Introduction

• One key benefit of bilateral cochlear implant (CI) use is an increased ability to localize sound.
• Sound localization is assumed to be best when Stimulation Rate = same as clinical map (900-1200 pps)

Bilateral Loudness-Balancing (BLB)-C Levels: For electrodes in the apex, middle, and base (typically 4, 12, and 20), the C levels (most-comfortable levels) were obtained in each ear using clinically-based procedures.

Stimulus Duration = 500 ms
Stimulation Rate = same as clinical map (900-1200pps)

Unilateral loudness-balanced (ULB)-C Levels: The C levels were balanced for loudness within an ear by stimulating all three electrodes consecutively with a 500-ms interstimulus interval (ISI). The experimenter adjusted the C levels to ensure that the perceived loudness was the same across electrodes.

Bilateral loudness-balanced (BLB)-C Levels: The ULBC levels for each electrode pair were loudness balanced across the ears by stimulating each ear consecutively with a 500-ms ISI. The experimenter adjusted the C levels to ensure that the perceived loudness was the same across ears.

Results:

• Most changes from C level to BLBC level were ≤ 3 current units (CUs).
• Larger changes suggest that methods for obtaining C level may not always be bilaterally balanced for loudness.

Method:

• An electrode pair was stimulated simultaneously at the BLBC or with an ILD (+5, +10 CU)
• The auditory image(s) was/were categorized using an interface with 10 options (see Fig. 2).

Purpose:

• To determine extent of perceived offset with ILDs

Participants and Equipment

• 17 post-lingually deafened bilateral CI users (Cochlear N24, Freedom, or N5 users)
• Direct stimulation with Nucleus Implant Communicator

Participants could have different lateralization offsets (i.e., 0-CU ILD ± 0 Lateralization) at different places for BLBC levels (Figs. 6 and 7).

• Participants were consistent in lateralization experiment over multiple days.

Lateralization Experiment

Method:

• Listeners were stimulated at BLBC, and then reported the location of the perceived image (see Fig. 5).
• ILDs = 0, ±5, ±10 CU
• Repeated over three days

Results:

• 44.8% of responses were perceived as both fused images (77.8% of responses, Fig. 4). The perceived image (77.8% of responses, Fig. 4) was/were categorized using an interface with 10 options (see Fig. 2).

Purpose:

• To determine number, location, and compactness of perceived bilateral stimulation for BLBC levels

Participants were consistent in lateralization experiment over multiple days. Participants only performed one day of testing. Fits to the data were done with 4-parameter cumulative normal functions.