

Peer-Review

Ravindranathan, Harini. 2025. "Is Cultural or Civilizational Exchange, Diffusion, or Contact a Requirement for the Formation and Evolution of Music?" *Journal of High School Science* 9 (3): 400–424. <https://doi.org/10.64336/001c.143977>.

The author seems to be knowledgeable in music theory and evolution. However, because the title of the manuscript is too broad, the content comes across as being too superficial and not analyzed in depth. There is also no quantitative or semi-quantitative analysis of the material, which puts this manuscript in the category of a commentary and opinion paper (unless a hypothesis is presented per point 2 and convincingly argued). The Journal does not accept commentary and opinion papers. I have the following comments which need to be addressed in a subsequent iteration.

1. Music theory is divided among those who propose 'universals', and those who contend that every culture's music is unique. See this paper: <https://doi.org/10.1073/pnas.1510724112> and the references therein; especially reference 4 Savage et al. <https://doi.org/10.1073/pnas.1414495112>, (and references therein) these two theories of thought need to be incorporated into the manuscript along with references, to present arguments about whether cultural diffusion or contact is/was a necessity for this "convergence" of Eastern and Western music; or whether this 'convergence' would have happened anyway (without cultural contact) because there is a statistical universality to music that is culture agnostic (see Savage et al.). Thereafter, the implications of these two competing views need to be discussed in the manuscript.

2. The manuscript's topic is too broad and open to extensive content. This has the effect of quality being diluted by quantity. I would urge the author to narrow the topic to content that is manageable and can be discussed in sufficient detail in the manuscript. Some titles that may be considered are "Is cultural exchange/diffusion/contact a requirement for cross-cultural music merging", or "Is a Religious to Classical to Popular music evolution common to all cultures and to what extent is this trajectory influenced by the rise of the scientific method/Renaissance?" or "Musical evolution and convergence in Theocracies and Democracies"..... etc. I leave it to the author to construct other titles; the ones suggested are by no means binding.

3. Yet another avenue of thought that can be pursued is to find similarities in Western and Eastern music using the cosine similarity measure (see: <https://doi.org/10.1007/s11192-017-2387-x>), If you take (Cosine similarity) the numbers from compositions from similar historical periods for both Eastern and Western music and present their differences as a function of time, it will be interesting to see if they converge or diverge or do neither over time. This will provide the author with quantitative data for their stated hypothesis (whatever that may be, see point 2). Please perform such a calculation using at least 3 pieces of western and 3 pieces of Eastern music per time-period in history all the way to present time.

4. An interesting contribution could be to construct an algorithm or a method to determine the relative percentages of the various cultural musical dialects in a particular song or musical composition. For example, you could use Figure s3 from the Savage et al.

reference: <https://doi.org/10.1073/pnas.1414495112> to dissect what percent of a particular musical melody or composition originated out of the various regions mentioned in Figure s3. If you did that for the most recent songs and worked your way backward in time.... you may find that the ethnography of the songs became "purer" (composed of 1 or 2 influences) as you went back in time. You would then have constructed a metric to chart music fusion or convergence with time.

5. Please perform a thorough search of the literature to find sources that support your hypothesis. Please also include a References section in the manuscript. Please consult the website on how to format a Review paper including sections and subsections. For example, one possibility may be Introduction, Literature review, Methods, Results, Discussion, Conclusion and References. Please format your manuscript per the Journal's guidelines.

The author is always free to construct their own ideas and hypotheses, but these must incorporate the spirit of the comments discussed above. Please note that the Journal's guidelines for what constitutes a review paper are different from convention. See: <https://jhss.scholasticahq.com/for-authors>, types of manuscripts, review papers.

I cannot review this manuscript unless - as communicated to the author - they submit a separate file describing (point-by-point), where and how in the manuscript they have addressed my comments from the earlier review. When the authors upload this file, I can review the manuscript.

1. Music theory is divided among those who propose 'universals', and those who contend that every culture's music is unique. See this paper: <https://doi.org/10.1073/pnas.1510724112> and the references therein; especially reference 4 Savage et al. <https://doi.org/10.1073/pnas.1414495112>, (and references therein) these two theories of thought need to be incorporated into the manuscript along with references, to present arguments about whether cultural diffusion or contact is/was a necessity for this "convergence" of Eastern and Western music; or whether this 'convergence' would have happened anyway (without cultural contact) because there is a statistical universality to music that is culture agnostic (see Savage et al.). Thereafter, the implications of these two competing views need to be discussed in the manuscript.

Both competing views are discussed as the topic of the manuscript has been changed to more specifically discuss whether contact or diffusion was a necessity for this convergence.

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The title has been changed and the topic has been narrowed to, "Is Cultural Exchange, Diffusion, or Contact a Requirement for Cross-Cultural Music Merging?"

3. Yet another avenue of thought that can be pursued is to find similarities in Western and Eastern music using the cosine similarity measure (see: <https://doi.org/10.1007/s11192-017-2387-x>), If you take (Cosine similarity) the numbers from compositions from similar historical periods for both Eastern and Western music and present their differences as a function of time, it will be interesting to see if they converge or diverge or do neither over time. This will provide the author with quantitative data for their stated hypothesis (whatever that may be, see point 2). Please perform such a calculation using at least 3 pieces of western and 3 pieces of Eastern music per time-period in history all the way to present time.

A separate section has been written on cosine similarity which references the study from which this idea was derived and touches on examples to help the audience understand this better.

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reference: <https://doi.org/10.1073/pnas.1414495112> to dissect what percent of a particular musical melody or composition originated out of the various regions mentioned in Figure s3. If you did that for the most recent songs and worked your way backward in time.... you may find that the ethnography of the songs became “purer” (composed of 1 or 2 influences) as you went back in time. You would then have constructed a metric to chart music fusion or convergence with time.

Another section has been written on case studies and historical trends to see how trends in convergence have changed over time, looking back at the Moghul period for the Eastern side, and early British colonization of Africa for the Western side.

5. Please perform a thorough search of the literature to find sources that support your hypothesis. Please also include a References section in the manuscript. Please consult the website on how to format a Review paper including sections and subsections. For

example, one possibility may be Introduction, Literature review, Methods, Results, Discussion, Conclusion and References. Please format your manuscript per the Journal's guidelines

References have been provided at the end of the text.

Thank you for addressing my comments. This version is much more focussed. However, in my earlier review, I had asked that you conduct a cosine similarity or a similar quantitative measure to add more depth and evidence to your manuscript. You have mentioned this in your manuscript but no actual quantitative analysis has been performed. This is actually easier than it looks. I have attached several files and comments on how to do this. Please perform such analyses in your manuscript's context and with your manuscript's content to add evidence to your premise.

Please see the attached documents and below.

I have made a template for you so that you can do the same with whatever compositions you think are relevant to your manuscript. I went ahead and found the cosine similarities of the oldest compositions known (<https://www.oldest.org/music/songs/>) as follows:

step 1: I found relevant renditions of these songs either on the piano or on string instruments on youtube. See references.

Step 2. I converted those youtube videos to mp3 files (of average size 2 minutes and 30 seconds) using the youtube downloader <https://y2mate.nu/en-p31K/>, but you can use other downloaders as well.

Step 3. I uploaded the mp3 file to audacity (which is a sound processing software). I am using a Linux Ubuntu OS but you can probably find audacity for windows as well.

Step 4. I analyzed the first 2 minutes and 20 seconds of the mp3 file to get a fourier transform that plotted (log) frequency against amplitude. The audacity software does this in its algorithm and displays the graph with an export functionality.

Step 5. I exported the graph as a .txt file.

Step 6. I opened a generic text editor and copied and pasted the frequency and amplitude column data to openoffice calc (you can use excel if you are working in windows).

Step 7. I used the concatenate function to include a comma after each number in a row.

Step 8. I copied the amplitude numbers (each followed by a comma) into a free cosine similarity program on the web (https://kutatua.com/statistics/cosine-similarity#google_vignette) for two compositions. The program returned a cosine similarity.

You can see that the cosine similarities of all the compositions (solitary orchid, Bali gamelan, Hurrian, Delphic hymn, sumer icomen and The entertainer) are all $> 95\%$ showing that they all carry the same fundamental music constructions. This should serve as evidence that music has a universal constructionist domain that is common across old world cultures such as Mesopotemia, Greece, China and Indonesia.

In addition, i found an interesting heuristic. If you plot the dates in history that these compositions were thought to be recorded (as the log) on the X axis against the slope/max on the y axis, a straight ine is obtained with a regression coefficent of > 0.95 (if you leave out the chinese composition). (see excel file attached for the graph derived from normalized frequency/amplitude data. I don't know what that implies.

<https://www.youtube.com/watch?v=-0AkXdP-LMA>

<https://www.youtube.com/watch?v=0ZhMeRUNpIU>

<https://y2mate.nu/en-p31K/>

https://kutatua.com/statistics/cosine-similarity#google_vignette

<https://www.youtube.com/watch?v=3MMI06AnhtM>

<https://www.oldest.org/music/songs/>

<https://www.youtube.com/watch?v=jiNkouCVrpA>

<https://www.youtube.com/watch?v=vsFGcPujqKE>

<https://doi.org/10.1371/journal.pone.0008144>

https://www.youtube.com/watch?v=AKdx_T1nf3A

Thank you for addressing my comments. Accepted