

# Image-based and self-controlled test procedure for assessing pure-tone thresholds in children

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Conditioned play-audiometry is a well established method in pediatric audiology. However, the task (usually placing a peg in a pegboard) is varied only little and thus can result in a less reliable threshold determination. In order to enhance the child's attentiveness an image-based touch-screen controlled test procedure (MAGIC) was developed.

Different animals represent different frequencies (cow 250 Hz, bear 500 Hz, elephant 1 kHz, cat 2 kHz, sheep 3 kHz, mouse 4 kHz, bird 6 kHz, dolphin 8 kHz). Each animal was present in three variants: neutral to start the sound presentation, healthy and sick for indicating the two conditions 'heard' and 'not heard'. Before measurement, a story was told such that the child was instructed that healthy animals will make sounds and sick animals are not able to. The test procedure progress was visualized by a shelf from which the current test animal was selected. The test was performed in 108 children aged between 3;6–11;11 years. For comparison, play-audiometry pure-tone thresholds (PTA) were determined at the corresponding frequencies.

There was a highly significant ( $p < 0.001$ ) correlation between MAGIC and PTA thresholds. Mean and standard deviation of threshold differences amounted to  $-1.5$  dB and  $9.6$  dB, respectively. MAGIC test-time per frequency was on average 30s, ranging from 14s to 91s and thus was lower than PTA test-time. By using animals as visual amplifiers and using a self-controlled measuring procedure the child's attentiveness was considerably enhanced. Thus, MAGIC may provide an alternate to the commonly used procedures.