LOUDNESS CONTOURS IN LESS TIME?

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Introduction

The Loudness Contour Test (LCT) returns sound levels corresponding to the patient's perception of seven categories of loudness from "very soft" to "uncomfortably loud". Instructions plus testing two frequencies for two ears consumes 20-25 minutes of clinical time, which can be a practical problem.

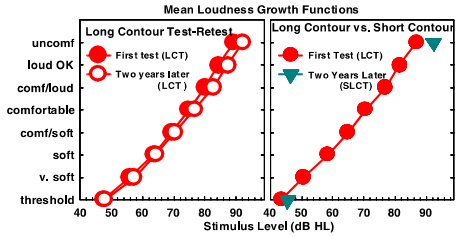
We have attempted to shorten the time required to obtain LCT data by using the Short Loudness Contour Test (SLCT). This poster reports the results of a study evaluating the extent to which the SLCT produces the same loudness growth functions as the original LCT.

The SLCT uses a similar psychophysical procedure to the LCT but only returns the "uncomfortably loud" level. Multiple regression equations derived from a large set of LCT data are then used to predict the levels for the other six loudness categories, using threshold and UCL as predictors.

Original Contour Test (LCT	Shortened Contour Test (SLCT)
Pulsed warble tones	Pulsed warble tones
Increment: 2, 2.5, or 5 dB	Increment: 2, 2.5, or 5 dB
3 or 4 ascending runs	3 or 4 ascending runs
Every run begins just above threshold	Only the 1st run begins just above threshold. Subsequent runs begin halfway between threshold and UCL
S provides a loudness category for every stimulus delivered	S waits to respond until the stimulus is judged to be a category 7 (UCL)

In this poster, we compare the accuracy of loudness functions predicted using the SLCT with predictions that are based on thresholds only. SLCT measurements are worthwhile only if they result in more accurate loudness predictions than thresholds alone. **The results show that using the SLCT will result in more accurate predicted loudness growth functions about 87% of the time.**

For Groups....



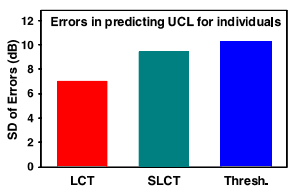
This figure shows that:

- The relationship between the LCT and SLCT (right panel) is similar to the test-retest relationship for the LCT (left panel).
- For groups of hearing impaired listeners, the mean UCL measured by the SLCT is similar to the mean UCL from the LCT.
- Thus, **the two tests give similar average UCLs.**

Determining UCL

How accurately does the SLCT predict the UCL measured by the LCT?

For Individuals.....



This figure shows the size of the prediction errors when UCL measured by the LCT is predicted from several measurements made two years later.

- The smallest errors (red) are made when the same test (LCT) is repeated to predict the earlier UCL.
- UCL prediction from the SLCT is next in accuracy (cyan).
- UCL prediction from threshold is least accurate (blue).
- **Prediction of UCL from SLCT is somewhat more accurate than prediction from threshold.**

HARL

Hearing Aid Research Lab.

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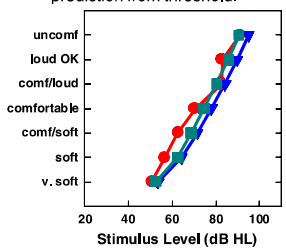
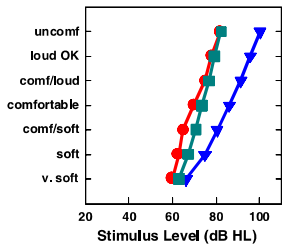
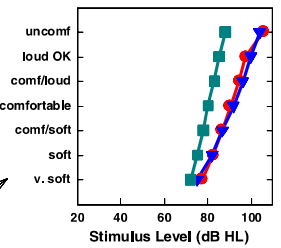
For patients with typical UCLs, using the SLCT to predict the loudness growth function did not improve accuracy over prediction from threshold.



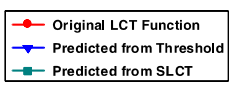
For many patients with atypical UCLs, predicting the loudness growth function using the SLCT was more accurate than predicting it from threshold.



For some patients, using the SLCT resulted in less accurate predictions of loudness growth functions than using thresholds. **This result was seen in 5 out of 40 tests (12.5%).**

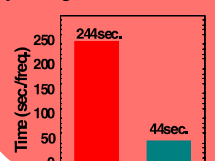


A Look at Sample Results for Individuals



Saving Time

How much time is saved by using the SLCT instead of the LCT?



The SLCT takes about 20% of the time needed for the LCT.