LEXICON FOR PRODUCT SOUND QUALITY

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1. INTRODUCTION

As applied to sensory evaluation methods, a lexicon is a list of terms used to describe fundamental sensory attributes of products or materials. The list is a collection of terms organized by category and subcategory that are neither consumer language nor engineer-speak. The lexicon consists of precise and succinct terms that clearly describe the perceived attribute. As part of analytical discrimination sensory methods, the lexicon provides clear and precise descriptions related to consumer acceptance to ultimately understand those characteristics that drive consumer preferences. Using proper terminology and calibrated intensity scales, sensory descriptive techniques are applied widely across several consumer products industries to characterize perceived properties.

2. CURRENT WORK

The development of a lexicon for Sound Quality is in progress under the auspices of the ANSI S12/WG36 group 3 with the following goals:

· Invite a broad cross section of sound engineers and scientists to participate in sound lexicon development workshops.

· Collect a large array of automotive sounds to serve as stimulants for term generation by workshop participants; use additional natural sources [thunder, babbling brook, animals, musical instruments, small motors, etc.] to expand the terms and use of the lexicon beyond automotive sounds.

· Develop a standard lexicon for sound with initial emphasis on automobile sounds.

· Identify current practitioners of sound quality measurement and potential users of a SQ lexicon.

· Establish a model for the underlying properties and corresponding terminology for naming sounds.

Currently lexicon interest has reached critical mass in automotive SQ so that there are adequate participants willing to meet to name attributes and build categories. An exhaustive lexicon that can be used as a model is the "Aroma and Flavor Lexicon for Sensory Evaluation". [2] Examples for the various entries for a given term are shown. Term: almond; Definition: aromatic associated with almonds, almond extract; Reference: oil of bitter almonds, almonds; Preparation: unroasted slivered almonds, baked at 190 C ° for 6 min; Example 1: marzipan; Example 2: benzaldehyde.

For the Sound Quality lexicon work, the sound stimuli are digital audio AachenHEAD binaural recordings of nature and product sounds. This catalog is supplemented by filtered and synthetic variants of the "real" sounds. For best results, sounds should be auditioned through high quality headphones to ensure everyone is listening to the same auditory event and remove any bias introduced by the acoustics of the listening room. It is beneficial to name sound characteristics independently then have participants share adjectives and look for similarity. The terms for sound description can be, but are not limited to, onomatopoeic words that immediately evoke an auditory image of the sound. An example of a term of this type can be found in "Proposal for Aurally-equivalent Acoustic Testing of Small-size Electric Motors". [3] The entry "chirp" from this small motor lexicon has the description "rising and falling amplitude modulated high-frequency sound impression". When the formant frequency lies outside the normal range of human speech, sounds are difficult to mimic. An analytic description including the period and degree of fluctuation may be appropriate when representing low frequency sound characteristics, as in the preceding reference.

3. PRELIMINARY RESULTS

For product sounds already discussed in the Lexicon working group, some distinct patterns are developing. Three groups of sound samples were explored: natural, appliance, and automobile. Descriptive terms such as flutter, hum, tick, hiss and whine were generated multiple times for different sounds. Pitch, spectrum, and time structure are important sound elements that are directly related to the naming process.

REFERENCES

[1] Meilgaard, M., Civille, G., Carr, B. *Sensory Evaluation Techniques*, CRC Press 1991

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[3] Genuit K., Bertolini T., Brass, O., Heger, S., Veil T., "Proposal for Aurally-equivalent Acoustic Testing of Small-size Electric Motors". DAGA '96 Bonn