

CDs Prove Secondary Features Matter

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Interpreting current events from an historic perspective is the prerogative of someone who has lived for more than six decades. There are not many advantages to being old, but that is one of the obvious ones.

We have all read extensive discussions about the future of radio broadcasting, and the belief that the HD format will be a revolutionary technology that may (could, should) revitalize an industry that has been around for almost a century. Though HD technology is clearly modern, there are analogies that may shed some light on its future. If nothing else, history may help us find the relevant questions.

As one of the fathers of digital audio in the 1970's, my opinion was often sought on how this fledgling technology would evolve. Around 1980, I predicted that the CD would never be a commercial success. And my family reminds me of this prediction whenever they think that I need a dose of humility. However, the story is actually subtler and more complex than this simple quotation.

To place my flawed prediction into its historic context, let us rewind the clock to the early 1960's when the dominant means for distributing recorded music was the long-playing 33-rpm vinyl record. At that time, these records were produced in warehouse-like pressing plants, with technology designed in the 1930's. A compressed air line at the periphery fed some 50 asynchronous stamping machines. Periodically during the day, all the machines would trigger at the same time, and the compressed air supply was grossly inadequate, being designed only for an average pressing load. Some 50 bad disks resulted. Moreover, record manufacturers were continually downgrading the quality of their vinyl stock in order to save money. There was no quality control on recordings produced.

The technical manager at RCA in charge of pressings, well aware of the simplicity of improving quality, made a proposal to a senior VP to upgrade the pressing facilities with a corresponding increase in manufacturing cost of about \$0.25 per disk. At that time, RCA had a policy of replacing any defective disk that was returned, no questions asked, and with that replacement came three free additional disks. The VP responded to the technical manager with a challenge: collect the statistics on returned disks as evidence that customers cared about quality recordings. To make a long story short, there were no returned disks. And RCA did not upgrade their pressing plants.

In 1980, discussions about the value of the digital CD format focused exclusively on audio quality: high signal-to-noise ratio, no dust or scratches, no degradation with use, perfect concert hall transparency, flat frequency response, insignificant distortion, high channel separation, and so on. Engineers were in love with the dramatic improvement in

quality, and they were sure that the public would also appreciate it. Yet, the experience at RCA argued that consumers were indifference to quality. Who was right?

By looking at the history of the CD, we know that it was a dramatic success and that the vinyl record became a museum curiosity. Phillips and Sony we justified in their investment of \$600 million (1980 dollars) to bring the CD to market. That investment paid handsomely. But a market analysis of consumer attitudes showed that this new CD technology was valued for its longevity, for its reduced size, for its ability to be played in automobiles and portable devices, and eventually for the possibility of burning CDs at home. With the advent of computers compatibility, users now had a vast array of inexpensive and sophisticated software tools to manipulate audio tracks. Although the CD was a big hit, audio quality was not at the top of the list of important features. The secondary features made it a commercial success.

Now at the beginning of the 21st century, we can again look at the issue of audio quality by observing two branches of digital audio: the Super Audio CD (SACD) and compressed audio (MPEG). These two branches move in opposite directions. The SACD is even higher audio quality than the conventional CD, but otherwise it has the same secondary properties as an ordinary CD. Conversely, in an effort to reduce the size of audio files, to expand the amount of music that can fit on a CD, and to reduce download time, compression technology is widely used even though it degrades audio quality, especially with high compression ratios. We know which branch dominates the market. The SACD is all but dead, and most audio tracks are very compressed. Apparently, audio file size and download time is far more important than quality. Furthermore, most listeners who use headphones on cheap CD or MP3 players are experiencing yet additional forms of audio degradation. The flat frequency response of the CD is far from flat when listening in this way.

Now back to the original question about interpreting HD from an historic context. What features would induce listeners to adopt this new technology? Is it analogous to the SACD versus conventional CD, a change that only improved audio quality? Or, is it analogous to the old vinyl disk versus CD, a change that offered a large number of secondary features, (eventually) valued by listeners? These are the relevant questions for HD radio.

When making a decision to invest in a new technology, marketing research does not always formulate the correct questions. I was not smart enough to recognize that the CD's secondary features were very important and that they would have a big impact on the life-style of listeners. Consumers must perceive value in their terms, not from the perspective of the designer or manufacturer, in order to justify the effort and expense of upgrading. The CD forced consumers to upgrade their playback system and their record library, and similarly, the HD format requires listeners to upgrade their radio.

HD radio is advertised as having many advantage to listeners: reception with almost CD quality, absence of static and crackles, transmission of additional information, addition of multiple channels, but it also reduces reception range under adverse conditions. Which of

these features qualifies as having the potential to change listeners' life-style, and which are a repeat of the argument that listeners want quality audio?

I have an answer to this question, but we also know from my experience in 1980 that my track record for making accurate predictions leaves something to be desired. Nevertheless, here is my opinion. Increasing the number of audio programs available would have value if the additional channels contained programs that were not otherwise available, and if listeners have a strong desire to listen to those additional programs. Simply having a larger quantity of the same kind of programming does not have high value. If we believe my reasoning, then the success of HD depends on what the broadcasters do with their additional channels. As with the CD, secondary features, not technical elegance, drive the market. Unfortunately, producing high quality programming that is also different from conventional programs is difficult and very, very expensive. The cost of technical upgrading is trivial compared to the ongoing cost of compelling program production. In other words, HD radio cannot be evaluated as a technology; it is an enabler. And the question is what will it enable? To listeners, one radio box is equivalent to another radio box, except for differences in what comes out of the loudspeakers. HD is interesting if, and only if, those differences are relevant to listeners.