Sound Quality & Jury Testing
What is sound quality?

Deliver products that fit your desired brand sound

Keep what makes it sound good

Remove what makes it sound bad
The sound quality process

Sound recording

Objective qualification:
Sound quality metrics

Subjective qualification:
Jury Testing
Audio replay & filtering

Classical analysis

2500.00 Hz
microfoon (CH1)
70.00 dB
10.00 Pa^2/Hz

5374.14 Hz
244.22 rpm
T1
110.00 dB
10.00 Pa^2/Hz
The sound quality process

Sound recording

Sound quality metrics

Classical analysis

Jury Testing
Binaural measurement systems

Binaural measurements
- Stereo recording just like human hearing
- Ideal for replay
- Requires artificial head or a binaural headset
- Can be used for direct replay
- Recorded data is automatically **equalized** for analysis

Equalization for analysis
- The effect of head and torso is removed from the recording
- The measured signal “looks” as if measured by a microphone
The sound quality process

Sound recording

Sound quality metrics

Classical analysis

Jury Testing
Why can’t we just look at microphone data?

Microphone ≠ Ear

Optical illusions ≠ Audible illusions
Why can’t we just look at microphone data?

Inner ear masking effect

- Sound frequencies trigger inner ear fluid resonance in specific locations along the cochlea
- Fluid motion triggers hair cell nerve response
- Fluid motion is saturated by dominant frequencies

Frequency masking = Inability to hear tones with close frequency spacing

Temporal masking = Inability to hear tones with close temporal spacing

Masking is the basis for MP3 sound compression!
The sound quality process

Sound recording

Sound quality metrics

Classical analysis

Jury Testing
Sound quality metrics
Objectively quantifying subjective experience

Which door slam sounds the best?
Sound quality metrics
Loudness example

Sound Pressure Level

- Quantifies sound energy heard by the listener
- Only takes into account frequency sensitivity of human ear

Loudness metrics

- Quantifies perceived loudness
- Accounts for frequency sensitivity and masking effects of human ear
- Some energy is lost!

Different sounds, same loudness

Sound Pressure Level

- Quantifies sound energy heard by the listener
- Only takes into account frequency sensitivity of human ear

Loudness metrics

- Quantifies perceived loudness
- Accounts for frequency sensitivity and masking effects of human ear
- Some energy is lost!
Demo
The sound quality process

Sound recording

Sound quality metrics

Classical analysis

Jury Testing
What is Jury Testing?

Gather subjective opinions on your product
Evaluate complex sound performance
Benchmark against competition
Check consistency and statistics

Understand the *expectations* of your customers and design the product that *exceeds* them
Which question should I ask?
A-B comparison

Juror selects preference between two sequential sounds

Goal:
- Relative comparison between products

Applications:
- Benchmarking against competition
- Ranking of design variants
- Ordering of sound pairs
Which question should I ask?
Category judgement

Juror rates sound quality on a scale related to a single descriptor (e.g. ‘sporty’ or ‘robust’)

Goal:
- Break-down the sound into impressions and feelings of the jurors

Applications:
- Standalone evaluation of product sound quality
- In-depth benchmarking against competition
- In-depth ranking of design variants
Which question should I ask?
Semantic differential

Juror rates sound quality on scale between two opposing adjectives (e.g. ‘cheap’ vs. ‘expensive’)

Goal:
- Break-down the sound into impressions and feelings of the jurors

Applications:
- Standalone evaluation of product sound quality
- In-depth benchmarking against competition
- In-depth ranking of design variants
Analyzing jury test results

Display of concordance vs. consistency. All Jurors are mapped on this X-Y graph to easily check the quality of their answers. The colors represent the answer to the question from the pie-chart.

Set of filters to be applied on the list of Jurors. The available criteria are: concordance, consistency, reference questions, statistical questions.

Pie-chart showing the percentage distribution of answers provided by Jurors. Use the drop-down to change the statistical question.

Column chart showing which sounds were preferred most. As the poor-quality results will be filtered out, the overall result will adapt.
The sound quality process

Sound recording

Objective qualification:
Sound quality metrics

Subjective qualification:
Jury Testing
Audio replay & filtering

Classical analysis