

DuoTone®

hearing test procedure

Self-running and self-administered pure tone audiometry

Patent: EP2572640B1

Overview

DuoTone® employs pairs of pure-tone stimuli at different frequencies. Different frequency pairs are tested (along with an additional silent condition) which determine pure-tone thresholds from 125Hz up to 12000Hz. The procedure is intended to determine hearing thresholds for both frequencies of the pure-tone stimuli.

The DuoTone® procedure

3 types of stimuli

- A: contains a **continuous tone** with the lower frequency
- B: contains an **intermittent tone**, three short tones, with the higher frequency.
- C: does not contain any signal at all and represents the “**silent**” stimulus.

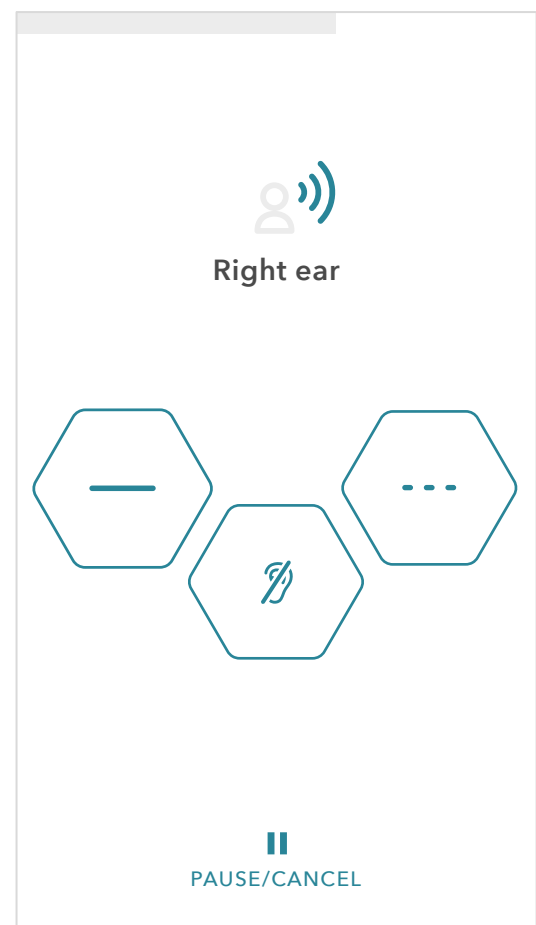
The test comprises several consecutive trials with pairs of stimuli A and B, for instance a 500Hz (continuous) tone and a 3kHz (intermittent) tone.

The role of “silent” stimulus

The subject knows that there are also silent stimuli. When one of the two stimuli (A) or (B) are delivered at an intensity level below the individual’s threshold, he will not guess between (A) and (B) but select (C).

DuoTone® has proven to be a valid procedure to measure the pure tone hearing thresholds as no statistically significant difference was found between the standard clinical procedure and the DuoTone procedure.

[Report on Antwerp Study: DuoTone® validation](#)



State of the art

The measurement of pure tone hearing thresholds is an established part of clinical hearing assessment protocols. Audiometry is essential for the diagnosis as well as for the fitting of hearing devices, if needed. Audiometry measures the capability of an individual to detect (pure) tones for a number of selected frequencies. The frequencies between 500 and 4.000 Hz are especially important since they fall in the frequency range of normal conversational speech. Therefore, Audiometry is used to identify hearing thresholds, enabling the determination of the degree of a hearing loss.

Audiometry as used in a clinical setting, is a subjective, behavioural assessment of the hearing thresholds, as it relies on the patient response to the pure tone stimuli. The presentation of the stimuli is controlled by the clinical audiologist and the test person – aka the patient - is expected to respond by pushing a button, raising the hand, giving a voice signal, or, for children, by performing an action in a play situation (play audiometry in children), if a sound is heard.

The quality of the measured pure tone thresholds, that is, by definition, the lowest sound level that was heard by the patient, not only depends on the attentiveness and cooperation of the patient, but also on the experience of the audiologist.

Behavioural audiometry is the gold standard for diagnostic procedures in clinics, but it is time consuming and requires special equipment and the presence of an audiologist.

DuoTone® procedure was developed with the intention of having a procedure that runs independently from the direct control by a test leader.

DuoTone®

- **Clinically validated**
 - **Fully software controlled**
 - **Audiologist not required**
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DuoTone®, key data generator in Jacoti HearingKit®

Jacoti HearingKit® is a software development kit (SDK) that allows the development of real-time audio applications for the purpose of processing audio to the unique hearing profile of a listener, including those with normal hearing or with hearing loss. It offers a C++ Application Programming Interface (API) which can be used to provide hearing assessment, hearing loss compensation and sound personalization on a single integrated audio system.

Jacoti HearingKit® use DuoTone® hearing test results to personalise audio according to the hearing characteristics of each user.

Jacoti

HEARING WITHOUT BARRIERS

Jacoti's hearing solutions can be deeply embedded in consumer electronics devices such as headphones and earbuds. Our technology enhances audio experiences tailored to every customer's individual needs & preferences.

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