

# On the Perception of Dynamic Range in Digital Audio Quality

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*The Loudness War* is a deprecatory term used by many audiophiles for the competitiveness of the music industry to digitally master audio recordings with higher levels of perceived “loudness”. Mastering engineers often claim that making “louder” records causes undesired side-effects such as reduced dynamic range.

This study attempts to establish if a significant relationship exists between dynamic range and loudness over time through the analysis of historical digitally mastered audio recordings for different genres of music. The study also attempts to establish if a significant relationship exists between the auditory perception of dynamic range and sound quality on digitally mastered audio recordings for non-expert listeners. This was investigated through comparative audio listening tests for a sample of 20 people, which were then analysed using a two-tail T distribution test for significance.

The study concluded that while dynamic range values were decreasing; loudness values were increasing as a function of time at approximately the same rate. The study also found that there was no significant relationship between the auditory perception of dynamic range and sound quality for non-expert listeners. The study did however find that listeners on average preferred digitally mastered audio recordings with a large dynamic range when compared with digitally mastered audio that had a small dynamic range. The study also discovered disparities between male and female auditory perception and listening habits.

This study has shown that DNR and loudness are systematically linked in digitally mastered audio, and *The Loudness War* does exist. What is more worrying is the large gulf that appears to exist between expert and non-expert listener concerning the auditory perception of DNR in digital audio quality. The research has highlighted that further research in this field is essential. Non-experts must be educated about dynamic range, sound quality, loudness, and potential side-effects such as hearing damage.