

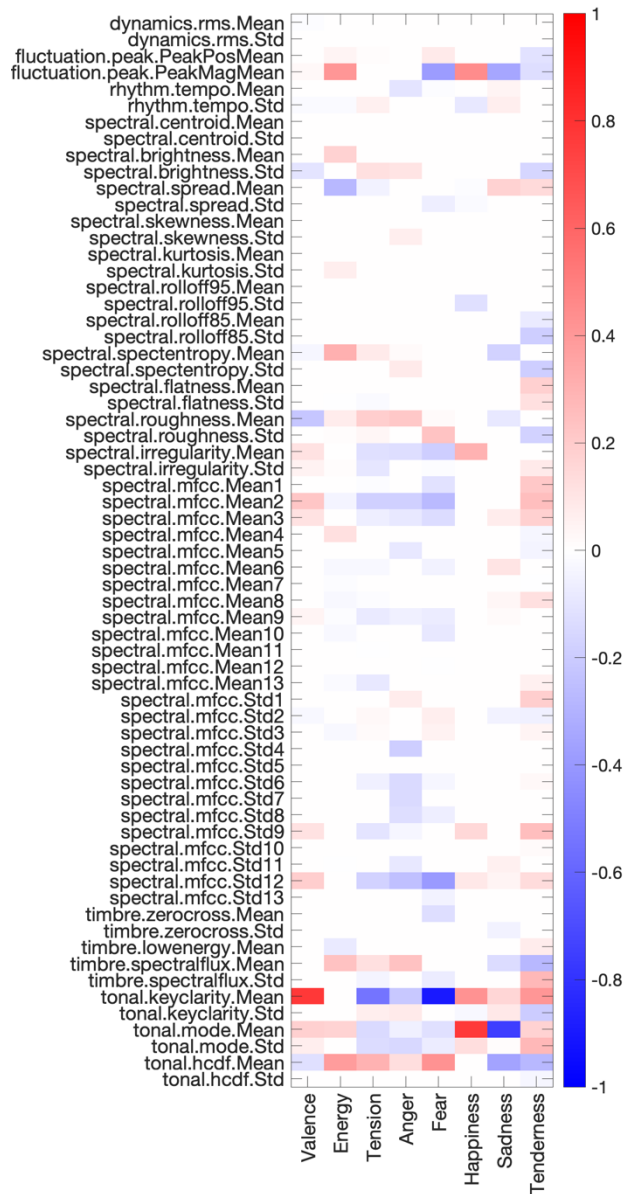
SUPPLEMENTARY INFORMATION

Supplementary Table 1. The 176 countries whose national anthems were included in the analysis. Numbers indicate countries for which data on each of Hofstede's scales were available: ¹PDI, IDV, MAS and UAI (N = 66); ²LTO (N = 89); ³IVR (N = 89).

Afghanistan	Dominican Republic ^{2,3}	Liechtenstein	Russia ^{1,2,3}
Albania ^{1,2,3}	Ecuador ¹	Lithuania ^{1,2,3}	Rwanda ^{2,3}
Algeria ^{2,3}	Egypt ^{2,3}	Luxembourg ^{1,2,3}	Saint Kitts & Nevis
Angola	El Salvador ^{1,2,3}	Macedonia ^{2,3}	Saudi Arabia ^{2,3}
Antigua	Eritrea	Madagascar	Senegal
Argentina ^{1,2,3}	Estonia ^{1,2,3}	Malawi	Serbia ^{1,2,3}
Aruba	Eswatini	Malaysia ^{1,2,3}	Seychelles
Australia ^{1,2,3}	Ethiopia ³	Maldives	Sierra Leone
Austria ^{1,2,3}	Fiji	Mali ^{2,3}	Singapore ^{1,2,3}
Azerbaijan ^{2,3}	Finland ^{1,2,3}	Malta ^{1,2,3}	Slovakia ^{1,2,3}
Bahamas	France ^{1,2,3}	Mauritania	Slovenia ^{1,2,3}
Bangladesh ^{1,2,3}	Gabon	Mauritius	Somalia
Barbados	Gambia	Mexico ^{1,2,3}	South Korea ^{1,2,3}
Belarus ^{2,3}	Georgia ^{2,3}	Micronesia	South Sudan
Belgium ^{1,2,3}	Germany ^{1,2,3}	Moldova ^{2,3}	Spain ^{1,2,3}
Belize	Ghana ^{2,3}	Monaco	Sri Lanka
Benin	Greece ^{1,2,3}	Mongolia	Sudan
Bolivia	Guatemala ¹	Montenegro ^{2,3}	Sweden ^{1,2,3}
Bosnia & Herzegovina ^{2,3}	Guinea	Morocco ^{1,2,3}	Switzerland ^{1,2,3}
Botswana	Guinea-Bissau	Mozambique	Syria
Brazil ^{1,2,3}	Guyana	Myanmar	Tanzania ^{2,3}
Brunei	Haiti	Namibia	Thailand ^{1,2,3}
Bulgaria ^{1,2,3}	Honduras	Nepal	Timor-Leste
Burkina Faso ^{2,3}	Hungary ^{1,2,3}	Netherlands ^{1,2,3}	Togo
Cambodia	Iceland ^{2,3}	Netherlands Antilles	Trinidad & Tobago ^{1,2,3}
Cameroon	India ^{1,2,3}	New Zealand ^{1,2,3}	Tunisia
Canada ^{1,2,3}	Indonesia ^{1,2,3}	Nicaragua	Turkey ^{1,2,3}
Cape Verde	Iran ^{1,2,3}	Niger	Turkmenistan
Centr. Afr. Republic	Iraq ^{2,3}	Nigeria ^{2,3}	Uganda ^{2,3}
Chad	Ireland ^{1,2,3}	Norway ^{1,2,3}	UK ^{1,2,3}
Chile ^{1,2,3}	Israel ^{1,2}	Oman	Ukraine ^{2,3}
China ^{1,2,3}	Italy ^{1,2,3}	Pakistan ^{1,2,3}	United Arab Emirates
Colombia ^{1,2,3}	Jamaica ¹	Panama ¹	Uruguay ^{1,2,3}
Comoros	Japan ^{1,2,3}	Papua New Guinea	USA ^{1,2,3}
Cook Islands	Jordan ^{2,3}	Paraguay	Uzbekistan
Costa Rica ¹	Kazakhstan	Peru ^{1,2,3}	Vanuatu
Cote d'Ivoire	Kenya	Philippines ^{1,2,3}	Vatican
Croatia ^{1,2,3}	Kuwait	Poland ^{1,2,3}	Venezuela ^{1,2,3}
Cuba	Kyrgyzstan ^{2,3}	Portugal ^{1,2,3}	Vietnam ^{1,2,3}
Czech ^{1,2,3}	Laos	Puerto Rico ^{2,3}	Virgin Islands
Dem. Rep. of Congo	Latvia ^{1,2,3}	Qatar	Western Sahara
Denmark ^{1,2,3}	Lebanon	Rep. of Congo	Yemen
Djibouti	Liberia	Rep. of South Africa ^{2,3}	Zambia ^{2,3}
Dominica	Libya	Romania ^{1,2,3}	Zimbabwe ^{2,3}

Supplementary Table 2. Optimal regularization parameters and model accuracies for each emotion characteristic in the full dataset. As shown, the three emotion dimensions—Valence, Energy Arousal, and Tension Arousal—are predicted with greater accuracy compared to the basic emotions. This difference in predictive accuracy is unsurprising, as emotion dimensions provide broader and more generalized representations of emotional content, capturing continuous variations across a spectrum. In contrast, the basic emotions are discrete categories that represent specific, context-dependent emotional states, which may be more challenging to model due to their higher specificity and variability. Furthermore, Tenderness exhibits the lowest optimal regularisation parameter among the emotions, indicating that its prediction relies on a broader and more diverse set of musical features. In contrast, Happiness has the highest regularisation parameter, reflecting a more constrained set of features contributing to its prediction.

Emotion	λ_{opt}	adjusted r^2
Valence	0.0480	0.6728
Energy arousal	0.0316	0.7312
Tension arousal	0.0358	0.6913
Anger	0.0551	0.6112
Fear	0.0369	0.6487
Happiness	0.0897	0.4783
Sadness	0.0601	0.5555
Tenderness	0.0261	0.6148



Supplementary Figure 1. Normalized beta coefficients obtained with LASSO regression for each of the extracted musical features and each of the eight emotion characteristics. As can be seen, musical features related to tonality and rhythmic fluctuation contribute most to the prediction of emotions. For explanation of the musical feature names, please refer to the MIR Toolbox manual (Lartillot & Toiviainen 2007).