Does the price of Headphones affect the way manufactures present their frequency response data and how is this data presented to the consumer?

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Abstract

This project investigated the way manufactures present their frequency response data to consumers and if the price of headphones had an impact on the way this data was presented. A variety of headphones were looked at during testing ranging in price and fit (Circumaural, supra-aural and insert to name a few). HATS was used for testing the headphones and the results plotted in plotly. These were then compared to results presented by manufactures as well as compared to results conducted by a third party. A conclusion was then reached on if the price of headphones has an impact on the way manufactures present their frequency response data.

Background

There are four main categories of headphones. Supra-aural, intra-concha, circumaural as well as insert (Precision Audio, 2016, P.1).
There has not been a large amount of research conducted into the presentation of frequency response data from manufactures however Douglas Self stated the data presented by manufactures should be taken with "A very large pinch of salt" (Self, 2009, p.745).
Headphones often have a boost of 3 or 4dB around 40Hz and 500Hz due to the fact headphones are not capable of producing frequencies associated with having a sub within a room (Headphones, 2021).

Aims and Objectives

Aims

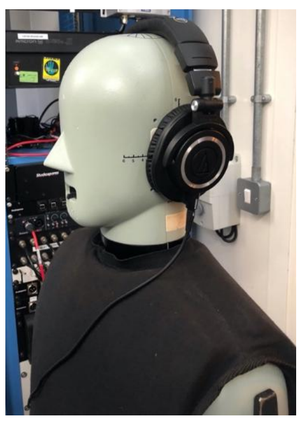
Investigate the way in which manufactures present their frequency response results to consumers and how accurate this data is.

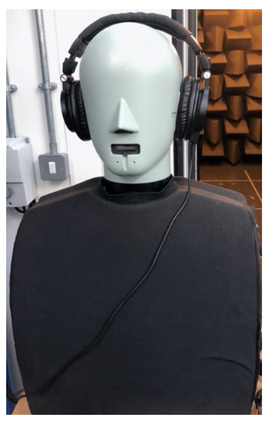
Objectives

1) Meaasure Headphone Frequency Responses.
2) Plot results in using correct correction curves applied for comparison.
3) Compare the results to those from manufactures.
4) Research how manufactures present their data and how accurate this data is to tests conducted.
5) Come to a conclusion on data presentation and if price has an impact on the way this data is presented.

Method

- Conduct tests using HATS (20hZ-20KhZ).
- Tests conducted on HATS Type 4128.
- Sweep from 20kHz to 20Hz using a NTi Flexus system.
- Each tests conducted a minimum of 3 times with the DUT being reseated before each test.

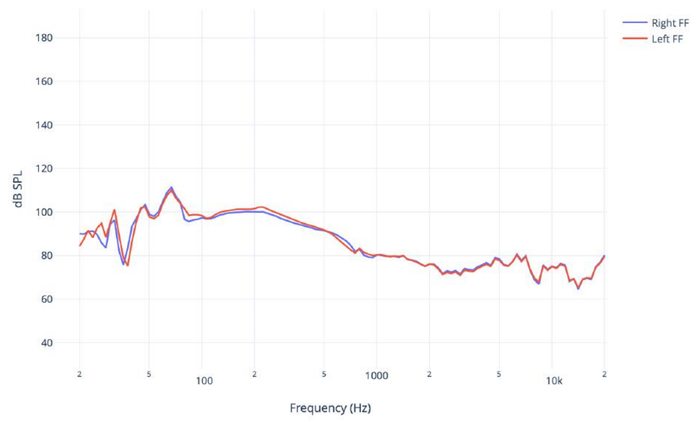




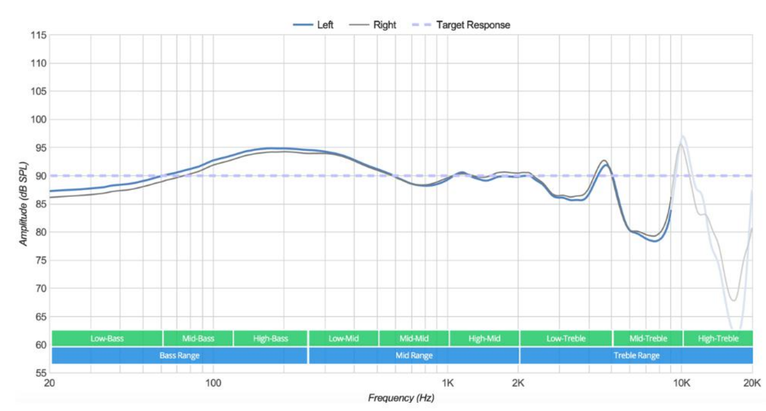
Results and Analysis

1) Results obtained from tests conducted using the HATS follow the frequency responses stated by manufactures.
2) Certain manufactures such as Audio Technica state they have a larger frequency response than that used for testing. Tests were conducted over 20Hz to 20kHz. Audio Technica ATH M50x are stated as having a frequency range of 15Hz to 28kHz.
3) Test results were obtained during the second year of university due to COVID restrictions and access to facilities. Results still followed the required testing standard (BS EN 60268-7) (BSI, 2011).
4) Due to limited information provided by manufactures regarding frequency response, comparison to manufactures data was limited to just covering their stated frequency response.

Shure SE215 Frequency Response



Shure SE215 Frequency Response From Ratings.com (Ratings, 2021).



5) In order to compare the results to frequency response data for accuracy, data from Ratings.com was used. Tests conducted by Ratings.com are independent from manufactures meaning their data is conducted by themselves and not manufactures.
As mentioned in section 3 due to restrictions, headphones could not be fully tested to their advertised frequency range therefore using results obtained from ratings.com for further comparison allowed for comparisons to be made and further frequencies that could not be tested.

Conclusion

Comparison from tests conducted at university to those provided by manufactures was difficult due to limitations on data from manufactures as well as the ability to conduct further testing due to COVID restrictions. The primary outcome from this project is that the headphones tested do cover the intended frequency range of the DUT's (between 20Hz and 20kHz). In addition, the price of the headphones does not have a direct correlation to the way tis data is presented to consumers. In order to further this project, additional testing is required with a larger test pool of headphones ranging significantly larger in price, range and brands.

References

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