Consequently, these dimensions can be used to interpret season-based music preferences.

Country of residence was included in the analysis, given that geographic location is related to climate, and prior research showing a relationship between geographic location and musical taste (e.g., North & Davidson, 2013). Indeed, the country of residence by season interaction was statistically significant for two of the dimensions (namely, serene and melancholy), illustrating that a listener's location influences the relationship between seasons and music listening preferences. However, the differences between means arising from these countries appear relatively trivial compared to those differences that arose between seasons. This might arguably reflect the similarity between these two countries with regard to Hofstede's (2001) cultural dimensions, such that future research might compare findings from countries with very different scores on Hofstede's dimensions as this might be expected to yield a larger effect of country.

Indeed, the pattern of means illustrated in the Figures indicated that the more interesting source of variation in the data concerned differences between seasons (and this is supported by the effect size pertaining to the main effect for season). Specifically, warmer seasons were associated with a preference for arousing music whereas cooler

seasons were associated with preference for melancholy music, and spring was associated with a preference for serene music.

The results are consistent with earlier research concerning seasonal variations in factors other than music. The apparent preference for arousing music in spring and summer rather than autumn and winter is consistent with previous work concerning the seasonal correlates of financial behaviors as well as mood disorders. Additionally, the results concerning the melancholy and serene preference dimensions are consistent with research findings concerning seasonal fluctuations in mood, evident in seasonal affective disorder for example. Further, the present results support Pettijohn et al.'s (2010) findings concerning seasonal music genre preferences. Pettijohn et al. used music preference classifications based on research by Rentfrow and Gosling (2003) concerning music genre preferences and personality, such that they found a preference for complex and reflective music during autumn and winter and a preference for more active, energetic and rhythmic music in spring and summer. The present findings concerning the arousing dimension arguably correspond with the energetic and rhythmic classification and it is possible to argue that the melancholy dimension represents an aspect of the reflexive classification.

This research is not without limitations, most notably the broad geographic classification of country of residence and that reported preferences were obtained at a single point in time. It is possible that the participants completed their preference ratings in a schematic manner, whereas actual playlists may demonstrate more or less variation. However, future research is well placed to continue to explore how listening is defined by such social influences. Specifically, future research could address the limitations of the present research, for instance, by considering different regions within Australia and the USA (since the experience of a particular season can vary dependent

on the state or region of each country). The presence of Seasonal Affective Disorder is markedly different dependent on location latitude (in Florida versus Alaska, for example - e.g., Magnusson & Partonen, 2005), so that latitude or hours of sunlight could account for minute differences in the preferences displayed by participants in different locations (as has been addressed in prior research concerning seasonal behaviors – e.g., Suhail & Cochrane, 1998).

Further, work investigating seasonal and time-relevant music preferences cross-culturally could make use of sales chart patterns and existing prepared playlists. As the current study asked participants to consider their preferences, an examination of purposely-prepared playlists could eliminate prediction errors and biases. Such work would need to manage potential difficulties in archival research concerning music, such as variations over time in musical fashions, and the demographics of people who buy music at different times of the year (although appropriate multivariate analyses can be utilized). Additionally, future research might take advantage of the number of people who post playlists online or be carried out in collaboration with streaming service providers who have access to listening histories from large numbers of people. In doing so, one could test whether the patterns demonstrated in the current study hold for actual listening behaviors across very large samples. It would be similarly possible to investigate cross-seasonal variation in commercial (e.g., radio) playlists. Finally, we note that the arousal dimension appeared to be a particularly important aspect of the present results, but is also arguably a composite of a number of different musical variables (including, for example, tempo and timbre): future research could consider how preference between these more specific musical features might vary by season. An extension of this research could also involve the incorporation of physiological measurements of factors indicative of arousal.

More generally, this research adds to the relatively small body of psychological literature that addresses musical taste at the broadest of Doise's levels of social influence. The present study highlights how cultural factors in the listener's general milieu apparently play a role in determining musical taste. This supports the claim of various researchers (e.g., North & Hargreaves, 2008) that music is a truly social product, which relates to social factors at each possible level of generality. Moreover, if it is possible to identify social influences on musical taste at this broad level then the present results may be of interest to those interested in the psychological bases of a range of other factors that can also be located at Doise's ideological level and which may also relate to musical taste. In addition to considering further the role of climate, future research might well employ the existing theories developed by psychologists to explain other broad cultural factors that may influence musical taste, such as micro— and macro-economic factors (e.g., Pettijohn II & Sacco Jr., 2009b), cultural values (e.g., Hofstede, 2001), stereotypes (North & Hargreaves, 1999), and any other feature of the listener's broad culture that might reasonably be expected to influence his/her emotional state at a given point in time.

The present findings may also be of practical interest to those working in music radio programming, who can adapt their repertoire in light of such macro-level preferences in order to more fully engage their listener audiences, and to the developers of playlist recommender systems. For instance, it follows that including such macro-level variables, such as time and season, in a recommendation algorithm might produce tracks that are more preferred. These findings suggest that recommendation algorithms might be trained to suggest more active and arousing music during the warmer months and more reflective music during the cooler months. In combination with a listener's stated preferences and listening history, these

additional considerations could improve music recommendation resulting in higher user engagement and satisfaction.

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Table 1.
Sample Characteristics

Sample		Age	Music importance rating	Technology importance rating	Average daily listening amount (hours)	Average daily technology use (hours)	Playlist creation frequency rating	Playlist listening frequency rating
Total [a]	*M*	24.05	5.92	5.77	3.47	7.98	4.28	4.85
	Mdn	20	6	6	3	8	4	5
	SD	9.68	1.122	1.15	2.65	4.11	1.79	1.95
U.S.A. [b]	*M*	28.14	6.09	5.52	3.99	8.55	4.26	4.49
	Mdn	21	6	6	3	8	4	5
	SD	12.90	1.17	1.24	2.76	4.43	1.85	1.98
Australia [c]	*M*	21.54	5.82	5.92	3.16	7.63	4.29	5.06
	Mdn	19	6	6	2.5	7	5	6
	SD	5.74	1.08	1.06	2.53	3.87	1.77	1.90

Note. The importance and playlist frequency ratings were made using a 1-7 scale.

[a] N = 402; 69.70% female; 23.90% held university qualifications

[b] N = 153; 63.40% female; 34.60% held university qualifications

[c] N = 249; 73.50% female; 17.30% held university qualifications

Table 2.

Factor Loadings, Means, Standard Deviations, and Cronbach's Alpha Values for the Dimensions by Season (N = 402)

Variable	Autumn	Winter	Spring	Summer
	Dimension 1: Arousing			
Attention-grabbing	0.780	0.766	0.771	0.809
Invigorating	0.668	0.688	0.461	0.599
Loud	0.828	0.862	0.840	0.857
Exotic	0.570	0.565	0.531	0.422
Can dance vigorously to it	0.795	0.725	0.813	0.812
Exciting/ festive	0.682	0.439	0.622	0.690
Strong rhythm	0.691	0.758	0.771	0.752
Dimension Mean (SD)	3.581 (1.099)	3.364 (1.062)	4.366 (1.100)	5.310 (1.072)
Dimension Cronbach's alpha	0.840	0.822	0.832	0.846
	Dimension 2: Serene			
Beautiful	0.707	0.739	0.777	0.775
Inspiring/ majestic	0.582	0.581	0.558	0.552
Natural/ fresh	0.608	0.489	0.835	0.703
Romantic	0.640	0.671	0.530	0.583
Relaxing/ peaceful	0.777	0.752	0.581	0.754
Dimension Mean (SD)	4.725 (1.019)	4.683 (1.031)	4.916 (1.035)	4.194 (1.144)
Dimension Cronbach's alpha	0.730	0.708	0.756	0.735
	Dimension 3: Melancholy			
Sad	0.809	0.812	0.791	0.802
Moody	0.801	0.813	0.787	0.798
Dimension Mean (SD)	3.908 (1.403)	4.360 (1.447)	2.671 (1.223)	2.355 (1.167)
Dimension Cronbach's alpha	0.729	0.703	0.668	0.630

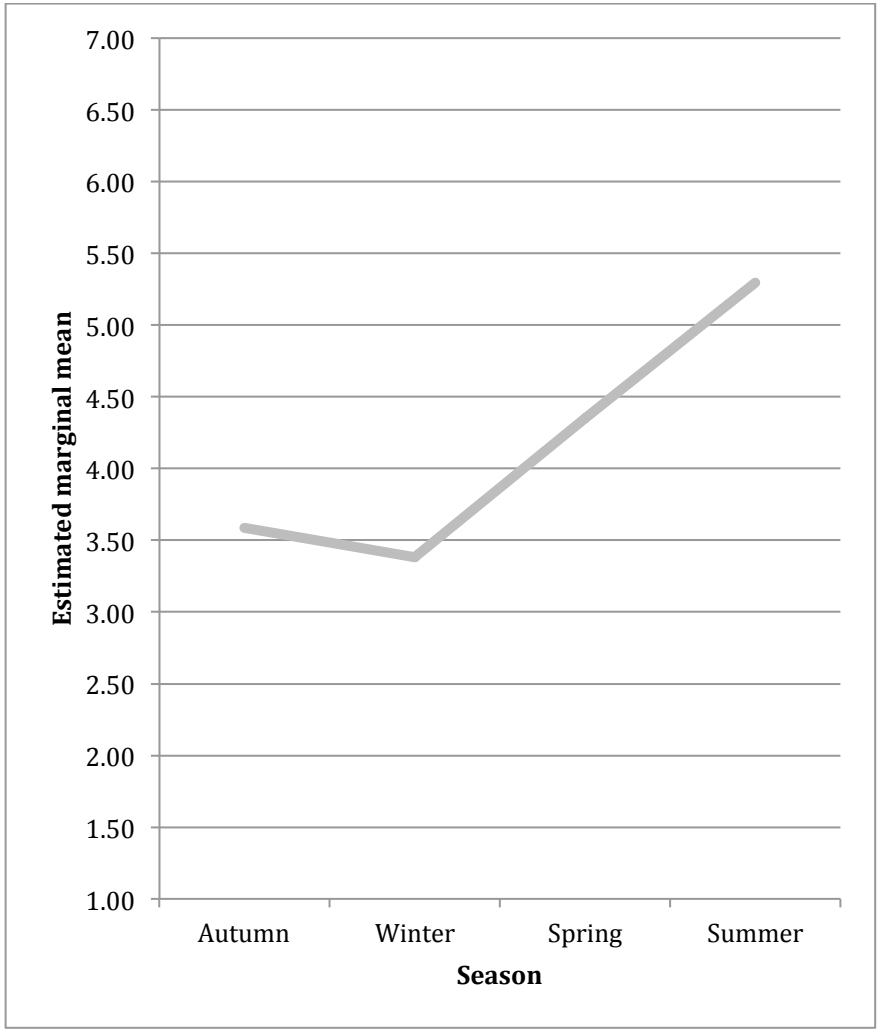

Figure 1. Estimated marginal means for Dimension 1, Arousing.

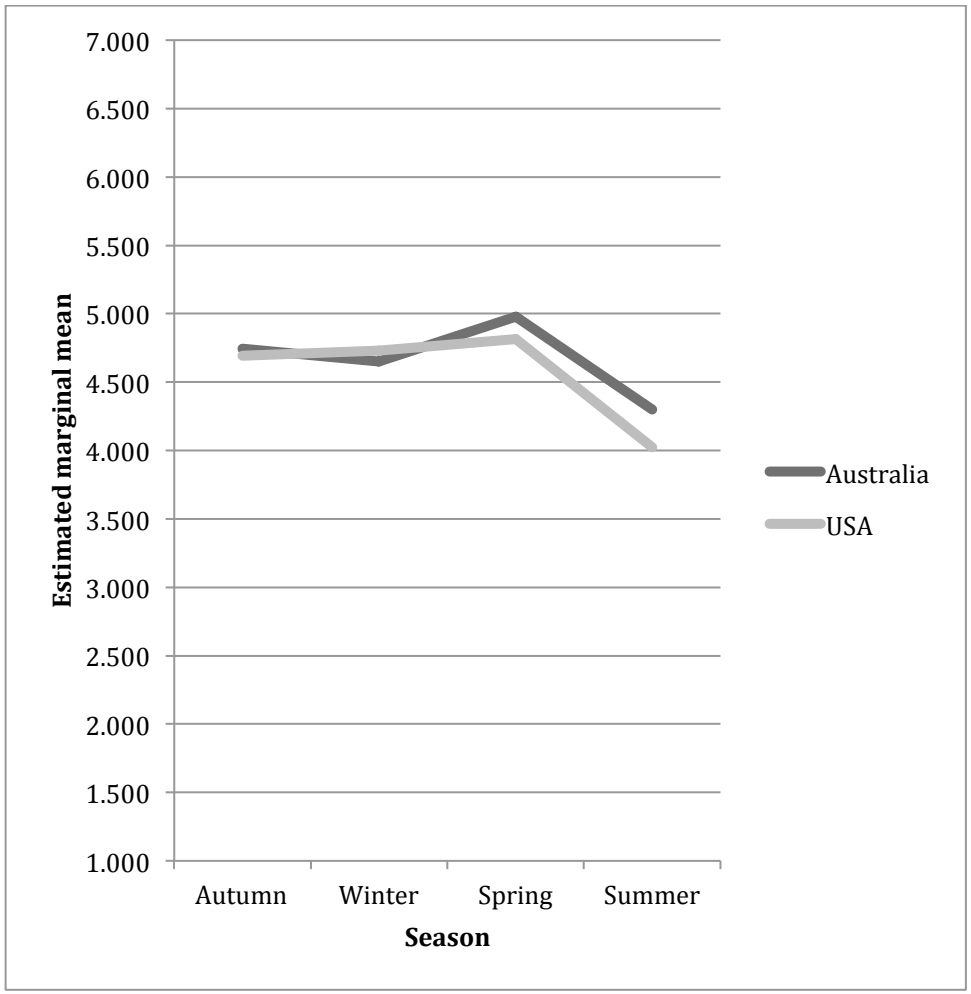

Figure 2. Estimated marginal means for Dimension 2, Serene.

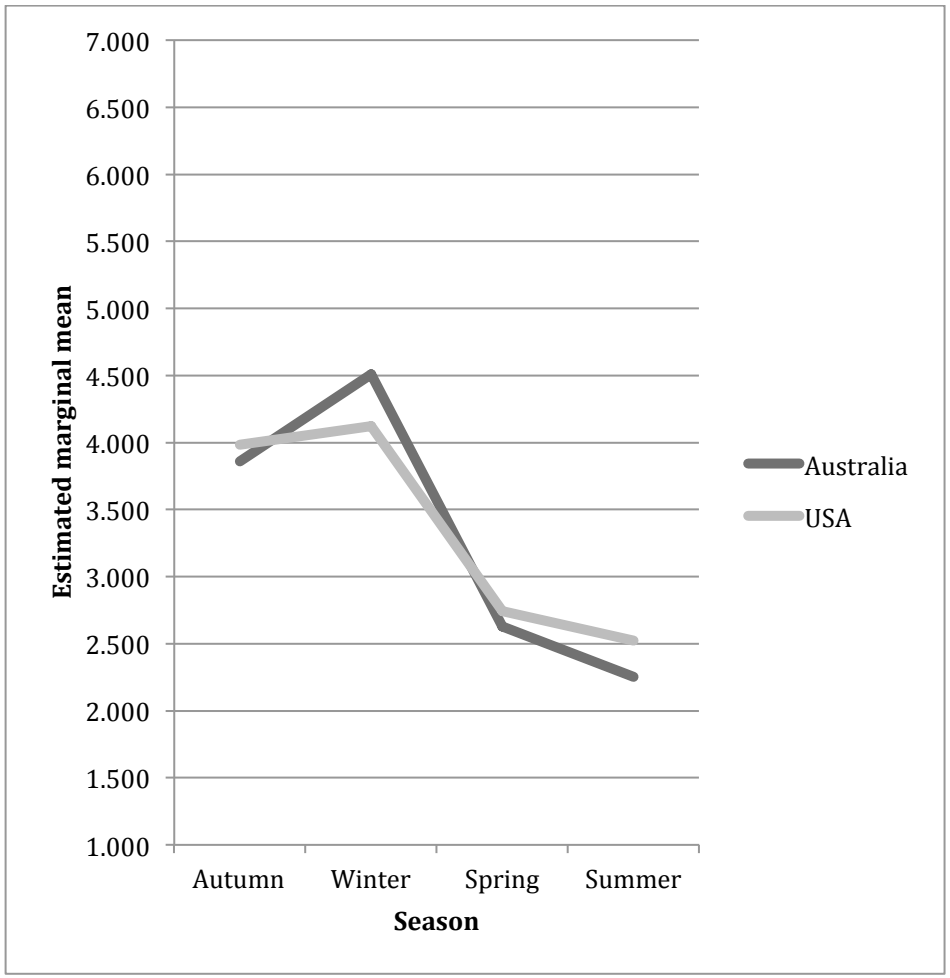

Figure 3. Estimated marginal means for Dimension 3, Melancholy.