Headphone Essentials 0:

Introducing the Headphone Essentials series

The **first three** (*Basics)* units in this series should be useful if you're coming at audio and/or the world of quality headphones without a lot of background, or might benefit from a refresher. **Units 4, 5 and 6** take a deep dive into the single biggest problem area in headphone audio, called frequency response. Then **units 7, 8 and 9** cover a tool called equalization that can be used to solve frequency response problems. But this whole frequency response focus may be a waste of time, depending on your audio focus.

Consider the following two scenarios:

1. Energy

Fig. 1: Queensrÿche live at Metal Heart Festival 2007, (Photo by GoogleMe, Wikipedia Commons)

In Fig. 1 the photographer captures a moment at a live concert. We do not expect that the singer has livid orange-pink skin, nor that the guitarist actually had pale purple hair. I might use image editing effects to make my own "enhancements" as dictated by a momentary whim:

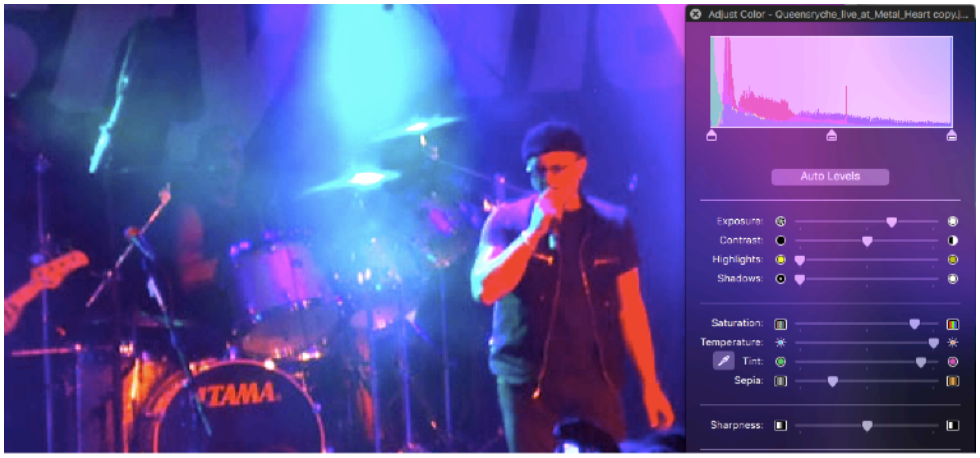

Fig. 2: modified version of Fig. 1

Here I've jacked up brightness (Exposure), colour vividness (Saturation), colour temperature, and tint to arbitrarily high values. The result hardly seems an insult to the aesthetic intent of the stage manager of that concert.

If the majority of your focus in music is on the music of raw power, I don't know that you'll get much benefit from digging into the units after the first three. Instead, I'd recommend a more hands-on approach. Watch some YouTube headphone reviews, ask some questions on headphone forum, then buy the headphone with the particular sonic flavour you think you'll enjoy. That may be bass cannon, optionally with relaxed upper mids, or it may be what's called a fun or v-shaped tuning that combines both boosted bass *and* boosted highs, or anything else.

2. Art

Now let's try a different picture:

Fig. 3: Edward Burne-Jones, The_Love_Song (1868-77) (source: Wikipedia Commons):

If you're ever at the Metropolitan Museum in New York City, you might be lucky enough to catch this exquisite Pre-Raphaelite painting on display. Let's zoom in on one section of it:

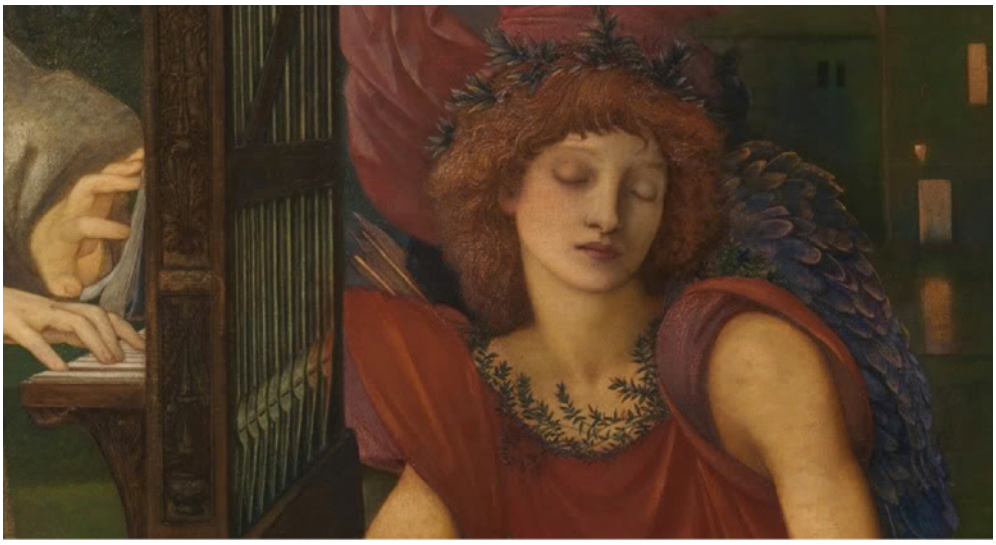

Fig. 4: detail from Fig. 3

Now let's "enhance" using some photo adjustments:

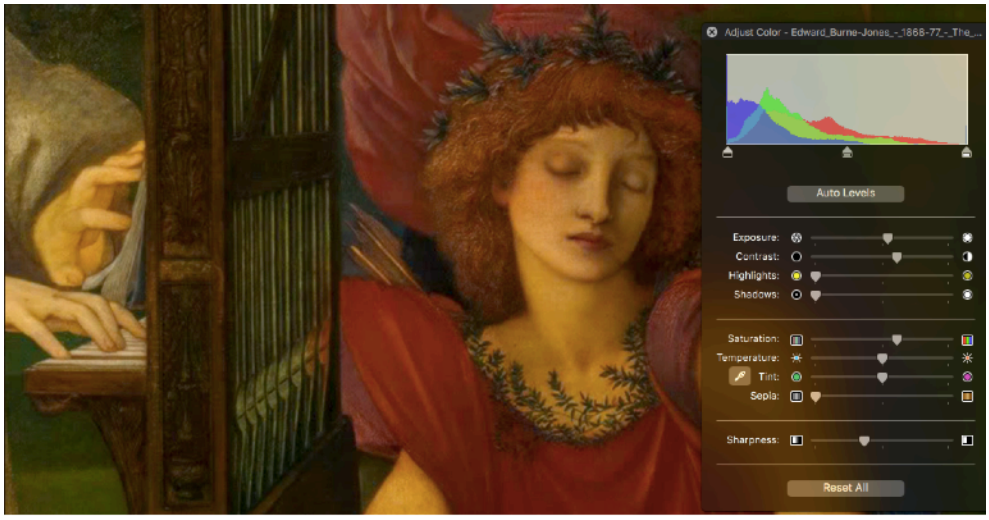

Fig. 5: modified version of Fig. 4

For Fig. 5 I brightened, increased light/dark contrast, added saturation and blurred by a moderate amount. These changes are typical of what's routinely done to create instant grab visuals.

But the Metropolitan did not pay millions of dollars for the "enhanced" version of this painting. The artist at the peak of his craft did not see fit to goose up colour and contrast, although he could easily have done so. Nor did he likely wish it to be viewed framed behind a smudged and hazy piece of glass (blurring). The particular degree of brightness, contrast, saturation and sharpness the artist employed work together to create the atmosphere/ambience he intended as being appropriate for the subject matter and emotional intent of the picture.

The audio equivalent of Fig. 3 is what the six frequency response units of the Headphone Essentials series are aimed at.

In today's electronic music playback technology the headphone or room loudspeakers are typically and by a huge margin the most compromised element in the signal chain. You can pay a fortune for amplifier and DAC rated for 0.0001% distortion, you can use a lossless 32/192 FLAC copy of the best engineered recording of a particular track available. But a typical headphone introduces 5, 10, 20 and higher percent signal deviation in various portions of the frequency response. The kind of distortion that amp and DAC enthusiasts obsess over is called total harmonic distortion plus noise. THD+N has only a veering relation to the gross frequency deviations a headphone (or room loudspeaker) introduces to an audio playback system.

Help! I just want to know what headphone to buy!

I feel your pain — if only life were that simple. Is there a best motor vehicle purchase? Or do we at least need to know whether the use case is multi-passenger in-city plus highway vs all-terrain vs utility vs long-haul freight? Is there a best casual street shoe? Or is fit and comfort far too personal a thing? Headphones are just too diverse.

There are over-ear, on-ear, and in-ear headphones. Wired and wireless (optionally plus noise-cancelling). There are closed-back and open-backs. If, for example, your use case is for commute, noisy environments and/or preventing sound leakage from the headphone, you need an in-ear or a closed-back over-ear with as much passive sealing as possible and optionally noise-cancelling.

People's needs and preferences are just too varied for blanket recommendations. The whole point of the energy vs art dichotomy above was to make just one of the major personal preference differences clear. Worse yet, the internet overflows with reviewers who hype and pan products as if their own tastes and biases were shared by every rational person on earth. There's no escape: research and skepticism are both essential for headphone shopping.

I am definitely in the art, not the energy, camp and so am focused on accurate playback. Here are some well-measuring budget-priced, wired headphones that don't require added amplification. I haven't heard any of these, but based on available information I would research for suitability to my needs (prices are US dollars list as I write this):

Superlux 668B	$34	over-ear	semi-closed	moderate extra bass
AKG K361	$85	over-ear	closed-back	extra bass
Audio-Technica M40x	$100	over-ear	closed-back	moderate extra bass
AKG K371	$120	over-ear	closed-back	extra bass
Philips X2HR	$145	over-ear	open-back	moderate extra bass
Beats Solo Pro	$199	on-ear	closed-back	extra bass
Sennheiser HD560S	$200	over-ear	open-back	neutral/accurate

But if you can handle a greater cash outlay, the Sennheiser HD 600 ($400), HD 650 ($400) or its clone the Drop+Sennheiser HD 6XX ($200) are outstanding choices for neutral/accurate open-backs. Buy used for greater savings if you have a trusted source.

$200 to $300 for something like the HD 6— series is as expensive as I would recommend anyone go in a headphone purchase under most circumstances. More expensive "audiophile" headphones certainly exist. But these are specialized hobbyist/enthusiast products that require separate electronics for digital conversion (DAC) and amplification to produce their intended sound quality benefits. On top of that, very few expensive headphones simply have good sound quality in all areas. Most have nearly as many, often severe, flaws as they have specialized strengths.

And, in any case, the HD 6— models mentioned already produce live concert quality sound. On top of all that, with headphones that can reproduce *better* than live concert audio, where do you get that music? How many of the recordings you listen to are flawlessly produced? Do you really want to get caught up in the world of lossless, high sample rate recordings? In my experience, that's a downward spiral that leads to a claustrophobic little sub-set of the vast musical universe.

But if you do have the extra money, here are a few well-regarded headphones in the next price tier to research, taken from this more extensive list:

Audio-Technica A70x	$350	over-ear	open-back	neutral/accurate
Hifiman Sundara	$350	over-ear	open-back	neutral/accurate
beyerdynamic DT1990	$600	over-ear	open-back	neutral + mod. bass
Drop+Focal Elex	$700	over-ear	open-back	neutral/accurate

Note: Hifiman as a company had a long-standing reputation for built and reliability issues. They seem to finally be getting past that and do seem to be responsive to warranty claims. Plus, the Sundara is a very recent model that seems to be fairing well. As the only planar magnetic model in either list the Sundara is intriguing. But equally, word is that it requires separate amplification even more imperatively than the other models on the list.

Again, at this level it's pretty much a waste of money to run any of these straight out of a smartphone or computer. You need to spend at least a comparable sum of money on amplifier and DAC in order to actually hear anything like their potentially superior sound quality. Plus, you'll begin to want those premium recordings I mentioned.

Finally, here's what little i can tell you based on actual personal experience:

Audio-Technica ATH-M50x: $150, closed-back. I use the M50x when I need some sound isolation in a noisy environment. It helps to reduce outside noise, but by no means eliminates it. It's audio quality is acceptable to me without EQ, given that it's competing with environment noise. Both the extra bass and the extra highs provide added clarity. It has a very close-to-your-head sound stage. But its great weakness is comfort. It's clamp force can be reduced by stretching the headband, but the small, shallow ear pads are less than ideal.

Sennheiser HD 579: sub-$100, open-back. Comfortable, with a decent but non-luxurious build quality, proven over more than a decade of HD 5— series headphones to be reliable. I find the skewed mid-range response of the HD 579 make it almost unusable for accurate playback of music, depending on the track. But apply an appropriate EQ correction and it's suddenly transformed into an exceptional performer for its price point. This should also apply to the other models in Sennheiser's HD 5— series.

Sennheiser HD 600: $400, open-back. Already discussed above. I got the HD 600 used from a trusted source for about $250. This is a headphone I use without EQ when necessary, but much prefer using EQ to reduce its (admittedly slight) elevation in the bass-to-mids transition area. That said, many actually prefer that particular colouration. They do have a small sound stage presentation, but the sound source placement in that stage is apparently top-notch.

beyerdynamic DT 1990 Pro: $600, open-back. Premium, faultless build quality. A minority of people find that the high frequency spike of the DT 1990 renders it unlistenable. I don't have that sensitivity and have yet to find anyone who does. It comes with two sets of ear pads, providing a greater bass boost and a more moderate bass boost. What bothers me, like the HD 600 is the elevated bass-to-mids transition even with the less boosted ear pads. So for my needs, EQ is basically non-optional. Other than that it has an excellently tight, clean sound that at a minimum holds its own beside the HD 600. The extra $200 over the HD 600 may be more about premium construction.

The HD 600 and the DT 1990 do not require, but are enhanced, by using a dedicated headphone amplifier. Both have an enjoyable sound, and can play far louder than my own loudness tolerance permits, straight out of my iPhone 6S.

You'll find a deeper dive into the DT 1990 on my web site below the Headphone Essentials series. I may do the same for the some or all of the other three models over time, as well.

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So overall, the purpose of the Headphone Essentials series is to provide factual information in the areas I have some competence in to aid in headphone pre-purchase research and post-purchase utilization and enjoyment. Enjoy!

Back to the Headphone Essentials series. You've been warned, grin.